ACADEMIC REGULATIONS (R19)

COURSE STRUCTURE

&

DETAILED SYLLABUS

(I YEAR)

ELECTRICAL & ELECTRONICS ENGINEERING

For
B.Tech., Four Year Degree Course
(Applicable for the batches admitted from 2019-20)

LENDI INSTITUTE OF ENGINEERING AND TECHNOLOGY
An Autonomous Institution
Approved by AICTE & Permanently Affiliated to JNTUK, Kakinada
Accredited by NAAC with "A" Grade and NBA (CSE, EEE & ME)
Jonnada (Village), Denkada (Mandal), Vizianagaram Dist – 535 005
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Foreword

I am delighted to emphasize about the Academic Regulations (R20), Course Structure and syllabi for B.Tech Program of Lendi Institute of Engineering & Technology under autonomous. At the outset, I thank the Management for giving me this opportunity to share my knowledge and experience in designing the curriculum of this esteem institution. Lendi Institute of Engineering and Technology began its journey in 2008, fortified by vigorous leadership, prudent planning and investment in libraries, information technology and infrastructural facilities - the institution progressively opted for autonomy with the only purview of academic enrichment and continuous support to emerging graduates.

Days of assessing student's caliber through 'Scoring Centum' is now replaced with conceptual knowledge and professional skills to meet the industry requirements/higher education. In view of the above, this curriculum and syllabi are designed for effective implementation of the outcome-based education.

The Technical Skill Development and Employability Skill Development courses with hands on experience are introduced in the curriculum for readiness of the industry requirements. Meeting with the global requirements, to inculcate the habit of self-learning and in compliance with UGC guidelines, MOOC (Massive Open Online Course) have been introduced. As a part of curriculum in all branches of engineering, it is mandatory for all students to undergo Summer Internship at industries (core or allied) / R & D organization to get practical insight of their subject domain during summer break after the 4th semester. Further, we introduced Community Service Project in the curriculum to address the solutions of contemporary societal issues.

We strongly believe that the graduate certainly acquires analytical and critical skills with mastering factual practical knowledge through this curriculum. Working with a noble vision of the institution, mission of developing technocrats to solve the societal problems, we are working progressively towards ensuring that our students are raised to adapt to the dynamics of the future, whilst paving their way towards excellence.

I greatly aspire that this Holistic approach at Lendi will lead us to greater heights of glory in the forthcoming years ahead. I trust this syllabus would train the students in pursuit of excellence through our pioneering education model.

"Excellence is not an act, but a habit"- Aristotle.

Dr. V V Rama Reddy
Principal

About Lendi Institute of Engineering & Technology

Lendi Institute of Engineering & Technology is a premiere Institution established in 2008 by a divine body of committed intelligentsia under the aegis of Saidhamam Educational Trust of Vizianagaram to cater to the needs of young graduates of technology. It is on national highway near to both Visakhapatnam and Vizianagaram having a lush green campus with eco-friendly environment. Its aim is to create a unique scenario of eligible and elegant engineers to be brought out into the society to compete with and complete the realistic technological needs of India.

Lendi Institute of Engineering & Technology is spread to all directions with strength of over 2600+ students and above 160 faculties. Under the guidance of Dr. V.V. Rama Reddy, Principal, having three decades of teaching and administrative experience, Lendi offers ECE, EEE, CSE, CSSE, & MECH courses. Lendi is famous for its teaching traits in its debutant year itself with its efficient and experienced faculty members dedicated in teaching, best in class infrastructural facilities, encouraging students to have practical exposure, individual attention etc. Lendi offers counseling to the identified slow learners, student teacher adoption program, allocation of projects to the students during vacation for the practical exposure, supplying Manuals for lucidity in the practical work. With an in-house Training and Placement Cell, Lendi offers campus recruitment training for acquiring various job opportunities along with engineering degree.

A Few Milestones:

1. The year of Establishment of Saidhamam Educational Trust is December, 2007
2. The year of Establishment of Lendi Institute of Engineering & Technology is 2008
3. Lendi Institute of Engineering & Technology is approved by AICTE, New Delhi with five UG B.Tech Programs (ECE, EEE, CSE, ME, and CSSE) with intake of 180 for ECE & CSE, 120 for EEE & ME, 60 for CSSE and four PG M.Tech Program (Computer Science and Engineering, Embedded Systems & VLSI Design, Power System & Control Automation and Machine Design) with intake of 18 for each M.Tech Programs in the year 2019.
4. Lendi Institute of Engineering & Technology is affiliated to Jawaharlal Nehru Technological University Kakinada (JNTUK), Kakinada from 2008-2017 and is permanently affiliated to Jawaharlal Nehru Technological University Kakinada (JNTUK), Kakinada from 2018-19.
5. Lendi Institute of Engineering & Technology is accredited by NAAC with "A" Grade from June, 2017.
6. Lendi Institute of Engineering & Technology is accredited by NBA with four branches.
7. Lendi Institute of Engineering & Technology is included under the Section of UGC 2(f) & 12 (B) in the year 2018-19.
8. Lendi Institute of Engineering & Technology got conferment of Autonomous Status for 10 years by UGC & JNTUK in the year 2019.
9. Every year 625+ offers and 400+ students are placed in various reputed industries from Lendi Institute of Engineering & Technology.

10. Lendi Institute of Engineering & Technology organizes various social activities every year and it adopted nearby villages for overall skill development among students.
11. Lendi Institute of Engineering & Technology conducts various seminars/conferences/skill development programs throughout the academic cycles.
12. Lendi Institute of Engineering & Technology recognized with 'A' Grade by Andhra Pradesh State Council of Higher Education.
13. Andhra Pradesh State Skill Development Center is established at Lendi Institute of Engineering & Technology and it is recognized as Skill Development center in Vizianagaram district.

About Autonomous

1. Introduction:

The Academic Autonomy to Colleges in Higher Education is an imperative methodology to fulfill the needs of all Stakeholders of the Institution. The Engineering College promotes excellence in academics with autonomy that leads to produce globally competent engineers. Universities, with many colleges affiliated to them are unable to cater for the varied needs of individual colleges under common system, irrespective of their inherent strengths, weaknesses and locations thus affecting the academic development of individual colleges. The academic autonomy provides an opportunity for academic flexibility to periodically review the course contents and mechanisms of teaching methodologies in the light of the changing demands of the industry. The effective implementation of innovations and new academic structures to meet the societal and industrial desires shall be possible through academic autonomy of the Institution. Under autonomy, an Institute can aim at giving freedom to the faculty in curriculum design and development, preparing learning materials, bringing innovations in conduct of examinations, encouraging the research activities among the faculty and students, effective implementation of outcome based education and choice based credit systems. All these efforts go a long way for improving the performance of the students and their employability.

2. Aims and Objectives:

Quality of Education:

- To maintain this Institution as a center of excellence in technical education.
- To sustain and ameliorate the present Accreditation status by NBA, NAAC to get International Accreditations.

Academic Flexibility:

- To transfer the appropriate technology to the rural youth.
- To impart strong Engineering knowledge, technical skills and life skills to become globally competent engineer/ entrepreneur and researcher.
- To make the programme more interdisciplinary aiming at a holistic learning process.

Industry Interaction:

- To tie up with multinational industries to make the students an industry ready person.
- To encourage students to undertake projects based on market and industry needs.
- To encourage consultancy and testing to generate additional revenues.

Research & Development:

To promote research activities among students and faculty that endow with solutions to engineering problems for sustainable development of society.

Innovative Teaching-Learning Methods:

- To inculcate the self-learning skills among the students as part of life-long learning to adapt rapidly changing technology.
- To develop scientific temper among the students with socio-ethical values, leadership roles by meeting environmental and socio-economical needs.
- To design the curriculum, relevant to present day industry needs and challenges.
- To adopt innovative teaching – learning methodologies.
- To impart personality development skills among students that will help them to succeed and lead.

INSTITUTION

Vision

Producing globally competent and quality technocrats with human values for the holistic needs of industry and society.

Mission

- Creating an outstanding infrastructure and platform for enhancement of skills, knowledge and behaviour of students towards employment and higher studies.
- Providing a healthy environment for research, development and entrepreneurship, to meet the expectations of industry and society.
- Transforming the graduates to contribute to the socio-economic development and welfare of the society through value based education.

DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING

Vision

To be a hub for imparting knowledge, skills, and behaviour for exemplary contributions in the field of Electrical and Electronics Engineering

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Mission

- To impart Technical Education through the state-of-the-art infrastructure facilities, laboratories and instruction.
- To inculcate industry oriented learning through industrial visits, internships, projects at Industries, MOUs, to make students' technically skills oriented.
- Creating conducive environment for higher education, employment and entrepreneurship through quality education, professional skills and research.
- To promote societal commitment among students by inculcating moral and ethical values.

Program Educational Objectives (PEOs)

- Graduates shall have strong foundation in core and allied Electrical and Electronics Engineering, in sciences and mathematics, to become globally competent in designing, modelling and critical problem solving.
- Graduates shall involve in research activities in the field of electrical and electronics engineering through lifelong learning and provide solutions to engineering problems for sustainable development of society.
- Graduates shall have good communication skills and socio-ethical values for getting employment or higher studies by excelling in competitive examinations and be able to work in supportive and leadership roles.

Program Outcomes (POs)

1. **Engineering Knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
2. **Problem Analysis:** Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
3. **Design/Development of Solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
4. **Conduct Investigations of Complex Problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
5. **Modern Tool Usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
6. **The Engineer and Society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
7. **Environment and Sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
8. **Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
9. **Individual and Team Work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
10. **Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
11. **Project Management and Finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
12. **Life-Long Learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Program Specific Outcomes (PSOs)

1. Capable of design, develop, test, verify and implement electrical and electronics engineering systems and products.
2. Succeed in national and international competitive examinations for successful higher studies and employment.

Academic Regulations (R19) for B.Tech (U.G) Courses

The following academic regulations will be applicable to the students of B. Tech. (Regular) from the Academic Year 2019-20 under Autonomous system.

1. Eligibility for Admission:

a. **I Year B.Tech (U.G):** The total seats available as per the AICTE approved intake are grouped into two categories (i.e) Category A and Category B in the ratio of 70:30 as per Andhra Pradesh State Council for Higher Education (APSCHE) in consonance with government reservation policy.

- Under Category A: 70% of the seats are filled through EAMCET counseling.
- Under Category B: 30% seats are filled based on 10+2 merits in compliance with guidelines of APSCHE.

b. **II Year B.Tech (U.G):** Under Lateral Entry Scheme students with Diploma/B.Sc qualification have an option of direct admission into 2nd year B.Tech. (Lateral Entry Scheme). Under this scheme 10% seats of sanctioned intake will be available in each course as supernumerary seats as per Andhra Pradesh State Council for Higher Education (APSCHE). Admissions to this three year B.Tech Lateral Entry Programme take place through ECET as per government policy.

2. Duration of the Programme:

a. **B.Tech(U.G):** The course duration for the award of the Degree in Bachelor of Technology will be 4 academic years, with two semesters in each year. However, if a student is unable to complete the course within 4 years, he/she can do so by giving more attempts but within 8 consecutive academic years from the date of admission.

b. **B.Tech (U.G) Under Lateral Entry:**The course duration for the award of the Degree in Bachelor of Technology will be 3 academic years, with two semesters in each year. However, if a student is unable to complete the course within 3 years, he/she can do so by giving more attempts but within 6 consecutive academic years from the date of admission.

3. Definition of Credit:

1 Hr. Lecture (L) per week	1 credit
1 Hr. Tutorial (T) per week	1 credit
1 Hr. Practical (P) per week	0.5credits

4. Award of B. Tech. Degree

A student will be declared eligible for the award of B. Tech. Degree if he/she fulfills the following academic regulations:

a. Student pursues a course of study in not less than four and not more than eight academic years.

b. The Student shall register for 160 credits and secure all the 160 credits.

5. Courses of Study

The following courses of study are offered at present as specializations for the B. Tech. Courses with English as medium of Instruction.

S. No	Branch	Branch Code
01	Electrical and Electronics Engineering	EEE
02	Mechanical Engineering	MEC
03	Electronics and Communication Engineering	ECE
04	Computer Science and Engineering	CSE
05	Computer Science and Systems Engineering	CSS

6. Structure of Undergraduate Engineering Program

S. No.	Category	Suggested Breakup of Credits (Total 160)				
		CSE	**CSS**	**ECE**	**EEE**	**ME**
1	Basic Science Courses(BS)	21.5	20.5	20	21	21
2	Engineering Science Courses(ES)	18.5	19.5	19	20.5	16
3	Humanities, Social Sciences including Management(HM)	12	12	15	9	9
4	Professional Core Courses (PC)	71.5	71.5	72.5	73	77.5
5	Professional Elective Courses (PE)	15	15	15	15	15
6	Open Elective Courses(OE)	9	9	6	9	9
7	Project Work (PJ)	12.5	12.5	12.5	12.5	12.5
8	Mandatory Courses (MC)	(non-credit)				
9	Skill Development Courses(SD)	(non-credit)				
10	MOOCS	(non-credit)				
11	Summer Internships Course(SI)	(non-credit)				
Total		160				

7. Program Structure, Method of Evaluation &Distribution and Weightage of Marks

The Outcome Based Curriculum Structure consists of courses of study viz. Theory, Practical, Drawing, Socially relevant projects, Mini project, Project, Mandatory courses, MOOCs, Summer Internship. Under Choice Based Credit System (CBCS), the students also have the flexibility to choose one elective from the list of open electives offered by other branches of engineering technology in consultation with their respective departments.

a. Theory Subject: The performance of a student in each semester shall be evaluated subject–wise with a maximum of 100 marks for theory subject. The distribution shall be 30 marks for Internal Evaluation and 70 marks for the Semester End - Examinations.

(i) Internal Evaluation:

i. The weight age of internal marks for 30 consists of Descriptive–20 and Assignment-10(Theory).
ii. Two descriptive examinations shall be conducted during the semester for theory subjects.
iii. As the syllabus is framed for 5 units, the 1st and 2nd mid examinations (Descriptive exam) are conducted on 1-2½ units and 2½ -5 units respectively for each subject in a semester. The mid examination (Descriptive exam) question paper shall contain 3 questions and all questions need to be answered in90 minute's duration for 30 marks. Further, each mid examination marks shall be scale down to 10 marks.
iv. Assignments: The weightage of Assignments is 10 marks during the semester for each theory subjects. However, maximum of 2 marks shall be given for each unit.
v. Internal Marks can be calculated for 30 marks by adding the marks of 1st mid, 2ndmid and Assignments.

(ii) Semester End -Evaluation:

i. The end semester examination is conducted covering the topics of all Units for 70 marks. And the question paper contains 5 Questions with internal choice.
ii. The question paper contains 5 Questions with internal choice. A student should be answered all Questions and each carrying14marks.

b. Practical Subject: The performance of a student in each semester shall be evaluated subject–wise with a maximum of 75 marks for practical subject. For practical subjects there shall be continuous evaluation during the semester for 25 internal marks and 50 end examination marks.

