Dr. BABASAHEB AMBEDKAR MARATHWADA UNIVERSITY,
CHHATRAPATI SAMBHAJINAGAR.

CIRCULAR NO.SU/ Engg./NEP-2020/117/2024

It is hereby inform to all concerned that, the syllabus prepared by the Board of Studies and recommended by the Dean, Faculty of Science & Technology, **Academic Council at its meeting held on 05 June 2024 has accepted the Scheme of Examination and Revised First Year B.E syllabus "Group A" – Mechanical Engineering; Civil Engineering and "Group B"– Computer Science and Engineering; AI & ML; Electrical and Electronics Engineering as per Norms of National Education Policy – 2020 under the Faculty of Science & Technology run to the Affiliated Colleges, Dr.Babasaheb Ambedkar Marathwada University** as appended herewith.

This is effective from the Academic Year 2024-25 and onwards.

All concerned are requested to note the contents of this circular and bring the notice to the students, teachers and staff for their information and necessary action.

University Campus,
Chhatrapati Sambhajinagar
-431 004.
REF.NO. SU/ENGG/2024/ 853-61
Date:- 15.06.2024.

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Deputy Registrar,
Academic Section.

Copy forwarded with compliments to :-

1] **The Principal of all concerned Colleges,**
Dr. Babasaheb Ambedkar Marathwada University,

2] **The Director, University Network & Information Centre, UNIC, with a request to upload this Circular on University Website.**

Copy to :-

1] The Director, Board of Examinations & Evaluation, Dr.Babasaheb Ambedkar Marathwada University,Chhatrapati Sambhajinagar.

2] The Section Officer,[Engg.Unit] Examination Branch, Dr.Babasaheb Ambedkar Marathwada University,Chhatrapati Sambhajinagar.

3] The Programmer [Computer Unit-1] Examinations, Dr.Babasaheb Ambedkar Marathwada University, Chhatrapati Sambhajinagar.

4] The Programmer [Computer Unit-2] Examinations, Dr.Babasaheb Ambedkar Marathwada University,Chhatrapati Sambhajinagar.

5] The In-charge,[E-Suvidha Kendra], Rajarshi Shahu Maharaj Pariksha Bhavan, Dr.Babasaheb Ambedkar Marathwada University,Chhatrapati Sambhajinagar.

6] The Public Relation Officer, Dr.Babasaheb Ambedkar Marathwada University, Chhatrapati Sambhajinagar.

7] The Record Keeper, Dr.Babasaheb