(i) **Internal Evaluation:** Theinternal25marksshallbeawarded as follows: day to day work - 10 marks, Record-5 marks and the remaining10 marks to be awarded by conducting an internal laboratory test.

(ii) **External Evaluation:** The end examination shall be conducted by the teacher concerned and an external examiner nominated by the Controller of Examinations (CoE).

c. Project Work:

The project work shall be carried out batch wise by the students during the 8th semester. Internal evaluation shall be done by the Project Review Committee (PRC), comprised of HOD, project coordinator and two senior faculty members along with the project supervisor.

Semester end evaluation of project work shall be done by the Project Evaluation Committee (PEC) comprised of three members which include - Head of Department, Project Guide and an External Examiner nominated by the CoE.

The performance of a student in Project work shall be evaluated for a maximum of 200 marks - out of which 60 marks shall be allocated for the Internal Evaluation and 140 marks for the External Evaluation.

(i) Internal Evaluation: The Internal evaluation is comprised of series of Presentations by each student about his/her project work - evaluated by the PRC.

(ii) **External Evaluation:** The End Semester Examination (Viva – Voce) shall be conducted by the PEC.

d. Design/Drawing Subjects: For the subject having design and / or drawing, (such as Engineering Graphics, Engineering Drawing, Machine Drawing) and estimation, the distribution shall be 30 marks for internal evaluation (20 marks for day – to – day work, and 10 marks for internal tests) and 70 marks for end examination.

(i) Internal Evaluation:

There shall be two internal tests in a Semester and the Marks for 10 can be calculated with 50% weightage for each of two tests and these are to be added to the marks obtained in day to day work.

(ii) Semester End -Evaluation:

a. The end semester examination is conducted covering the topics of all Units for 70 marks. And the question paper contains 5 Questions with internal choice.
b. The question paper contains 5 Questions with internal choice. A student should be answered all Questions and each carrying 14 marks.

e. Mini project:

The curriculum offers Mini Projects for the students during 6^{th}-7^{th} semester. They will be divided into batches and the report will be evaluated by a committee as nominated by HOD constituted with members.

In case of Mini Project, the performance of a student shall be evaluated with a maximum of 50 marks comprised of 20 marks for internal evaluation and 30 marks for external evaluation. Such that:

A) **Continuous Internal Evaluation is comprised of**:
- i) Report submission : 10 Marks
- ii) Seminar : 10 Marks

B) Ex**ternal Evaluation is comprised of:**
- i) Final Presentation : 20 Marks
- ii) Viva-voce : 10 Marks

For External Evaluation, BoS chairman shall appoint **an external examiner drawn** from other institutions in association with an **internal committee** appointed by the BoS chairman.

Student shall be declared to have passed the Mini Project only when he/she secures 40% or more of the final 50 marks.

In case, the student fails, a re-examination shall be conducted for failed candidates after every six months/ Next semester.

f. Mandatory Courses/ Skill Development Courses:

Mandatory/ Skill Development courses are those among the compulsory courses that does not carry any credits.

1. All the Regular and Lateral Entry students shall complete the mandatory courses on par with other regular courses.

2. Mandatory /Skill Development Courses shall be either Theory Courses or Laboratory Courses carrying a weight age of 50 Marks

3. The weight age of 50 Marks for Mandatory Theory Courses is split in the following order:

i) Descriptive Examinations (Mid-1 and Mid-2) -30 Marks
ii) Objective Examinations -10 Marks
iii) Assignments -10 Marks

3.1) Two Descriptive Examinations shall be conducted during the semester for all theory Mandatory Courses.

3.2) As the syllabus is comprised of 5 units, 1st and 2nd Mid (Descriptive) examinations shall be conducted for first 2½ units and remaining 2½ units respectively for each subject in a particular semester.

3.3) Mid Examination shall be conducted for 30 Marks of 90 Minutes duration; it shall comprise 3 questions from different units, student shall answer all three questions. Further marks obtained shall be scaled down to 15 Marks.

3.4) Objective Examination shall be conducted for 10 Marks of 20 minutes duration: it shall comprise 20 Multiple Choice Questions with a weight age of ½ Mark each.

3.5) Weight age for Assignments is 10 marks; a maximum of 2 Marks shall be given to each assignment from every unit.

4. In case of Laboratory Course (under mandatory/Skill Development courses)-weight age of 50 Marks shall Include Continuous Internal Evaluation of 20 Internal Marks and Semester End Internal evaluation of 30 Marks.

A) **Continuous Internal Evaluation is comprised of**:

i) Day to Day Evaluation : **10 Marks**
ii) Record : **10 Marks**

B) **Semester End Internal Evaluation is comprised of Internal Examination for 20 Marks and Viva –Voce for 10 Marks**

5. Final results for Mandatory Courses shall be indicated as "Satisfactory" and shall not be considered for calculation of CGPA.

6. A student shall be declared to have passed Mandatory Courses only when he/she secures 40% or more in the final marks. In case of failure, a student shall appear for a Descriptive Re-Examination at every six months/ Next Semester at a mutually convenient date for the Institution/Students.

7. In case of Re-Examination, only Internal Evaluation shall be conducted and No External Evaluation shall be conducted.

≥ 40%	SA	Satisfactory	**0**
<40%	**US**	**Un-Satisfactory**	**0**

g. MOOCs: Meeting with the global requirements, to inculcate the habit of self-learning and in compliance with UGC guidelines, MOOC (Massive Open Online Course) have been introduced.

i. All departments will declare the list of the courses at the beginning of the semester, with duration of minimum of 8 weeks in a given semester.

ii. Course content for the selected MOOCs shall be drawn from respective MOOCs links or shall be supplied by the department. Course will be mentored by faculty members and assessment & evaluation of the courses shall be done by the department.

iii. A student should complete at least two MOOCs courses with minimum 8 weeks duration and no credits will be awarded upon successful completion of each MOOCs.

iv. The results will be indicated with "Satisfactory" and it will not be accounted for the calculation of CGPA.

h. Summer Internship: As a part of curriculum in all branches of engineering, it is mandatory for all students to undergo two summer internship programme at industries (core or allied) / R & D organization to get practical insight of their subject domain during summer break after the 4^{th} semester.

i. The summer internship programme shall be availed to a minimum duration of 4 weeks.

ii. Student should submit the report after completion of Summer Internship and the assessment shall be carried out with internal experts leading to "Satisfactory" and "Non-Satisfactory Performance" and it will not be accounted for the calculation of CGPA.

i. Socially Relevant Project: The curriculum offers Socially Relevant Project for the students during 4^{th}-6^{th} semester. They will be divided into batches and the report will be evaluated by a committee as nominated by HOD constituted with internal members.

Internal Evaluation: The performance of a student shall be evaluated with a maximum of 25 marks for Socially Relevant Project work.

i. The Internal Evaluation shall be on the basis of two seminars and report given by each student on the topic of his project and evaluated by an internal committee as nominated by HOD constituted with members.

ii. Student shall be declared to have passed the Socially Relevant Project only when he/she secures 40% or more in the final marks. In case, the student fails, a re-examination shall be conducted for failed candidates every six

months/semester at a mutually convenient date of the college/students.

iii. The internal evaluation will be conducted. No external evaluation will be conducted.

j. Induction Program: Induction Program will be conducted before commencement of I year I semester class work with 3 weeks duration. If the student is admitted after induction program, then college will arrange induction program classes in the free hours.

i. Student should attend the induction program with 75% of attendance.

ii. Student should submit the report after completion of induction program and the assessment shall be carried out with internal experts leading to "Satisfactory" and "Non-Satisfactory Performance" and it will not be accounted for the calculation of CGPA.

iii. Student shall be declared to have passed the Induction Program only when he/she secures 40% or more in the final marks. In case, the student fails, a re-examination shall be conducted for failed candidates every six months/semester at a mutually convenient date of the college/students.

iv. The internal evaluation will be conducted. No external evaluation will be conducted.

≥ 40%	SA	Satisfactory	**0**
<40%	**US**	**Un-Satisfactory**	**0**

No	**Course**	**Credits**	**Marks for Assessment**	
			Internal	**Semester End**
1	Theory Course	2-4	30	70
2	Laboratory	1-3	25	50
3	Drawing Course	2.5	30	70
4	Elective Courses	3	30	70
5	Socially Relevant Course	0.5	25	-
6	Mini Project	4	50	-
7	Project Work	8	60	140
8	Summer Internship	0	50	-
9	Mandatory Courses	0	50	-
10	MOOCs	0	100	-
11	Skill Development Courses	0	50	-
12	Induction Program	0	50	-

8. Attendance Requirements

a. A student is eligible to write the semester examinations if he acquires a minimum of 75% of attendance in aggregate of all the subjects.
b. Condonation of shortage of attendance in aggregate up to 10% (65% and above and below 75%) in each semester may be granted by the College Academic Committee. Further, he acquires a minimum of 50% of attendance in each the subject.
c. Shortage of attendance below 65% in aggregate shall not be condoned.
d. Students whose shortage of attendance is not condoned in any semester are not eligible to write their corresponding end semester examination.
e. The maximum number of times a student can avail condonation should be 3 times in all the 8 semesters.
f. A stipulated fee shall be payable towards condonation of shortage of attendance.
g. A student who is short of attendance in semester may seek re-admission into that semester when offered within 4 weeks from the date of the commencement of class work.
h. A student will be promoted to the next semester if he/she satisfies the (a) attendance requirement of the present semester and (b) minimum required credits.
i. If any candidate fulfills the attendance requirement in the present semester, he shall not be eligible for readmission into the same class.

9. Minimum Academic Requirements

The following academic requirements have to be satisfied in addition to the attendance requirements mentioned in item no 8.

a. A student is deemed to have satisfied the minimum academic requirements if he/she has earned the credits allotted to each theory/practical design/drawing subject/project by securing not less than 35% of marks in the end semester exam, and minimum 40% of marks in the sum total of the internal marks and end semester examination marks.

b. A student shall be promoted from first year to second year if he fulfills the minimum attendance requirement.

c. A student will be promoted from II year to III year if he fulfills the academic requirement of 40% of the credits up to either II year I semester or II year II semester from all the examinations, whether or not the candidate takes the examinations and secures prescribed minimum attendance in II year II semester.

d. A student shall be promoted from III year to IV year if he fulfills the academic requirements of 40% of the credits up to either III year I semester or III year II semester from all the examinations, whether or not the candidate takes the examinations and secures prescribed minimum attendance in III year II semester.

e. A student shall register and put up minimum attendance in all 160 credits and earn all 160 credits.

10. Course Pattern

a. The entire course of study is for four academic years; all the years are on semester pattern.
b. A student eligible to appear for the end semester examination in a subject, but absent from it or has failed in the end semester examination, may write the exam in that subject when conducted next.
c. When a student is detained for lack of credits / shortage of attendance, he/she may be re-admitted into the same semester / year in which he has been detained. However, the academic regulations under which he/she was first admitted shall continue to be applicable to him/her.

11. Cumulative Grade Point Average (CGPA)

Marks Range Theory (Max – 100)	Marks Range Lab (Max – 75)	Letter Grade	Level	Grade Point
≥ 90	≥ 67	O	Outstanding	10
≥80 to <90	≥60 to <67	S	Excellent	9
≥70 to <80	≥52 to <60	A	Very Good	8
≥60 to <70	≥45 to <52	B	Good	7
≥50 to <60	≥37 to <45	C	Fair	6
≥40 to <50	≥30 to <37	D	Satisfactory	5
<40	<30	F	Fail	0
			Absent	0

Computation of SGPA

The following procedure is to be adopted to compute the Semester Grade Point Average. (SGPA) and Cumulative Grade Point Average (CGPA):

The SGPA is the ratio of sum of the product of the number of credits with the grade points scored by a student in all the courses taken by a student and the sum of the number of credits of all the courses undergone by a student, i.e.,

SGPA (Si) = $\sum$ (Ci X Gi) / $\sum$ Ci

Where Ci is the number of credits of the i^{th} course and Gi is the grade point scored by the student in the i^{th} course.

Computation of CGPA

- The CGPA is also calculated in the same manner taking into account all the courses undergone by a student over all the semester of a programme,
  i.e. CGPA = $\sum$ (Ci X Si) / $\sum$ Ci Where Si is the SGPA of the i^{th} semester and Ci is the total number of credits in that semester.
- The SGPA and CGPA shall be rounded off to 2 decimal points and reported in the transcripts.
- Equivalent Percentage =(CGPA-0.75)x10

12. Award of Class

After a student has satisfied the requirements prescribed for the completion of the program and are eligible for the award of B.Tech. Degree, he/she shall be placed in one of the following four classes:

Class Awarded	CGPA to be secured	
First Class with Distinction	≥ 7.75 (without any backlogs)	**From the CGPA secured from 160 Credits.**
First Class	≥ 6.75	
Second Class	≥ 5.75 to < 6.75	
Pass Class	≥ 5.00 to < 5.75	

13. Minimum Instruction Days

For all the eight semesters a common academic calendar shall be followed in each semester by having sixteen weeks of instruction, one week for the conduct of practical exams and with three weeks for theory examinations and evaluation. Further, the minimum instruction days for each semester shall be 90 days. Dates for registration, sectional and end semester examinations shall be notified in the academic calendar of every semester. The schedule for the conduct of all the curricular and co-curricular activities shall be notified in the academic plan.

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

15. With holding of Results: If any case of indiscipline is pending against him, the result of the student will be withheld. His degree will be withheld in such cases.

16. Transitory Regulations

a. Discontinued or detained candidates are eligible for readmission in the next following academic years.

b. A student in one academic regulation of JNTUK, detained due to lack of required number of credits or percentage of attendance at the end of any semester is permitted to take re-admission at appropriate level in any other scheme prevailing in the institute subject to the following rules and regulations.

   i. Student shall pass all the courses in the earlier scheme of JNTUK. However, in case of having backlog courses, they shall be cleared by appearing for supplementary examinations conducted by JNTUK from time to time.

   ii. After readmission, the student is required to study the courses as prescribed in the JNTUK regulations for the re-admitted program at that level and thereafter.

c. A student in one academic regulation under autonomous, detained due to lack of required number of credits or percentage of attendance at the end of any semester is permitted to take re-admission at appropriate level in any other scheme prevailing in the institute subject to the following rules and regulations.

   i. Student shall pass all the courses in the earlier scheme. However, in case of having

backlog courses, they shall be cleared by appearing for supplementary examinations conducted by college in their regulations from time to time.

ii. After readmission, the student is required to study the courses as prescribed in the new regulations for the re-admitted program at that level and thereafter.

iii. If the student has already passed any courses of readmitted program in the earlier regulation/semester of study, such courses are exempted.

iv. The courses that are not done in the earlier regulations/semester as compared with readmitted program need to be cleared after readmission by appearing for the examinations conducted time to time under the new regulations.

v. In general, after transition, course composition and number of credits/semester shall be balanced between old and new regulations on case to case basis.

vi. In case the students who do not have option of acquiring required credits with the existing courses offered as per the curriculum under autonomy, credit balance can be achieved by clearing the additional/substitute courses offered.

d. (i) In case of transferred students from other Universities, the credits shall be transferred to this institution as per the academic regulations and course structure of this institution**.**

(ii)The students seeking transfer to colleges affiliated to JNTUK from various other Universities / Institutions have to obtain the credits of any equivalent subjects as prescribed by this institution. In addition, the transferred candidates have to pass the failed subjects at the earlier institute with already obtained sectional marks to be conducted by this institution.

e. The decision of the Principal is final on any other clarification in this regard.

17. General

a. Wherever the words “he”, “him”, “his”, occur in the regulations, they include “she”, “her”, “hers”.

b. The academic regulation should be read as a whole for the purpose of any interpretation.

c. In case of any doubt or ambiguity in the interpretation of the above rules, the decision of the Institute academic counsel is final.

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

Academic Regulations for B. Tech. (Lateral Entry Scheme)

The following academic regulation will be applicable for the students admitted into II year B. Tech. from the Academic Year 2020-21 onwards.

1. **Eligibility for Admission**:

   II Year B.Tech (U.G): Under Lateral Entry Scheme students with Diploma / B.Sc qualification have an option of direct admission into 2nd year B.Tech. (Lateral Entry Scheme). Under this scheme 10% seats of sanctioned intake will be available in each course as supernumerary seats as per Andhra Pradesh State Council for Higher Education (APSCHE). Admissions to this three year B.Tech Later Entry Programme will be through ECET as per government policy..

2. **Award of B. Tech. Degree**

   A student will be declared eligible for the award of B. Tech. Degree if he fulfills the following academic regulations:

a. A student shall be declared eligible for the award of the B. Tech Degree, if he pursues a course of study in not less than three academic years and not more than six academic years.

b. The candidate shall register for 120 credits and secure all the 120 credits.

3. TheattendanceregulationsofB.Tech.(Regular)shallbeapplicabletoB.Tech.

4. **Promotion Rule**

   a. A student shall be promoted from second year to third year if he fulfills the minimum attendance requirement.

   b. A student shall be promoted from III year to IV year if he fulfills the academic requirements of 40% of the credits up to either III year I semester or III year II semester from all the examinations, whether or not the candidate takes the examinations and secures prescribed minimum attendance in III year II semester.

5. **Award of Class**

   After a student has satisfied the requirement prescribed for the completion of the program and is eligible for the award of B.Tech. Degree, he shall be placed in one of the following four classes:

Class Awarded	CGPA to be secured	
First Class with Distinction	≥ 7.75 (without any backlogs)	**From the CGPA secured from120 Credits from II Year to IV Year**
First Class	≥ 6.75	
Second Class	≥ 5.75 to < 6.75	
Pass Class	≥ 5.00 to < 5.75	

   The marks obtained in the internal evaluation and the end semester examination shall be shown separately in the marks memorandum.

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

I Year –I Semester

Subject Code	Subject Name	L	T	P	C
R19BSH-MA1102	Linear Algebra and Ordinary Differential Equations	3	0	0	3

Course Objectives:

- This course is designed to equip the students with the necessary Mathematical skills and techniques that are essential for an engineering course.
- To enlighten the learners in the concept of Linear Algebra and Calculus.
- To furnish the learners with basic concepts and techniques at plus two level to lead them into advanced level by handling various real world applications.

Course Outcomes:

At the end of the course, the student will be able to

1. Apply the matrix algebra techniques to engineering applications(L3)
2. Apply the concepts of eigen values and eigen vectors to free vibration of a two mass system(L3).
3. Apply mean value theorems to real world problems (L3).
4. Apply the first order ordinary differential equations to solve various engineering problems(L3).
5. Apply the higher order ordinary differential equations to solve various engineering problems(L3).

Unit I

Matrix Operations and Solving Systems of Linear Equations:

Rank: Rank of a matrix, echelon form and normal form of a matrix, finding the non singular matrices P, Q of a matrix A such that PAQ is in normal form.

Linear Equations: Solving system of homogeneous and non-homogeneous linear equations using-Row-Rank Method, Direct Methods (Gauss elimination method, Gauss Jordan method) and Iterative methods (Jacobi's iteration method, Gauss Seidel method).

Application: Finding the current in an electrical circuit.

Unit II

Eigen values, Eigen vectors and Quadratic forms:

Eigen values and Eigen vectors: Eigen values and Eigen vectors and their properties (without proofs), diagonalisation of a matrix, Cayley-Hamilton theorem (without proof), finding inverse and power of a matrix by using Cayley-Hamilton theorem.

Quadratic forms: Quadratic forms, reduction of quadratic form to canonical form by orthogonal transformation, rank, index and signature of a quadratic form, Sylvester's law of inertia (without proof), nature of the quadratic forms.

Application: Free vibration of two mass systems.

Unit III

Mean Value Theorems & Sequences and Series (without proofs):

Mean Value Theorems: Rolle 's theorem, Lagrange's mean value theorem, Cauchy's mean value theorem, Taylor's and Maclaurin's theorems with remainders.

Sequences and Series: Sequence, series, convergence and divergence of series, geometric series, auxiliary series, comparison tests, ratio test, integral test, Cauchy's root test, Raabe's test, alternating series, Leibnitz test, absolute and conditional convergence.

Unit IV

Differential Equations of First Order and First Degree : Linear and Bernouill's differential equations, exact differential equations and differential equations reducible to exact equations.

Application: Orthogonal trajectories, simple electrical circuits.

Unit V

Linear Differential Equations of Higher Order: Definitions, complete solution, operator D, rules for finding complementary function, inverse operator, rules for finding particular integral (The RHS term of the type e^{ax} , Sin ax, cos ax, polynomial in x, e^{ax} V(x), xV(x)), method of variation of parameters, simultaneous linear equations with constant coefficients using direct elimination method.

Applications: L-C-R Circuits.

Textbooks

1. B. S. Grewal, Higher Engineering Mathematics, 44/e, Khanna Publishers, 2017.

References

1. Erwin Kreyszig, Advanced Engineering Mathematics, 10/e, John Wiley & Sons, 2011.
2. R. K. Jain and S. R. K. Iyengar, Advanced Engineering Mathematics, 3/e, Alpha Science International Ltd., 2002.
3. George B. Thomas, Maurice D. Weir and Joel Hass, Thomas Calculus, 13/e, Pearson Publishers, 2013.
4. Glyn James, Advanced Modern Engineering Mathematics, 4/e, Pearson publishers, 2011.
5. Michael Greenberg, Advanced Engineering Mathematics, 2/e, Pearson, 2018.
6. W. E. Boyce and R. C. DiPrima, Elementary Differential Equations and Boundary Value Problems, 9/e, Wiley India, 2009.

COURSE OUTCOMES VS POs & PSOs MAPPING (DETAILED; HIGH:3; MEDIUM:2; LOW:1):

CO No.	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	3	3	1	1	1	-	-	-	2	2	-	1	-	2
CO2	3	3	1	1	1	-	-	-	2	2	-	1	-	2
CO3	3	3	1	1	1	-	-	-	2	2	-	1	-	2
CO4	3	3	1	1	1	-	-	-	2	2	-	1	-	2
CO5	3	3	1	1	1	-	-	-	2	2	-	1	-	2
CO*	3	3	1	1	1	-	-	-	2	2	-	1	-	2

** For Entire Course, CO vs. PO-PSO Mapping*

I Year –I Semester Syllabus

Subject Code	Subject Name	L	T	P	C
R19BSH- EN1101	English	3	0	0	3

Course Objectives:

- Educate students in the acquisition of the English language through the study of literature and other contemporary forms of culture.
- Help students to explore literature in order to learn how the world works to understand the complex dynamics of human interpersonal relationships.
- Promote the development of empathy by engaging students in a discussion of literary works, highlighting the emotional aspects of the pieces.
- Assist students in the development of intellectual flexibility, creativity, and cultural literacy by involving them in life-long learning.
- Acquire a wide range of vocabulary, an understanding of grammar and knowledge to demonstrate students' ability to think creatively in order to express effectively.

Course Outcomes:

At the end of the course, the student will be able to:

1. Understand the value of Human Conduct for career development through life skills: Ethics & Values and use root words and Prepositions without errors. Gain reading skills for comprehension, specific information, gist, and pleasure through extensive reading(L2)
2. Observe the significance of imagery in poetry to use it in real-time contexts and learn to use and misuse of Articles, Prefixes, Suffixes, and Punctuations. Gain reading skills for comprehension, specific information, gist, and pleasure through extensive reading(L1)
3. Acquire conversation skills through drama and enhance the correct use of Nouns, Pronouns, Verbs and Concord to write paragraphs effectively. Gain reading skills for comprehension, specific information, gist, and pleasure through extensive reading(L1)
4. Develop reading for inspiration, interpretation & innovation and learn to use modifiers, synonyms and antonyms to write essays effectively. Gain reading skills for comprehension, specific information, gist, and pleasure through extensive reading(L3)
5. Learn meaningful use of language by avoiding meaningless clichés, bureaucratic euphemisms and academic jargon in order to acquire the skill of summarizing. Gain reading skills for comprehension, specific information, gist, and pleasure through extensive reading(L1)

Unit I

On the Conduct of Life: William Hazlitt-**Reading**; **Grammar**-Prepositions; **Vocabulary**-Word Formation-I; Introduction to Word Formation; **Writing**-Clauses and Sentences; **Life-Skills**: Values and Ethics. If-- Rudyard Kipling.

Wings of Fire" An Autobiography of Dr.APJ Abdul Kalam--1. Strong Roots--2.Early Influences-3.Education Provides a Solid Foundation-for Extensive reading-Reading for Pleasure-Information and General Understanding

Unit II

The Brook: Alfred Tennyson: Reading; Grammar-Articles; **Vocabulary**-Word Formation-II: Root Words from Other Languages; **Writing**-Punctuation; **Life-Skills**: Self-Improvement. How I Became a Public Speaker:George Bernard Shaw.

Wings of Fire" An Autobiography of Dr.APJ Abdul Kalam--4.Preparing to Start a Career--5.Work Begins in Earnest--6. From Hovercraft to Rockets -for Extensive reading-Reading for Pleasure-Information and General Understanding

Unit III

The Death Trap: Saki: Reading; Grammar-Noun-Pronoun Agreement-Subject-Verb Agreement; **Vocabulary**-Word Formation-III: Prefixes and Suffixes from Other Languages; **Writing**-Principal of Good Writing-Paragraph Writing; **Life-Skills**: Time Management- On Saving Time: Seneca

Wings of Fire" An Autobiography of Dr.APJ Abdul Kalam--7.Adding Momentum to Space Research--8.Balancing Defence Technology with Space Research--for Extensive reading-Reading for Pleasure-Information and General Understanding

Unit IV

Chindu Yellamma: Reading; Grammar-Misplaced Modifiers; **Vocabulary**-Synonyms & Antonyms; **Writing**-Essay Writing; **Life-Skills**: Innovations. Muhammad Yunus.

Wings of Fire" An Autobiography of Dr.APJ Abdul Kalam--9. Dreaming of Satellites--10.The End of an Era--for Extensive reading-Reading for Pleasure-Information and General Understanding

Unit V

Politics and the English Language-George Orwell: Reading; Grammar-Cliches and Redundancies; **Vocabulary**-Common Abbreviations; **Writing**-Writing a summary; **Life-Skills**: Motivation- The Dancer with a White Parasol: Ranjana Deva

Wings of Fire" An Autobiography of Dr.APJ Abdul Kalam--11. Leading a Team--12. Dear ones Pass On--for Extensive reading-Reading for Pleasure-Information and General Understanding

Textbooks:

1. Language and Life -A skills Approach by Orient Black Swan.
2. Wings of Fire An Autobiography APJ Abdula Kalam with Arun Tiwari Abridged by Universities Press

Online References:

1. https://www.gradesaver.com/the-poetry-of-dh-lawrence/study-guide/summary
2. https://englicist.com/notes/summary-where-the-mind-is-without-fear-rabindranath-tagore.
3. http://www.authorstream.com/Presentation/cse1amity-2314117-stench-kerosene-amrita-pritam/.
4. https://www.poemhunter.com/poem/dream-love-8/comments/
5. https://www.poetryfoundation.org/collections

COURSE OUTCOMES VS POs & PSOs MAPPING (DETAILED; HIGH:3; MEDIUM:2; LOW:1):

CO No.	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	-	-	-	-	-	2	-	2	-	3	-	2	-	3
CO2	-	2	-	-	-	2	2	-	-	3	-	2	-	3
CO3	-	2	-	-	-	-	2	-	2	3	-	2	-	3
CO4	2	-	-	-	-	2	2	-	2	3	-	2	-	3
CO5	2	-	-	-	-	2	2	-	2	3	-	2	-	3
CO*	2	2	-	-	-	2	2	2	2	3	-	2	-	3

** For Entire Course, CO vs. PO-PSO Mapping*

I Year –I Semester Syllabus

Subject Code	Subject Name	L	T	P	C
R19BSH- CH1101	Engineering Chemistry	3	0	0	3

Course Objectives:

- To familiarize various properties and applications of polymers.
- To aware on factors influencing rate of corrosion and different methods for control of corrosion.
- To impart knowledge on the basic concepts of battery technology.
- To demonstrate the construction of photovoltaic cells.
- To introduce different types of Nano materials and importance of green chemistry.

Course Outcomes:

At the end of the course, the student will be able to:

1. Distinguish thermoplastics, thermosetting plastics and elastomers (L2)
2. Design the metallic materials to prevent the corrosion(L3)
3. Discuss the working principle and applications of primary, secondary battery cells, fuel cells and Photo Voltaic Cell(L2)
4. Understand the applications of superconductors semiconductors and storage devices(L2)
5. Illustrate the preparation, properties and applications of Nano materials and importance of green chemistry(L2)

Unit I

Polymer Chemistry: Introduction to polymers, functionality of monomers, chain growth, step growth polymerization - coordination polymerization and copolymerization- mechanism of polymerisation - Free radical, anionic and cationic. Stereo regular polymers

Plastics: Thermoplastics and Thermosettings, compounding of plastic, Preparation, properties and applications of – Bakelite, Urea-Formaldehyde, Nylon-66.

Elastomers: Preparation, properties and applications of Buna-S, Buna-N.

Applications:

1. Polymers also used in automobile industries for making body panel, vision window.
2. Polymers used for making house hold purpose articles like water bottles, refrigerator components, curtains, dining table cloths and carrier bags.
3. Polymers used in bulletproof vests, bullet proof cars and fire-resistant jackets.

Unit II

Corrosion Technology: Introduction to corrosion, wet/electrochemical theory of corrosion, metal oxide formation by dry/ chemical corrosion, Pilling Bedworth rule, galvanic corrosion, differential aeration cell corrosion - water line corrosion, pitting corrosion, factors affecting corrosion rate, corrosion control methods – corrosion inhibitors, cathodic and anodic protection, metallic coatings (Galvanizing, tinning, electroplating).

Applications:

1. To control corrosion of various machines used in large scale industries.

2. Control of corrosion by using paint in preventing the iron pipes, tables.
3. Control of corrosion used to prevent the underground pipes from leaking which causes environmental pollution.

Unit III

Energy Sources And Applications:

Electrochemical Energy: Classification of batteries-important applications of batteries, Primary batteries-dry/Leclanche cell, secondary batteries- lead acid cell, lithium cells-Li MnO_2 cell, Fuel cells – hydrogen and oxygen fuel cell, Methanol and oxygen fuel cell.

Solar energy: Introduction-Thermal conversion (Solar water heater, parabolic dish and parabolic trough), photo voltaic conversion- construction and working of photo voltaic cell and its importance, applications of solar energy.

Applications:

1. The lead acid battery is used in lightning and ignition system of automobiles.
2. Alkaline batteries are designed for long lasting performance in remote controls, clocks, and radios. The high run time makes alkaline batteries ideal for digital cameras, hand held games, MP3 players.
3. These long life batteries are used in portable consumer instruments like calculators, iPods, digital diaries, wrist watches and stop watches, toys, and artificial pacemakers.
4. Solar energy is used at residential homes for heating water and for generation of electricity for domestic use.
5. PV cells are used in electrical goods such as cookers, calculators, toys.

Unit IV

Superconductivity, Semiconductors, Storage Devices & Applications:

Superconductivity: Preparation, Properties and Engineering Applications.

Semiconductors: Preparation of semi conductors-Zone refining and Czochralski process, Stiochiometric, Non stichometric, Organic and Controlled Valency Semiconductors-applications.

Storage Devices: Materials used and working of Floppy, CD, and Pen drive.

Applications:

1. Super conductors are used in Maglev trains
2. Semi conductors are used in electronic circuit devices
3. Floppy, CD and pen drive are used to store large data.

Unit- V

Advanced Topics In Chemistry:

Nanomaterials: Introduction – sol-gel method, chemical reduction method for preparation of metal Nano particles, Types of nano materials – carbon nano tubes and fullerenes (preparation, properties and applications)-Applications of nano materials.

Green Chemistry: Principles of Green Chemistry- Methods of Green Synthesis (Super Critical Fluid extraction, aqueous phase Method and Microwave Induction)-Applications of Green chemistry

Applications:

1. Nano materials are used in paints, lubricants and medicine technology.
2. Green synthesis is used to make eco friendly reactions.

Text Books

1. P.C. Jain and M. Jain, Engineering Chemistry, 15/e, Dhanapat Rai & Sons, Delhi (2014).
2. B.K. Sharma, Engineering Chemistry, Krishna Prakashan, Meerut.
3. O G Palanna, Engineering Chemistry, Tata McGraw Hill Education Private Limited, (2009).

References

1. Sashi Chawla, A Textbook of Engineering Chemistry, Dhanapath Rai and sons, (2003)
2. B.S Murthy and P. Shankar, A Text Book of Nano Science and NanoTechnology , University Press (2013).
3. S.S. Dara, A Textbook of Engineering Chemistry, S.Chand & Co, (2010)
4. N. Krishna Murthy and Anuradha, A text book of Engineering Chemistry, Murthy Publications (2014).
5. K. Sesha Maheshwaramma and Mridula Chugh, Engineering Chemistry, Pearson India Edn services, (2016).

COURSE OUTCOMES VS POs & PSOs MAPPING (DETAILED; HIGH:3; MEDIUM:2; LOW:1):

CO No.	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	2	1	-	-	-	-	-	-	-	-	-	1	-	-
CO2	2	1	-	-	-	-	-	-	-	-	-	1	2	1
CO3	2	1	-	-	-	-	-	-	-	-	-	1	1	-
CO4	2	-	-	-	-	-	-	-	-	-	-	1	-	-
CO5	2	1	-	-	-	-	1	-	-	-	-	1	-	-
CO*	2	1	-	-	-	-	1	-	-	-	-	1	1	1

** For Entire Course, CO vs. PO-PSO Mapping*

I Year –I Semester Syllabus

Subject Code	Subject Name	L	T	P	C
R19CSE-ES1101	Problem Solving and Programming using C	3	0	0	3

Course Objectives:

- Formulating solutions to problems using algorithms and flowcharts and also Learning
- Structure of C program, basic C programs, Compiling and executing C Programs
- Understand branching, iteration statements
- Modular programming and recursive solution formulation.
- Understanding arrays, pointers and dynamic memory allocation and Comprehension of file
- Handling and user defined data types.

Course Outcomes:

At the end of the course, the student will be able to:

1. Develop Algorithms and flowcharts and also understand the compilation, debugging, execution and writing of basic C programs (L3).
2. Develop C Programs using control and iterative statements (L3).
3. Develop C programs using Arrays and functions (L3).
4. Apply the knowledge of strings and pointers in programming (L3).
5. Comprehend file handling and user defined data types (L3).

Unit I

Introduction to Computers, Algorithm and Flowchart design through Raptor:

Introduction-Computer Hardware, Bits and Bytes, Components, types of languages

Algorithm- Definition, Characteristics, Steps to develop, examples.

Flow chart-Definition, symbols, Input/output, Assignment, conditional if, repetition, function and sub charts.

Introduction to C Programming- structure of c program, Identifiers, The main () Function, The printf () Function, - Indentation, Comments, Data Types, Arithmetic Operations, Expression Types, Variables and Declarations, Negation, Operator Precedence and Associativity, Declaration Statements, Initialization, Compiling and Executing C program

Applications: Computer Networks, Word Processor, Email Client

Unit II

Programming Style Assignment: Implicit Type Conversions, Explicit Type Conversions (Casts), Assignment Variations, Mathematical Library Functions, Interactive Input, Formatted Output, Format Modifiers.

Control Flow-Relational Expressions - Logical Operators:

Selection: if-else Statement, nested if, examples, Multi-way selection: switch, else-if, examples.

Repetition: Basic Loop Structures, Pretest and Posttest Loops, Counter-Controlled and Condition Controlled Loops, The while Statement, The for Statement, Nested Loops, The do-while Statement

Applications: Embedded Software's, Simulators, Development of New languages

Unit III

Arrays: One-Dimensional Arrays, Input and Output of Array Values, Array Initialization, Arrays as Function Arguments, Two-Dimensional Arrays, Multi Dimensional Arrays- Matrices

Modular Programming: Function and Parameter Declarations, Returning a Value, Functions with Empty Parameter Lists, Variable Scope, Variable Storage Class, Local Variable Storage Classes, Global Variable Storage Classes, Pass by Reference, Passing Addresses to a Function, Storing Addresses, Using Addresses, Declaring and Using Pointers, Passing Addresses to a Function. Case Study: Swapping Values, Recursion - Mathematical Recursion, Recursion versus Iteration.

Applications: Computer and Mobile Games, Design Compilers

Unit IV

Pointers, Strings:

Pointers: Concept of a Pointer, Initialisation of pointer variables, pointers as function arguments, passing by address, Dangling memory, address arithmetic, character pointers and functions, pointers to pointers, Dynamic memory management functions, command line arguments

Strings: String Fundamentals, String Input and Output, String Processing, Library Functions

Applications: Operating Systems, Test code, Developing Verification software

Unit V

Structures : Derived types, Structures declaration, Initialization of structures, accessing structures, nested structures, arrays of structures, structures and functions, pointers to structures, self referential structures, unions, typedef, bit-fields, enumeration.

Data Files: Declaring, Opening, and Closing File Streams, Reading from and Writing to Text Files, Random File Access

Applications: Database and spread sheets, Word Processing, Database files systems, Online Reservation Systems.

Text Books

1. How to Solve It By Computer By R G Dromey
2. C for Programmers with an Introduction to C11 (Deitel Developer Series) 1st Edition, Kindle Edition
3. Programming in ANSI C , McGrawHill, seventh edition by E.Balagurusamy.
4. The C programming Language, Dennis Richie and Brian Kernighan, Pearson Education
5. ANSI C Programming, Gary J. Bronson, Cengage Learning.

Reference Books

1. Let us "C" - Yashwant Kanetkar
2. Programming in C, Bl Juneja Anita Seth, Cengage Learning.
3. C Programming-A Problem Solving Approach, Forouzan, Gilberg, Cengage.
4. Programming in C, Reema Thareja, OXFORD

5. C by Example, Noel Kalicharan, Cambridge
6. https://raptor.martincarlisle.com/(Download and Install Raptor software, Use the tool to draw flowcharts for the problems given.)

COURSE OUTCOMES VS POs & PSOs MAPPING (DETAILED; HIGH:3; MEDIUM:2; LOW:1):

CO No.	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	3	3	3	2	2	-	-	-	2	-	1	2	-	3
CO2	3	3	3	2	-	-	-	-		-	1	3	-	-
CO3	3	3	3	2	-	-	-	-	2	-	1	3	-	-
CO4	3	3	3	2	-	-	-	-	-	-	1	3	-	-
CO5	3	3	3	2	-	-	-	-	-	-	1	3	2	-
CO*	3	3	3	2	2	-	-	-	2	-	1	3	2	3

** For Entire Course, CO vs. PO-PSO Mapping*

I Year –I Semester Syllabus

Subject Code	Subject Name	L	T	P	C
R19BSH-EN1102	Communicative English Lab-I	0	0	3	1.5

Course Objectives:

- Adopt activity-based teaching-learning methods to ensure that learners would be engaged in the use of language both in the classroom and laboratory sessions.
- Facilitate effective listening skills for better comprehension of academic lectures and English spoken by native speakers
- Focus on appropriate reading strategies for comprehension of various academic texts and authentic materials
- Help improve speaking skills through participation in activities such as role-plays, discussions and structured talks/oral presentations
- Impart effective strategies for good writing and demonstrate the same in summarizing, writing well-organized essays, record and report useful information
- Provide knowledge of grammatical structures and vocabulary and encourage their appropriate use in speech and writing

Course Outcomes:

At the end of the course, the student will be able to

1. Enhance pronunciation with befitting tone for clarity in a speech to communicate language effectively(L2)
2. Participate in short conversations in routine contexts on topics of interest and ask questions and make requests politely(L2)
3. Listen for specific information, gist, note-taking, note-making and comprehension and develop convincing and negotiating skills through debates (L2)
4. Acquire effective strategies for good writing and demonstrate the same in summarizing and reporting(L2)
5. Gain knowledge of grammatical structures and vocabulary for day-to-day successful conversations(L2)

Unit I

Listening: Identifying the topic, the context and specific pieces of information by listening to short audio texts and answering a series of questions. **Speaking:** Asking and answering general questions on familiar topics such as home, family, work, studies and interests; introducing oneself and others. **Reading:** Skimming to get the main idea of a text; scanning to look for specific pieces of information. **Reading for Writing:** Beginnings and endings of paragraphs - introducing the topic, summarizing the main idea and/or providing a transition to the next paragraph. **Grammar and Vocabulary:** Content words and function words; word forms: verbs, nouns, adjectives and adverbs; nouns: countables and uncountables; singular and plural; basic sentence structures; simple question form - wh-questions; word order in sentences.

Unit II

Listening: Answering a series of questions about the main idea and supporting ideas after listening to audio texts. **Speaking:** Discussion in pairs/ small groups on specific topics followed by short structured talks. **Reading:** Identifying sequence of ideas; recognizing verbal techniques that help to link the ideas in a paragraph together. **Writing:** Paragraph writing (specific topics) using suitable cohesive devices; mechanics of writing - punctuation, capital letters. **Grammar and Vocabulary:** Cohesive devices - linkers, sign posts and transition signals; use of articles and zero article; prepositions.

Unit III

Listening: Listening for global comprehension and summarizing what is listened to. **Speaking:** Discussing specific topics in pairs or small groups and reporting what is discussed **Reading:** Reading a text in detail by making basic inferences - recognizing and interpreting specific context clues; strategies to use text clues for comprehension. **Writing:** Summarizing - identifying main idea/s and rephrasing what is read; avoiding redundancies and repetitions. **Grammar and Vocabulary:** Verbs - tenses; subject-verb agreement; direct and indirect speech, reporting verbs for academic purposes.

Unit IV

Listening: Making predictions while listening to conversations/ transactional dialogues without video; listening with video. **Speaking:** Roleplays for the practice of conversational English in academic contexts (formal and informal) - asking for and giving information/directions. **Reading:** Studying the use of graphic elements in texts to convey information, reveal trends/patterns/relationships, communicate processes or display complicated data. **Writing:** Information transfer; describe, compare, contrast, identify significance/trends based on information provided in figures/charts/graphs/tables. **Grammar and Vocabulary:** Quantifying expressions - adjectives and adverbs; comparing and contrasting; degrees of comparison; use of antonyms

Unit V

Listening: Identifying key terms, understanding concepts and answering a series of relevant questions that test comprehension. **Speaking:** Formal oral presentations on topics from academic contexts - without the use of PPT slides. **Reading:** Reading for comprehension. **Writing:** Writing structured essays on specific topics using suitable claims and evidence **Grammar and Vocabulary:** Editing short texts – identifying and correcting common errors in grammar and usage (articles, prepositions, tenses, subject-verb agreement)

Reference Books

1. Bailey, Stephen. Academic writing: A handbook for international students. Routledge, 2014.
2. Chase, Becky Tarver. Pathways: Listening, Speaking and Critical Thinking. Heinley ELT; 2nd Edition, 2018.
3. Skillful Level 2 Reading & Writing Student's Book Pack (B1) Macmillan Educational.
4. Hewings, Martin. Cambridge Academic English (B2). CUP, 2012.

Sample Web Resources

Grammar/Listening/Writing

1. 1-language.com
2. http://www.5minuteenglish.com/
3. https://www.englishpractice.com/

Grammar/Vocabulary

1. English Language Learning Online
2. http://www.bbc.co.uk/learningenglish/
3. http://www.better-english.com/
4. http://www.nonstopenglish.com/
5. https://www.vocabulary.com/
6. BBC Vocabulary Games
7. Free Rice Vocabulary Game

Reading

1. https://www.usingenglish.com/comprehension/
2. https://www.englishclub.com/reading/short-stories.htm
3. https://www.english-online.at/

Listening

1. https://learningenglish.voanews.com/z/3613
2. http://www.englishmedialab.com/listening.html

Speaking

1. https://www.talkenglish.com/
2. BBC Learning English – Pronunciation tips
3. Merriam-Webster – Perfect pronunciation Exercises

All Skills

1. https://www.englishclub.com/
2. http://www.world-english.org/
3. http://learnenglish.britishcouncil.org/

Online Dictionaries

1. Cambridge dictionary online
2. MacMillan dictionary
3. Oxford learner's dictionaries

COURSE OUTCOMES VS POs & PSOs MAPPING (DETAILED; HIGH:3; MEDIUM:2; LOW:1):

CO No.	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	-	-	-	-	3	-	-	3	2	3	2	2	-	3
CO2	-	-	-	-	3	2	2	3	2	3	2	2	-	3
CO3	-	-	-	-	3	2	2	3	2	3	2	2	-	3
CO4	2	2	-	-	3	2	-	3	2	3	2	2	-	3
CO5	-	-	-	-	3	2	2	3	2	3	2	2	-	3
CO*	2	2	-	-	3	2	2	3	2	3	2	2	-	3

** For Entire Course, CO vs. PO-PSO Mapping*

I Year –I Semester Syllabus

Subject Code	Subject Name	L	T	P	C
R19BSH- CH1102	Engineering Chemistry Lab	0	0	3	1.5

Course Objectives:

- To familiarize the students with the basic concepts of Engineering Chemistry lab.
- To train the students on how to handle the instruments.
- To demonstrate the digital and instrumental methods of analysis.
- To expose the students in practical aspects of the theoretical concepts.

Course Outcomes:

At the end of the course, the student will be able to

1. Explain the functioning of the instruments such as pH, Viscometer, Conductivity and Potentiometric meters(L2)
2. Interpret the graphical values to analyze the experimental results(L2)
3. Determine the concentrations of Acid, Zinc, Iron and Copper(L1)
4. Compare viscosities of different oils(L2)
5. Prepare polymers and nano materials(L1)

List of Experiments

1. Preparation of Phenol-Formaldehyde resin
2. Preparation of Urea-Formaldehyde resin
3. Determination of conductance by conductometric method
4. Determination of strength of an acid by pH metric method
5. Determination of Fe (II) in Mohr's salt by potentiometric method
6. Determination of sulphuric acid in lead-acid storage cell
7. Determination of Zinc by EDTA method.
8. Determination of copper in a copper ore
9. Determination of viscosity of a liquid
10. Determination of surface tension of a liquid
11. Preparation of TiO_2/ZnO nano particles
12. Determination of chromium (VI) in potassium dichromate

Text Books

1. Mendham J, Denney RC, Barnes JD, Thosmas M and Sivasankar B Vogel's Quantitative Chemical Analysis 6/e, Pearson publishers (2000).
2. N.K Bhasin and Sudha Rani Laboratory Manual on Engineering Chemistry 3/e, Dhanpat Rai Publishing Company (2007).

COURSE OUTCOMES VS POs & PSOs MAPPING (DETAILED; HIGH:3; MEDIUM:2; LOW:1):

CO No.	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	2	1	-	-	-	-	-	-		-	-	-	-	-
CO2	2	1	-	-	-	-	-	-	1	-	-	-	-	-
CO3	2	1	-	-	-	-	-	-	1	-	-	-	-	-
CO4	2	1	-	-	-	-	-	-	1	-	-	-	-	-
CO5	1	1	-	-	-	1	1	-	1	-	-	-	-	-
CO*	2	1	-	-	-	1	1	-	1	-	-	-	-	-

** For Entire Course, CO vs. PO-PSO Mapping*

I Year –I Semester Syllabus

Subject Code	Subject Name	L	T	P	C
R19CSE-ES1102	Problem Solving and Programming using C Lab	0	0	3	1.5

Course Objectives:

- Understand the basic concept of C Programming, and its different modules that include conditional and looping expressions, Arrays, Strings, Functions, Pointers, Structures and File programming.
- Acquire knowledge about the basic concept of writing a program.
- Role of constants, variables, identifiers, operators, type conversion and other building blocks of C Language.
- Use of conditional expressions and looping statements to solve problems associated with conditions and repetitions.
- Role of Functions involving the idea of modularity.

Course Outcomes:

1. Learn Basic computer Installations and Office Tools, Document and present the algorithms, flowcharts and programs in form of user-manual and also apply and practice logical ability to solve the problems(L1)
2. Understand C programming development environment and also how to compiling, debugging, and linking a Program using C Language(L2)
3. Apply arrays, strings concepts to solve problems(L3)
4. Understand and apply the in-built functions and customized functions for solving the problems(L2)
5. Understand and apply the pointers, memory allocation techniques and use of files for dealing with variety of problems(L2)

Exercise -1

Operating Systems and installation of Windows & LINUX Operating System

Exercise -2(Office Tools)

a) Word: Inserting Images, Auto Shapes, Header & Footer, Applying Text effects, Using Character Spacing, Borders and Colors, Inserting Header and Footer, Using Date and Time option,
b) Excel: Formulas & Data AutoFill, Format Cells, auto fill, Formatting Text
c) PowerPoint: PPT Orientation, Slide Layouts, Inserting Text, Word Art, Formatting Text, Bullets and Numbering, Auto Shapes, Lines and Arrows, Hyperlinks, Inserting –Images, Clip Art, Tables in PowerPoint, Costume Animations.

Exercise – 3 (Basic)

a) What are the OS Commands, Familiarization of Editors - vi, EMACS
b) Using commands like mkdir, ls, cp, mv, cat, pwd, and man
c) C Program to Perform Adding, Subtraction, Multiplication and Division of two numbers From Command line

Draw the flow chart for the following problems using Raptor package

d) Finding maximum of 3 numbers, Unit converters, Interest calculators, multiplication tables,
e) GCD of 2 numbers
f) Fibonacci generation, prime number generation. Minimum, Maximum and average of n numbers, linear search, Binary Search

Exercise - 4 (Basic Math)

a) Write a C Program to Simulate 3 Laws at Motion
b) Write a C Program to convert Celsius to Fahrenheit and vice versa

Exercise – 5 (Control Flow – I)

a) Write a C Program to Find Whether the Given Year is a Leap Year or not.
b) Write a C Program to Add Digits & Multiplication of a number

Exercise – 6 (Control Flow – II)

a) Write a C Program to Find Whether the Given Number is
   i) Prime Number ii) Armstrong Number
b) Write a C program to print Floyd Triangle
c) Write a C Program to print Pascal Triangle

Exercise – 7 (Functions)

a) Write a C Program demonstrating of parameter passing in Functions and returning values.
b) Write a C Program illustrating Fibonacci, Factorial with Recursion without Recursion

Exercise –8 (Control Flow – III)

a) Write a C Program to make a simple Calculator to Add, Subtract, Multiply or Divide Using switch…case
b) Write a C Program to convert decimal to binary and hex (using switch call function the function)

Exercise –9 (Functions – Continued)

Write a C Program to compute the values of sin x and cos x and e^x values using Series expansion.(use factorial function)

Exercise – 10 (Arrays)

Demonstration of arrays a) Search-Linear. b) Sorting-Bubble, Selection. c) Operations on Matrix.

Exercises - 11 (Structures)

a) Write a C Program to Store Information of a Movie Using Structure
b) Write a C Program to Store Information Using Structures with Dynamically Memory Allocation
c) Write a C Program to Add Two Complex Numbers by Passing Structure to a Function

Exercise - 12 (Arrays and Pointers)

a) Write a C Program to Access Elements of an Array Using Pointer
b) Write a C Program to find the sum of numbers with arrays and pointers.

Exercise – 13 (Dynamic Memory Allocations)

a) Write a C program to find sum of n elements entered by user. To perform this program, allocate memory dynamically using malloc () function.

b) Write a C program to find sum of n elements entered by user. To perform this program, allocate memory dynamically using calloc () function. Understand the difference between the above two programs

Exercise – 14 (Strings)

a) Implementation of string manipulation operations with library function.

i) copy ii) concatenate iii) length iv) compare

b) Implementation of string manipulation operations without library function.

i) copy ii) concatenate iii) length iv) compare

Exercise -15 (Files)

a) Write a C programming code to open a file and to print it contents on screen.

b) Write a C program to copy files

Exercise - 16 (Files Continued)

a) Write a C program merges two files and stores their contents in another file.

b) Write a C program to delete a file.

COURSE OUTCOMES VS POs & PSOs MAPPING (DETAILED; HIGH:3; MEDIUM:2; LOW:1):

CO No.	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	3	3	3	2	-	-	-	-	-	-	-	-	2	3
CO2	3	3	3	2	-	-	-	-	-	-	-	-	2	3
CO3	3	3	3	2	-	-	-	-	-	-	-	2	2	3
CO4	3	3	3	2	-	-	-	-	-	-	-	2	2	3
CO5	3	3	3	2	-	-	-	-	2	-	-	2	2	3
CO*	3	3	3	2	-	-	-	-	2	-	-	2	2	3

** For Entire Course, CO vs. PO-PSO Mapping*

I Year –I Semester Syllabus

Subject Code	Subject Name	L	T	P	C
R19EEE-ES1103	Electrical Engineering Workshop	0	0	3	1.5

Course Objectives:

- To demonstrate the usage of measuring equipment
- To identify different protective equipment's and their usage.
- To train the students in setting up simple wiring circuits
- To impart methods in electrical machine wiring
- To explain the starting methods of dc motors
- To explain the starting methods of single phase and three phase induction motors.

Course Outcomes:

At the end of the Course, the student is able to

1. Explain the limitations, tolerances, Safety aspects of electrical systems and wiring(L2)
2. Select wires/cables and other accessories used in different types of wiring(L2)
3. Make simple lighting and power circuits(L1)
4. Measure current, voltage and power in a circuit(L2)
5. Apply starting methods to AC and DC Machines(L3)

List of Experiments

1. Study of various electrical tools and symbols.
2. Identify different types of cables/wires and switches, fuses & fuse carriers, MCB and ELCB, MCCB with ratings and usage.
3. Wiring of light /fan circuit using two way/three way control (stair case wiring) Go-down wiring/Tunnel wiring.
4. Wiring of power distribution arrangement using single phase MCB distribution board with ELCB, main switch and energy meter.
5. Measurement of voltage, current, resistance in DC circuit.
6. Measurement of voltage, current and power in single phase circuit using voltmeter, ammeter and wattmeter. Calculate the power factor of the circuit.
7. Wiring of backup power supply including inverter, battery and load for domestic Installations.
8. Starting of DC shunt motor using three point starter
9. Starting of DC series motor using two point starter
10. Starting of single phase induction motor
11. Starting of three phase induction motor.

COURSE OUTCOMES VS POs & PSOs MAPPING (DETAILED; HIGH:3; MEDIUM:2; LOW:1):

CO No.	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	2	1	2	-	-	-	-	-	2	-	-	2	1	1
CO2	2	1	2	-	-	-	-	-	2	-	-	2	1	1
CO3	2	1	2	-	-	-	-	-	2	-	-	2	1	1
CO4	2	1	2	-	-	-	-	-	2	-	-	2	1	1
CO5	2	1	2	-	-	-	-	-	2	-	-	2	1	1
CO*	2	1	2	-	-	-	-	-	2	-	-	2	1	1

** For Entire Course, CO vs. PO-PSO Mapping*

I Year –I Semester Syllabus

Subject Code	Subject Name	L	T	P	C
R19BSH-MC1101	Environmental Science	3	0	0	0

Course Objective:

- To make the students to get awareness on environment, to understand the importance of protecting natural resources, ecosystems for future generations.
- Students get awareness on pollution that is caused due to the day to day activities of human life to save earth from the inventions by the engineers.
- To make student get awareness on the social issues, environmental legislation.

Course Outcomes:

At the end of the Course, the student is able to

1. Understand the significance of various natural resources, including renewable, non renewable water, minerals, forests and soil, in the environment and the problems associated with it in maintaining ecological balance and supporting human activities(L2)
2. Apply strategies for mitigating different types of environmental pollution, managing solid waste effectively and adopt individual actions that contribute to pollution prevention and waste reduction(L3)
3. Understand the structure, function, characteristic features of different kind of eco systems, value of biodiversity, threats to bio diversity and India's role and strategies in the conservation of biodiversity for sustainable development(L2)
4. Apply the Air (Prevention and Control of Pollution) Act, Water (Prevention and Control of Pollution) Act, Wildlife Protection Act, and Forest Conservation Act to promote sustainable environmental development; Address related social issues and propose effective solutions, delving into the intersection of environmental policies and community welfare to achieve ultimate sustainability goals(L3)
5. Identify the role of information technology in addressing population-related problems, focusing on resource management, environmental monitoring, urban planning, healthcare improvement, education to enhance sustainability and quality of life(L2)

Unit I

Multidisciplinary Nature of Environmental Science: Definition, Multi disciplinary nature of environmental sciences, Scope and Importance, Need for Public Awareness.

Natural Resources: Forest resources – Uses and deforestation-causes, consequences, Water resources – Use and over utilization of surface and ground water, Floods, drought, conflicts over water, dams – benefits and problems, Food resources: World food problems, effects of modern agriculture, fertilizer-pesticide problems, pesticide related problems, water logging, salinity, Energy resources: Renewable and non-renewable resources – Natural resources and associated problems, Land Resources: Land degradation, Soil erosion, Desertification.

Applications: Different conservation methods of different natural resources like afforestation programs, social forestry programs, soil conservation practices.

Unit II

Environmental Pollution and Solid Waste Management:

Environmental Pollution: Definition, Cause, effects and control measures of (a) Air Pollution. (b)Water pollution (c) Marine pollution (d) Noise pollution

Solid Waste Management: Causes, effects and control measures of urban and industrial wastes, e-waste management, Role of an individual in prevention of pollution, Disaster management: floods, earthquake, cyclone and landslides.

Applications: Different treatment methods for different types of pollution cyclone separator, electrostatic precipitators, waste water treatment, solid waste management, e-waste management.

Unit III

Ecosystems, Biodiversity and its Conservation:

Ecosystems: Concept of an ecosystem, Structure and function of an ecosystem – Producers, consumers and decomposers, Food chains, food webs, Energy flow in the ecosystem, primary and secondary productivity, ecosystem regulation and development.

Biodiversity And Its Conservation: Definition: levels of biodiversity- genetic, species and ecosystem diversity, Bio-geographical classification of India, Value of biodiversity- consumptive use, Productive use, social, ethical, aesthetic and option values, ecosystem service value, India as a mega-diversity Nation, Hot-spots of biodiversity- Indo Burma, Eastern Himalayas, Western Ghats, Threats to biodiversity- habitat loss, poaching of wildlife, Global environmental issues, Pollution, Man-wildlife conflicts, Endangered and endemic species of India-Red Data Book, Conservation of biodiversity- In-situ and Ex-situ conservation of biodiversity.

Applications: Different conservation methods like gene bank, seed bank, botanical garden.

Unit IV

Social Issues and the Environment:

Social Issues And The Environment: From Unsustainable to Sustainable development, Water conservation- rain water harvesting and watershed management, Resettlement and rehabilitation issues of people, its problems and concerns, case studies, Climate change- global warming, acid rain, ozone layer depletion, nuclear accidents- their causes, effects and control measures, Environmental legislation- Wildlife Protection Act, Forest Conservation Act, Air (Prevention and Control of Pollution) Act and Water (Prevention and control of Pollution) Act.

Applications:

1. Water conservation practices like rainwater harvesting, soaking pits, and modern agricultural methods to minimize the environmental effects.
2. Energy conservations methods in houses, industrial sector and commercial sector, apply environmental related laws in environmental issues.

Unit V

Human Population and Environmental Management:

Human Population- Population growth, variation among nations, Population explosion, Role of information Technology in Environment.

Environmental management- Environmental Impact Assessment- Methodology, Environmental Impact Statement, Environmental Management Plan, Environmental Audit- process, Significance of EIA.

Applications:

1. Information Technology in different natural calamities and health aspect of view.
2. Industrial and developmental activities.

Field Work: Visit to a local area to document environmental assets River/forest grassland/hill/mountain, Visit to a local polluted site-Urban/Rural/Industrial/Agricultural Study of common plants, insects, and birds – river, hill slopes, etc.

Text Books

1. Perspectives in Environment Studies, Anubha Kaushik, C P Kaushik, New Age International Publishers, 2014.
2. Text Book of Environmental Studies, K. Raghavan Nambiar, Scitech Publications.
3. Environmental Studies by Palaniswamy – Pearson education
4. Environmental Studies by Dr.S.AzeemUnnisa, Academic Publishing Company

References

1. Textbook of Environmental Science by Deeksha Dave and E.Sai Baba Reddy, Cengage Publications.
2. Text book of Environmental Sciences and Technology by M.Anji Reddy, BS Publication.
3. Comprehensive Environmental Studies by J.P.Sharma, Laxmi publications.
4. Environmental sciences and engineering – J. Glynn Henry and Gary W. Heinke – Prentice hall of India Private limited.
5. A Text Book of Environmental Studies by G.R.Chatwal, Himalaya Publishing House
6. Introduction to Environmental engineering and science by Gilbert M. Masters and Wendell P. Ela - Prentice hall of India Private limited.

COURSE OUTCOMES VS POs & PSOs MAPPING (DETAILED; HIGH:3; MEDIUM:2; LOW:1):

CO No.	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	2	-	-	-	-	2	3	2	-	-	-	2	-	1
CO2	2	-	-	-	-	2	3	2	-	-	-	2	-	1
CO3	2	-	-	-	-	2	3	1	-	-	-	2	-	1
CO4	2	-	-	-	-	2	3	1	-	-	-	2	-	1
CO5	2	-	-	-	-	2	3	1	-	-	-	2	-	1
CO*	2	-	-	-	-	2	3	1	-	-	-	2	-	1

** For Entire Course, CO vs. PO-PSO Mapping*

I Year –II Semester

Subject Code	Subject Name	L	T	P	C
R19BSH-MA1205	Transform Techniques and Partial Differential Equations	3	0	0	3

Course Objectives:

- To familiarize the transform techniques to solve partial differential and difference equations.
- To equip the students to solve application problems in their disciplines.

Course Outcomes:

At the end of the course, the student will be able to

1. Apply the Laplace transform to solve differential equations and integral equations that arise in various engineering fields(L3)
2. Apply multi variable calculus to solve optimization problems(L3)
3. Find the Fourier series of periodic functions and evaluate Fourier integral, Fourier transform and inverse Fourier of a given function(L2)
4. Apply the partial differential equations to solve various engineering problems(L3)
5. Understand the concept of Z Transforms and able to solve difference equations(L2)

Unit I

Laplace transforms (All Theorems/Properties without proofs):

Definition of Laplace transform, existence conditions, properties of Laplace transforms, inverse Laplace transforms, transforms of derivatives, transforms of integrals, multiplication by t^n, division by t, Inverse Laplace Transforms, convolution theorem, periodic functions, unit step function, unit impulse function, initial and final value theorems.

Applications: Evaluation of improper integrals, solutions of ordinary differential equations, integral equations and system of ordinary differential equations.

Unit II

Partial Differentiation: Partial derivatives, total derivative, chain rule, Taylor's series and Maclaurin's series of functions of two variables, change of variables, Jacobian, functional dependence.

Applications: Errors and Approximations, Tangent Planes and Normal Lines, maxima and minima of functions of two variables, method of Lagrange's multipliers.

Unit III

Fourier Series & Fourier transforms (without proofs)

Fourier Series: Fourier series, determination of Fourier coefficients, Dirichlet's conditions, Fourier series of even and odd functions, Fourier series of even and odd periodic functions in an arbitrary interval, Half-range Fourier sine and cosine expansions, Parseval's formula.

Applications: Practical harmonic analysis

Fourier transforms: Fourier integrals, Fourier cosine and sine integrals, Fourier transform, sine and cosine transform, properties, convolution theorem.

Unit IV

Partial Differential Equations (PDE): First order partial differential equations, solutions of first order linear and standard forms of non-linear PDE, solutions of homogenous higher order linear PDE with constant coefficients.

Unit V

Z-Transforms: Definition of Z-transform, elementary properties, linearity property, damping rule, shifting u_n to the right and left, multiplication by n, initial value theorem, final value theorem, inverse Z-transform, convolution theorem.

Applications: Solution of difference equations using Z-transforms.

Textbooks:

1. B. S. Grewal, Higher Engineering Mathematics, 44/e, Khanna publishers, 2017.

References:

1. Erwin Kreyszig, Advanced Engineering Mathematics, 10/e, John Wiley & Sons, 2011.
2. Dennis G. Zill and Warren S. Wright, Advanced Engineering Mathematics, Jones and Bartlett, 2011.
3. Michael Greenberg, Advanced Engineering Mathematics, 2/e, Pearson, 2018.
4. George B. Thomas, Maurice D. Weir and Joel Hass, Thomas Calculus, 13/e, Pearson Publishers, 2013.
5. R. K. Jain and S. R. K. Iyengar, Advanced Engineering Mathematics, 3/e, Alpha Science International Ltd., 2002.
6. Glyn James, Advanced Modern Engineering Mathematics, 4/e, Pearson publishers, 2011.
7. W. E. Boyce and R. C. DiPrima, Elementary Differential Equations and Boundary Value Problems, 9/e, Wiley India, 2009.
8. Saber Elaydi, Introduction to Difference Equations, Springer, 3rd Edition.
9. W. G. Kelley, Allen C Peterson, Difference Equations, An Introduction with Applications, 2nd edition, Academic Press.

COURSE OUTCOMES VS POs & PSOs MAPPING (DETAILED; HIGH:3; MEDIUM:2; LOW:1):

CO No.	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	3	3	1	1	1	-	-	-	2	2	-	1	-	2
CO2	3	3	1	1	1	-	-	-	2	2	-	1	-	2
CO3	3	3	1	1	1	-	-	-	2	2	-	1	-	2
CO4	3	3	1	1	1	-	-	-	2	2	-	1	-	2
CO5	3	3	1	1	1	-	-	-	2	2	-	1	-	2
CO*	3	3	1	1	1	-	-	-	2	2	-	1	-	2

** For Entire Course, CO vs. PO-PSO Mapping*

I Year –II Semester

Subject Code	Subject Name	L	T	P	C
R19BSH-MA1204	Numerical Methods and Multivariable Calculus	3	0	0	3

Course Objectives:

- To familiarize the numerical techniques for solving non-linear equations, interpolation, differentiation, integration and ordinary differential equations.
- To enlighten the learners in the concept of Multivariable Calculus.

Course Outcomes:

At the end of the course, the student will be able to

1. Apply complex integration techniques to find the velocity potential and flux functions of flow problems(L3)
2. Evaluate complex integrals using contour integration techniques, including Cauchy's integral theorem and residue theorem(L2)
3. Apply multiple integral methods to find the areas and volumes of solids(L3)
4. Analyze the behaviour of fluid flow, electromagnetic fields, and other physical phenomena in engineering using vector differentiation(L4)
5. Analyze quantitative measures (like Volume, Mass, Center of Mass, Surface Area, Moment of Inertia) of physical and engineering fields using multiple integrals(L4)

Unit I

Solution of Algebraic and Transcendental Equations: Intermediate value theorem (statement only), geometrical representation of a solution of an equation, Bisection method, Regula-Falsi method, Iterative Method, Newton-Raphson method for one variable and two variables.

Unit II

Interpolation & Solutions of Ordinary differential equations:

Interpolation: Finite differences, symbolic relations between operators, interpolation using Newton's forward, backward formulae, Gauss central difference formulae and Lagrange's formulae.

Solutions of Ordinary differential equations: Taylor's series method, Picard's method of successive approximation, Euler's method, modified Euler's method and Runge-Kutta method of fourth order for solving first order differential equations.

Unit III

Multiple Integrals and Beta, Gamma Functions:

Multiple Integrals: Double integrals, double integration in polar coordinates, change of variables, change of order of integration, evaluation of triple integrals, change of variables in triple integral (Cartesian to cylindrical and spherical polar co-ordinates).

Applications: Area enclosed by plane curves, volume of solids.

Beta and Gamma functions: Beta and Gamma functions and their properties, relation between beta and gamma functions.

Applications: Evaluation of improper integrals.

Unit IV

Vector Differentiation: Scalar and vector point functions, vector operator del, del applied to scalar point functions-Gradient, del applied to vector point functions-Divergence and Curl, vector identities.

Application: Equation of continuity, potential surfaces.

Unit V

Vector Integration (All Theorems without proofs): Line integral, circulation, surface integral, volume integral, Green's theorem in the plane, Stoke's theorem, Divergence theorem.

Application: Work done, flux.

Text Books

1. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 44/e, 2017.
2. B.S. Grewal, Numerical Methods in Engineering & Science, Khanna Publishers, 2014.

References

1. Erwin kreyszig, Advanced Engineering Mathematics, 10/e, John Wiley & Sons, 2011.
2. Dennis G. Zill and Warren S. Wright, Advanced Engineering Mathematics, Jones and Bartlett, 2011.
3. Michael Greenberg, Advanced Engineering Mathematics, 2/e, Pearson, 2018.
4. George B. Thomas, Maurice D. Weir and Joel Hass, Thomas Calculus, 13/e, Pearson Publishers, 2013.
5. R. K. Jain and S. R. K. Iyengar, Advanced Engineering Mathematics, 3/e, Alpha Science International Ltd., 2002.
6. Glyn James, Advanced Modern Engineering Mathematics, 4/e, Pearson publishers, 2011.
7. P. Kandasamy, K. Thilagavathy, K. Gunavathi, Numerical Methods, S. Chand & Company, 2/e, Reprint 2012.
8. Sastry, S.S, Introductory Methods of Numerical Analysis, 5th edition, , Prentice Hall , 2017.

COURSE OUTCOMES VS POs & PSOs MAPPING (DETAILED; HIGH:3; MEDIUM:2; LOW:1):

CO No.	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	3	3	1	1	1	-	-	-	2	2	-	1	-	2
CO2	3	3	1	1	1	-	-	-	2	2	-	1	-	2
CO3	3	3	1	1	1	-	-	-	2	2	-	1	-	2
CO4	3	3	1	1	1	-	-	-	2	2	-	1	-	2
CO5	3	3	1	1	1	-	-	-	2	2	-	1	-	2
CO*	3	3	1	1	1	-	-	-	2	2	-	1	-	2

** For Entire Course, CO vs. PO-PSO Mapping*

I Year –II Semester

Subject Code	Subject Name	L	T	P	C
R19MEC-PC1202	Thermal and Hydro Prime Movers	3	0	0	3

Course Objectives:

- Apply to train the student in the aspects of steam formation and its utilities through the standard steam data tables and charts
- Understand about the constructional features, operational details of various types of internal combustion engines through the details of several engine systems and the basic air standard cycles
- Understand gas turbine fundamentals, the governing cycles and the methods to improve the efficiency of gas turbines To know the different kinds of power plants.

Course Outcomes:

At the end of the course, the student will be able to

1. Classify internal combustion engine and Evaluate the performance of IC engines(L2)
2. Estimate the performance of a steam turbine using vapor power cycles and velocity diagrams(L2)
3. Analyze the different methods for improving the efficiency of gas turbines(L4)
4. Apply the concepts of momentum equation for finding the forces acting on the vanes of the turbines, centrifugal pump(L3)
5. Calculate the performance characteristics of a Hydraulic turbine at different loads (L2)

Unit I

Objectives: To make the student learn about the constructional features, operational details of various types of internal combustion engines through the details of several engine systems and the basic air standard cycles, that govern the engines. Further, the student shall be able to calculate the performance of different types of internal combustion engines.

I.C Engines: Classification, working principles – valve and port timing diagrams – air standard cycles – Engine systems line fuel injection, carburetion, ignition, cooling and lubrication – Engine performance evaluation.

Application: Automobile vehicles

Unit II

Objectives: To train the student in the aspects of steam formation and its utilities through the standard steam data tables and charts. To make the student correlate between the air standard cycles and the actual cycles that govern the steam turbines. To train the student to calculate the performance of steam turbines using velocity diagrams.

Properties of Steam and use of Steam Tables- T-S and H-S Diagrams..

Vapor Power Cycles:Rankine Cycle- Efficiency and output of Rankine Cycle-Re-generative cycle Steam

Steam Turbines: Schematic layout of steam power plant Classification of Steam Turbines Impulse Turbine and Reaction Turbine- Compounding in Turbines- Velocity Diagrams for simple Impulse and Reaction Turbines- Work done & efficiency

Application: Steam power plants

Unit III

Objectives: To impart the knowledge of gas turbine fundamentals, the governing cycles and the methods to improve the efficiency of gas turbines.

Gas Turbines: Simple gas turbine plant-ideal cycle, closed cycle -open cycle-. Efficiency, Work ratio and optimum pressure ratio for simple gas turbine cycle.

Actual cycle, analysis of simple cycles & cycles with inter cooling, reheating and Regeneration

Application: Gas turbine power plants

Unit IV

Objectives: To teach the student about the fundamental of fluid dynamic equations and its applications fluid jets. To impart the knowledge of various types of pumps, their constructional features, working and performance.

Impact of Jets and Pumps: Impulse momentum equation, Impact of Jet on stationary and moving vanes (flat and curved).

Pumps: Types of pumps, Centrifugal pumps: Main components, Working principle, Multi stage pumps, Performance and characteristic curves

Application: Bore wells, Water servicing for automobile vehicles, Industries etc.

Unit V

Objectives: To make the student learn about the constructional features, operational details of various types of hydraulic turbines. Further, the student shall be able to calculate the performance of hydraulic turbines.

Hydraulic Turbines: Classification of turbines; Working principle of Pelton wheel,Francis and Kaplan turbines, Efficiency, Performance and characteristic curves.

Hydro Electric Power: Components of Hydro electric power plant: pumped storage systems, Estimation of water power potential; Estimation of load on turbines: load curve, load factor, capacity factor, utilization factor, diversity factor

Application: hydraulic turbine power plant, Dams, Industries etc.

Text Books

1. Thermodynamics by P K NAG
2. Internal combustion engines by Ganesan
3. Thermal Engineering / RK Rajput
4. A text of Fluid mechanics and hydraulic machines by Dr. R.K. Bansal

References

1. Fluid mechanics and fluid machines by Rajput, S. Chand & Co.
2. Thermal Engineering-R.S Khurmi, &J S Gupta/S.Chand.
3. Thermal Engineering / RK Rajput/ Lakshmi Publications

COURSE OUTCOMES VS POs & PSOs MAPPING (DETAILED; HIGH:3; MEDIUM:2; LOW:1):

CO No.	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	3	3	3	-	-	-	-	-	-	-	-	3	-	2
CO2	2	2	-	-	-	-	-	-	-	-	-	3	-	2
CO3	3	3	2	-	-	-	-	-	-	-	-	2	-	2
CO4	2	2	-	-	-	-	-	-	-	-	-	2	-	2
CO5	3	3	2	-	-	-	-	-	-	-	-	3	-	3
CO*	3	2	3	-	-	-	-	-	-	-	-	2	-	2

** For Entire Course, CO vs. PO-PSO Mapping*

I Year –II Semester Syllabus

Subject Code	Subject Name	L	T	P	C
R19BSH-PH1201	Applied Physics	3	0	0	3

Course Objectives:

- To impart knowledge in basic concepts of Wave optics, Lasers and Fiber optics, Electromagnetic fields, Super conductors and physics of nano materials, Semiconductor physics and digital electronics
- To familiarize the applications of Nano materials and digital electronics relevant to Electrical and Electronics Engineering

Course Outcomes:

After the completion of this course the student can able to

1. Apply the principles of acoustics and Ultra sonics for noise reduction (L3)
2. Develop the relationship between elastic constants(L3)
3. Identify the principles of lasers and mechanics (L2)
4. Explain the various types of crystal systems and nano materials(L2)
5. Demonstrate the working principles of heat engine and refrigerator using laws of thermodynamics(L3)

Unit I

Wave optics:

Interference: Principle of superposition of waves- interference of light- Conditions for sustained interference- interference in thin films by Reflection-Newton's Rings

Applications: Colours of thin films, Determination of wavelength of given light source and refractive index of given unknown liquid

Diffraction: Introduction- comparison of interference and Diffraction-Types of diffraction-Fraunhofer diffraction- single slit Diffraction, double slit, N-slit, Diffraction Grating-Grating Spectrum- -Rayleigh's criterion, Resolving power of Grating

Applications: Determination of wavelength of monochromatic source of light and Application of diffraction for determination of separation of lines on integrated circuit

Unit II

Polarizationand Lasers:

Polarization: Polarization by reflection, refraction and double Refraction-Nicol Prism-Half Wave and Quarter Wave Plate.

Applications: Nicol prism as polarizer and analyzer, Glare reduction due to sunglasses

Lasers: Characteristics- Spontaneous and Stimulated Emissions- Pumping and Population Inversion-Ruby Laser-He-Ne-Laser

Applications: Medical applications and Communication applications

Unit III

Dielectric Materials and Semiconductor Physics:

Dielectric Materials: Introduction to Dielectrics- Electric Polarization- Dielectric Polarizability- Susceptibility and Dielectric Constant- Types of Polarization-Electronic, ionic, orientation (without proof) and space charge (without proof) – Frequency dependence on polarization- Lorentz (Internal) field – Claussius- Mosotti equation

Applications: Ferroelectrics and Pizoelectrics

Semiconductor Physics: Origin of Energy Bands- Classification of Solids based on Energy Bands- intrinsic and extrinsic (P-N) semiconductors- Fermi Energy- Direct and Indirect Band Gap Semiconductors- Hall Effect-Hall coefficient.

Applications: Thermistor and applications of Hall Effect.

Unit IV

Electromagnetic Fields: Introduction-scalar and vector field-gradient-divergence-curl of a vector Field-statements of Gauss divergence theorem and stokes theorem (without proofs)-Gauss law in Electrostatics & Magnetism-Faraday's laws - Ampere's circuit Law-Maxwell's Equations- differential form and integral Form-Propagation of electromagnetic fields through non conducting medium

Applications: Wave guides and single propagation coaxial cable

Unit V

Physics of Nanomaterials and Digital Electronics:

Physics of Nanomaterials: Properties of Nanomaterials- Synthesis-Sol-gel Method, preparation of CNT-pulsed laser deposition techniques –Properties of CNT

Applications: Electrical circuits, Computer applications, CNT gas sensor, Nano batteries, drug delivery systems

Digital Electronics: Introduction to digital Electronics-Logic Gates-Basic Gates-Universal gates-Realization of other gates using universal gates-Demorgan's theorem

Text Books

1. M.N. Avadhanulu, P.G. Kshrisagar "A Text book of Engineering Physics" –S. Chand Publications, 2017
2. H.K. Malik &A.K. Singh "Engineering Physics", - McGraw Hill Publishing Company Ltd, 2018
3. Ch. Srinivas, Ch. Seshu Babu, "Engineering Physics", Cengage Learning

Reference Books

1. David J. Griffiths, "Introduction to Electrodynamics" -4/e, Pearson Education,2014
2. S.L.Gupta and Sanjeev Gupta, "Unified Physics",Vol.3, Jai Prakash Nath & co.
3. Shatendra Sharma, Jyotsna Sharma, "Engineering Physics", Pearson Publications.

4. S.M. Sze “Semiconductor Devices-Physics and Technology” –Wiley, 2008
5. T Pradeep “A Text Book of Nano Science and Nano Technology”- Tata Mc GrawHill,2013
6. Sanjay D Jain, Girish G Shastra Buddi, “Engineering Physics” –University Press
7. Dr.K. Vijaya Kumar, Engineering Physics-S.Chand publications

COURSE OUTCOMES VS POs & PSOs MAPPING (DETAILED; HIGH:3; MEDIUM:2; LOW:1):

CO No.	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	3	1	1	-	-	-	-	-	-	-	-	-	1	1
CO2	3	1	1	-	-	-	-	-	-	-	-	-	1	1
CO3	3	1	1	-	1	-	-	-	-	-	-	-	1	1
CO4	3	1	1	-	1	-	-	-	-	-	-	-	1	1
CO5	3	1	1	-	-	-	-	-	-	-	-	-	1	1
CO*	3	1	1	-	1	-	-	-	-	-	-	-	1	1

** For Entire Course, CO vs. PO-PSO Mapping*

I Year –II Semester Syllabus

Subject Code	Subject Name	L	T	P	C
R19EEE-ES1203	Electrical Circuit Analysis – I	3	0	0	3

Course Objectives:

- To study the concepts of passive elements, types of sources and various network reduction techniques.
- To understand the applications of network topology to electrical circuits.
- To understand the difference between electric and magnetic circuit.
- To study the behavior of RLC networks for sinusoidal excitations.
- To study the performance of R-L, R-C and R-L-C circuits with variation of one of the parameters and to understand the concept of resonance.
- To study the applications of network theorems for analysis of electrical networks.

Course Outcomes:

At the end of the course, the students are able to

1. Understands V-I relationships of basic circuit elements and network reduction techniques(L2)
2. Determine of co-efficient of coupling for a given magnetic circuit(L3)
3. Analyses single phase ac circuits and understands concepts of phase and power factor(L4)
4. Extends knowledge of dc analysis to ac circuits and determines selectivity of a RLC resonant circuit(L2)
5. Simplify complex electrical networks by using various network theorems(L2)

Unit I

Introduction to Electrical Circuits & Network Topology: Passive components and their V-I relations. Sources (dependent and independent) -Kirchoff's laws, Network reduction techniques (series, parallel, series - parallel, star-to-delta and delta-to-star transformation). Source transformation technique, nodal analysis and mesh analysis.

Network topology:Definitions of Graph and Tree, Basic cut-set and tie-set matrices for planar networks, Loop and nodal methods of analysis of networks with dependent and independent voltage and current sources, Duality and Dual networks.

Unit II

Magnetic Circuit: Basic definition of MMF, flux and reluctance. Analogy between electrical and magnetic circuits. Faraday's laws of electromagnetic induction Concept of self and mutual inductance. Dot convention-coefficient of coupling and composite magnetic circuit. Analysis of series and parallel magnetic circuits.

Unit III

Single Phase A.C Systems: Periodic waveforms (determination of rms, average value and form factor).Concept of phase angle and phase difference – Waveforms and phasor diagrams for

lagging, leading networks. Complex and polar forms of representations, steady state analysis of R, L and C circuits. Power Factor and its significance real, reactive power and apparent power, waveform of instantaneous power triangle and complex power

Unit IV

Analysis of AC Networks: Extension of node and mesh analysis to AC networks, Numerical problems on sinusoidal steady state analysis, Series and parallel resonance, Selectively band width and Quasi factor, Introduction to locus diagram.

Unit V

Network theorems (DC & AC Excitations): Superposition theorem, Thevenin's theorem, Norton's theorem, Maximum Power Transfer theorem, Reciprocity theorem, Millman's theorem and compensation theorem.

Text Books

1. Engineering Circuit Analysis by William Hayt and Jack E.Kemmerley, McGraw Hill Company, 6th edition.
2. Network synthesis: Van Valkenburg; Prentice-Hall of India Private Ltd.

Reference Books

1. Introduction to circuit analysis and design by TildonGlisson. Jr, Springer Publications.
2. Circuits by A.BruceCarlson ,Cengage Learning Publications.
3. Network Theory Analysis and Synthesis by SmarajitGhosh, PHI publications.
4. Networks and Systems by D. Roy Choudhury, New Age International publishers.
5. Electric Circuits by David A. Bell, Oxford publications.
6. Circuit Theory (Analysis and Synthesis) by A.chakrabarthi, DhanpatRai&co.

COURSE OUTCOMES VS POs & PSOs MAPPING (DETAILED; HIGH:3; MEDIUM:2; LOW:1):

CO No.	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	3	3	2	2	-	-	-	-	-	-	-	2	2	2
CO2	3	3	2	2	-	-	-	-	-	-	-	3	2	2
CO3	3	3	2	2	-	-	-	-	-	-	-	3	2	2
CO4	2	2	2	2	-	-	-	-	-	-	-	2	2	2
CO5	2	1	1	2	-	-	-	-	-	-	-	2	2	2
CO*	3	3	2	2	-	-	-	-	-	-	-	3	2	2

** For Entire Course, CO vs. PO-PSO Mapping*

I Year –II Semester Syllabus

Subject Code	Subject Name	L	T	P	C
R19BSH-PH1204	Applied Physics Laboratory	0	0	3	1.5

Course Objectives:

- To impart the practical knowledge in basic concepts of Wave optics, Lasers and Fiber optics and Semiconductor physics
- To familiarize the handling of basic physical apparatus like Vernier callipers, screw gauge, spectrometers, travelling microscope, laser device, optical fibre,etc.

Course Outcomes:

At the end of the course, the students are able to

1. Apply the working principles of laboratory experiments in optics, mechanics, electromagnetic and electronics and perform the experiments using required apparatus. (L3)
2. Compute the required parameter by suitable formula using experimental values (observed values) in mechanics, optics, electromagnetic and electronic experiments. (L3)
3. Analyze the experimental results through graphical interpretation. (L4)
4. Recognize the required precautions to carry out the experiment and handling the apparatus in the laboratory. (L2)
5. Demonstrate the working principles, procedures and applications. (L3)

List of Experiments

1. Determine the thickness of fibre (thin paper/piece of hair) using wedge shaped film
2. Determination of the radius of curvature of the lens by Newton's rings method
3. Determination of the wavelength of mercury light by plane diffraction grating
4. Determination of wavelength of laser light by normal incidence method
5. Determine the Numerical Aperture of a given Optical Fiber and hence find its acceptance angle
6. Determine the energy band gap of a given semi-conductor
7. Determine the temperature co-efficient of resistance of a given Thermistor
8. Determine the resolving power of grating.

Virtual Lab Experiments

1. Determination of the Brewster's angle.
2. Determine the Hall coefficient & the carrier concentration of charge carriers in the given sample materialby Hall Effect.

Reference Books

1. S.BalaSubrahmanian, M.N.Srinivasan "A TextBook of practical physics" by S.Chand publishers,2017

2. Engineering Physics Lab Manual by Dr.Y. Aparna&Dr.K.Venkateswarao (V.G.S.Book links).
3. Laboratory Experiments in College Physics, C.H. Bernard and C.D. Epp, John Wiley and Sons, Inc., New York, 1995.
4. Laboratory Experiments in College Physics, C.H. Bernard and C.D. Epp, John Wiley and Sons, Inc., New York, 1995.
5. "Great Experiments in Physics", M.H.Shamos, Holt, Rinehart and Winston Inc., 1959.
6. “Engineering physics Lab Manual; by Narendra Kolla, amigobookssales@gmail.com.

Web Source References

1. http://vlab.co.in/ba_labs_all.php?id=8
2. http://va-iitk.vlabs.ac.in/
3. http://ml-iitb.vlabs.ac.in/

COURSE OUTCOMES VS POs & PSOs MAPPING (DETAILED; HIGH:3; MEDIUM:2; LOW:1):

CO No.	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	3	1	-	-	-	-	-	-	2	-	-	-	1	-
CO2	3	1	-	-	-	-	-	-	2	-	-	-	1	-
CO3	3	1	-	-	-	-	-	-	2	-	-	-	1	-
CO4	3	1	-	-	-	-	-	-	2	-	-	-	1	-
CO5	3	1	-	-	-	-	-	-	2	-	-	-	1	-
CO*	3	1	-	-	-	-	-	-	2	-	-	-	1	-

** For Entire Course, CO vs. PO-PSO Mapping*

I Year –II Semester

Subject Code	Subject Name	L	T	P	C
R19BSH-EN1201	Communicative English Lab-II	0	0	3	1.5

Course Objectives

- Adopt activity based teaching-learning methods to ensure that learners would be engaged in use of language both in the classroom and laboratory sessions.
- Facilitate active listening to enable inferential learning through expert lectures and talks
- Impart critical reading strategies for comprehension of complex texts
- Provide training and opportunities to develop fluency in English through participation in formal group discussions and presentations using audio-visual aids
- Demonstrate good writing skills for effective paraphrasing, argumentative essays and formal correspondence
- Encourage use of a wide range of grammatical structures and vocabulary in speech and writing

Course Outcomes:

After the completion of this course, the student can able to

1. Enhance pronunciation with befitting tone for clarity in a speech to communicate language effectively(L2)
2. Participate in short conversations in routine contexts on topics of interest and ask questions and make requests politely(L2)
3. Listen for specific information, gist, note-taking, note-making and comprehension and develop convincing and negotiating skills through debates (L2)
4. Acquire effective strategies for good writing and demonstrate the same in summarizing and reporting(L1)
5. Gain knowledge of grammatical structures and vocabulary for day-to-day successful conversations(L1)

Unit I

Listening: Listening for presentation strategies and answering questions on the speaker, audience, and key points. **Speaking:** Formal presentations using PPT slides without graphic elements. **Reading:** Reading for presenting – strategies to select, compile and synthesize information for presentation; reading to recognize academic style. **Writing:** Paraphrasing; using quotations in writing; using academic style - avoiding colloquial words and phrases. **Grammar and Vocabulary:** Formal/academic words and phrases.

Unit II

Listening: Following an argument/ logical flow of thought; answering questions on key concepts after listening to extended passages of spoken academic discourse. **Speaking:** Formal presentations using PPT slides with graphic elements. **Reading:** Understand formal and informal styles; recognize the difference between facts and opinions. **Writing:** Formal letter writing and

email writing (enquiry, complaints, seeking permission, seeking internship); structure, conventions and etiquette. **Grammar and Vocabulary:** Phrasal prepositions; phrasal verbs.

Unit III

Listening: Identifying views and opinions expressed by different speakers while listening to discussions. **Speaking:** Group discussion on general topics; agreeing and disagreeing, using claims and examples/ evidences for presenting views, opinions and position. **Reading:** Identifying claims, evidences, views, opinions and stance/ position. **Writing:** Writing structured persuasive/argumentative essays on topics of general interest using suitable claims, examples and evidences. **Grammar and Vocabulary:** Language for different functions such as stating a point, expressing opinion, agreeing/ disagreeing, adding information to what someone has stated, and asking for clarification.

Unit IV

Listening: Understanding inferences; processing of information using specific context clues from the text. **Speaking:** Group discussion; reaching consensus in group work (academic context). **Reading:** Reading for inferential comprehension. **Writing:** Applying for internship/ job - Writing one's CV/Resume and cover letter. **Grammar and Vocabulary:** Active and passive voice – use of passive verbs in academic writing.

Unit V

Listening: Understanding inferences - processing of explicit information presented in the text and implicit information inferable from the text or from previous/background knowledge. **Speaking:** Formal team presentations on academic/ general topics using PPT slides. **Reading for Writing:** Structure and contents of a Project Report; identifying sections in project reports; understanding the purpose of each section; significance of references. **Grammar and Vocabulary:** Reinforcing learning; editing short texts; correcting common errors in grammar and usage.

Reference Books

- Bailey, Stephen. Academic writing: A handbook for international students. Routledge, 2014.
- Chase, Becky Tarver. Pathways: Listening, Speaking and Critical Thinking. Heinley ELT; 2nd Edition, 2018.
- Skillful Level 2 Reading & Writing Student's Book Pack (B1) Macmillan Educational.
- Hewings, Martin. Cambridge Academic English (B2). CUP, 2012. (Student Book, Teacher Resource Book, CD & DVD)

Sample Web Resources

Grammar/Listening/Writing

1. 1-language.com
2. http://www.5minuteenglish.com/

3. https://www.englishpractice.com/

Grammar/Vocabulary

English Language Learning Online

1. http://www.bbc.co.uk/learningenglish/
2. http://www.better-english.com/
3. http://www.nonstopenglish.com/
4. https://www.vocabulary.com/
5. BBC Vocabulary Games
6. Free Rice Vocabulary Game

Reading

1. https://www.usingenglish.com/comprehension/
2. https://www.englishclub.com/reading/short-stories.htm
3. https://www.english-online.at/

Listening

1. https://learningenglish.voanews.com/z/3613
2. http://www.englishmedialab.com/listening.html

Speaking

1. https://www.talkenglish.com/
2. BBC Learning English – Pronunciation tips
3. Merriam-Webster – Perfect pronunciation Exercises

All Skills

1. https://www.englishclub.com/
2. http://www.world-english.org/
3. http://learnenglish.britishcouncil.org/

Online Dictionaries

1. Cambridge dictionary online
2. MacMillan dictionary
3. Oxford learner's dictionaries

COURSE OUTCOMES VS POs & PSOs MAPPING (DETAILED; HIGH:3; MEDIUM:2; LOW:1):

CO No.	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	-	-	-	-	3	-	-	3	2	3	2	2	-	3
CO2	-	-	-	-	3	2	2	3	3	3	2	2	-	3
CO3	-	-	-	-	3	2	2	3	2	3	2	2	-	3
CO4	2	2	-	-	3	2	-	3	2	3	2	2	-	3
CO5	-	-	-	-	3	2	2	3	2	3	2	2	-	3
CO*	2	2	-	-	3	2	2	3	2	3	2	2	-	3

** For Entire Course, CO vs. PO-PSO Mapping*

I Year –II Semester Syllabus

Subject Code	Subject Name	L	T	P	C
R19MEC-ES1201	Engineering Drawing	1	0	3	2.5

Course Objectives:

- To enhance the communications of the students using engineering drawing.
- To make the student familiar to the drawing practices and convection.
- To familiarize the techniques of constructing polygons, curves and scales.
- To introduce the orthographic projections, projections of points, lines and planes.
- To make the students understand as to how the industry communicates technical information. .
- To enable the student draft simple engineering components and analyze different views of components.

Course Outcomes:

After completing the course, the student will be able to

1. Apply the basics of engineering drawing to construct the polygons and curves. (L3)
2. Draw the orthographic projections, used in points and lines. (L3)
3. Draw the projections of planes in various conditions. (L3)
4. Draw the projections of regular solids inclined to one of the planes. (L3)
5. Imagine the isometric views of orthographic views and vice versa. (L3)

Unit I

Introduction to Engineering graphics: Principles of Engineering Graphics and their significance-Conventions in drawing-lettering - BIS conventions.

Polygons: - Construction of regular polygons using given length of a side;

Ellipse: - Arcs of circles and Oblong methods;

Scales: – Vernier and Diagonal scales.

Applications:

- Elliptical shape - bridges and arches, elliptical trammel.

Diagonal scale is used in engineering to read lengths with higher accuracy as it represents a unit into three different multiple in metres, centimeters and millimeters.

- Vernier scales are used in Machine Shop Applications, Medical Applications, Research & Laboratory Applications etc.

Unit II

Orthographic Projections: Horizontal plane, vertical plane, profile plane, importance of reference lines, projections of points in various quadrants, projections of lines, lines parallel either two of the reference planes (HP,VP or PP)

Projections of straight lines inclined to both the planes, determination of true lengths, angle of inclination and traces- HT, VT.

Applications:

- Structural plans and elevations.

- Stair casing designs, Structural plans and elevations.

Unit III

Projections of planes: regular planes perpendicular/parallel to one plane and inclined to the other reference plane; inclined to both the reference planes.

Applications:

- Structural plans and elevations, stair casing designs.

Unit IV

Projections of Solids: – Prisms, Pyramids, Cones and Cylinders with the axis inclined to one of the planes.

Applications:

- Machine component drawings, AC ducts, cooling towers , piping layout designs,

Unit V

Isometric projections-Conversion of isometric views to orthographic views; Conversion of orthographic views to isometric views.

Applications :

- Structural drawings –industrial components, architectural drawing.

Text Books

1. N.D.Bhatt, Engineering Drawing, 53/e, Charotar Publishers, 2016.
2. Basant Agarwal & C.M.Agarwal, Engineering Drawing, Tata McGraw-Hill, Copy Right, 2008.
3. K.L.Narayana & P.Kannaiah, Engineering Drawing, 3/e, Scitech Publishers, Chennai, 2012.

Reference Books

1. Dhanajay A Jolhe, Engineering Drawing, Tata McGraw-Hill, Copy Right, 2009
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3. Venugopal, Engineering Drawing and Graphics, 3/e, New Age Publishers, 2000
4. K.C.John, Engineering Graphics, 2/e, PHI, 2013

COURSE OUTCOMES VS POs & PSOs MAPPING (DETAILED; HIGH:3; MEDIUM:2; LOW:1):

CO No.	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	3	3	2	-	-	-	-	-	-	-	-	1	2	-
CO2	3	3	2	1	-	-	-	-	-	-	-	1	1	-
CO3	3	3	2	-	2	-	-	-	-	-	-	1	1	-
CO4	3	3	2	1	2	-	-	-	-	-	-	1	1	-
CO5	3	3	2	-	3	-	-	-	-	-	-	1	1	-
CO*	3	3	2	1	2	-	-	-	-	-	-	1	1	-

** For Entire Course, CO vs. PO-PSO Mapping*

I Year –II Semester Syllabus

Subject Code	Subject Name	L	T	P	C
R19MEC-ES1205	Engineering Workshop & IT Workshop (EEE)	0	0	3	1.5

Course Objective:

- Familiarize different wood working operation in carpentry.
- Understand to build different parts with sheet metal.
- Familiarize various fitting operations.
- Understand the smithy and black smithy operations for real world applications.
- Compare black smith and Tin smith.
- Understand the basic components and peripherals of a computer. • To become familiar in configuring a system.

Course Outcomes:

After completion of this lab, the student will be able to

1. Apply wood working skills in real world applications. (L3)
   Apply forging operations for different black smith applications. (L3)
2. Build different parts with fitting in engineering applications. (L3)
3. Apply forging operations for different black smith applications. (L3)
4. Understand the basic components, peripherals and basic operations of a computer (L3)
5. Get hands on experience in trouble shooting a system? (L3)

List of Experiments (Engineering Workshop)

Carpentry (Any Two)

1 T-Lap Joint
2 Cross Lap Joint
3 Dovetail Joint
4 Mortise and Tennon Joint

Fitting (Any ONE)

5 Vee Fit
6 Square Fit
7 Half Round Fit
8 Dovetail Fit

Black Smithy (Any One)

9 Round rod to Square
10 S-Hook
11 Round Rod to Flat Ring
12 Round Rod to Square headed bolt

Tin Smithy (Any Two)

13 Taper Tray
14 Square Box without lid
15 Open Scoop
16 Funnel

List of Experiments (IT Workshop)

1 System Assembling, Disassembling and identification of Parts / Peripherals
2 **Operating System Installation**-Install Operating Systems like Windows, Linux along with necessary Device Drivers.
3 **MS-Office / Open Office**
   a) **Word** - Formatting, Page Borders, Reviewing, Equations, symbols.
   b) **Spread Sheet** - organize data, usage of formula, graphs, charts.
   c) **Power point** - features of power point, guidelines for preparing an effective presentation.
   d) **Access**- creation of database, validate data.
4 **Network Configuration & Software Installation-**Configuring TCP/IP, proxy and firewall settings. Installing application software, system software & tools.
5 **Internet and World Wide Web**-Search Engines, Types of search engines, netiquette, cyber hygiene.
6 **Trouble Shooting-**Hardware trouble shooting, Software trouble shooting**.**

COURSE OUTCOMES VS POs & PSOs MAPPING (DETAILED; HIGH:3; MEDIUM:2; LOW:1):

CO No.	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	3	2	2	-	-	-	-	-	3	-	2	1	-	-
CO2	3	2	2	1	-	-	-	-	3	-	2	1	-	-
CO3	3	2	2	1	-	-	-	-	3	-	2	1	-	-
CO4	3	2	2	-	-	-	-	-	3	-	2	1	-	-
CO5	3	2	2	1	-	-	-	-	3	-	2	1	-	-
CO*	3	2	2	1	-	-	-	-	3	-	2	1	-	-

** For Entire Course, CO vs. PO-PSO Mapping*

I Year –II Semester Syllabus

Subject Code	Subject Name	L	T	P	C
R19BSH-MC1201	Constitution of India	3	0	0	0

Course Objectives:

- To Enable the student to understand the importance of constitution
- To understand the structure of executive, legislature and judiciary
- To understand philosophy of fundamental rights and duties
- To understand the autonomous nature of constitutional bodies like Supreme Court and high court controller and auditor general of India and election commission of India.
- To understand the central and state government aspects related to finance and administrative.

Course Outcomes:

At the end of the course, the student will be able to

1. Understand historical background of the constitution making and its importance for building a democratic India. (L2)
2. Understand the functioning of three wings of the government ie., executive, legislative and judiciary. (L2)
3. Understand the value of the fundamental rights and duties for becoming good citizen of India. (L2)
4. Analyze the decentralization of power between central, state and local self-government. (L4)
5. Apply the knowledge in strengthening of the constitutional institutions like CAG, Election Commission and UPSC for sustaining democracy. (L3)

Unit I

Introduction to Indian Constitution: Constitution' meaning of the term, Indian Constitution-Sources and constitutional history, Features - Citizenship, Preamble, Fundamental Rights and Duties, Directive Principles of State Policy.

Unit II

Union Government and its Administration Structure of the Indian Union: Federalism, Centre- State relationship, President: Role, power and position, PM and Council of ministers, Cabinet and Central Secretariat, Lok Sabha, Rajya Sabha, The Supreme Court and High Court: Powers and Functions.

Unit III

State Government and its Administration: Governor - Role and Position - CM and Council of ministers, State Secretariat: Organization, Structure and Functions.

Unit IV

Local Administration: District's Administration Head - Role and Importance, Municipalities - Mayor and role of Elected Representative - CEO of Municipal Corporation PachayatiRaj: Functions PRI: Zilla Panchayat, Elected officials and their roles, CEO ZilaPanchayat: Block

level Organizational Hierarchy - (Different departments), Village level - Role of Elected and Appointed officials - Importance of grass root democracy

Unit V

Election Commission: Election Commission- Role of Chief Election Commissioner and Election Commissionerate State Election Commission:, Functions of Commissions for the welfare of SC/ST/OBC and women

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2. SubashKashyap, Indian Constitution, National Book Trust
3. J.A. Siwach, Dynamics of Indian Government & Politics, SAGE Publications India Pvt Ltd
4. D.C. Gupta, Indian Government and Politics, Vikas publishing house
5. H.M.Sreevai, Constitutional Law of India, 4th edition in 3 volumes (Universal Law Publication)
6. J.C. Johari, Indian Government and Politics Hans, Novelty & Co.,
7. J. Raj Indian Government and Politics, SAGE Publications India Pvt
8. M.V. Pylee, Indian Constitution Durga Das Basu, Human Rights in Constitutional Law, Prentice – Hall of India Pvt. Ltd.. New Delhi
9. Noorani, A.G., (South Asia Human Rights Documentation Centre), Challenges to Civil Right), Challenges to Civil Rights Guarantees in India, Oxford University Press 2012

E-Resources

1. nptel.ac.in/courses/109104074/8
2. nptel.ac.in/courses/109104045/
3. nptel.ac.in/courses/101104065/
4. www.hss.iitb.ac.in/en/lecture-details
5. www.iitb.ac.in/en/event/2nd-lecture-institute-lecture-series-indian-constitution

COURSE OUTCOMES VS POs & PSOs MAPPING (DETAILED; HIGH:3; MEDIUM:2; LOW:1):

CO No.	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	-	-	-	-	-	2	1	1	-	-	-	1	-	2
CO2	-	-	-	-	-	2	1	1	-	-	-	1	-	1
CO3	-	-	-	-	-	2	1	1	-	-	-	1	-	1
CO4	-	-	-	-	-	2	1	1	-	-	-	1	-	1
CO5	-	-	-	-	-	2	1	1	-	-	-	1	-	1
CO*	-	-	-	-	-	2	1	1	-	-	-	1	-	1

** For Entire Course, CO vs. PO-PSO Mapping*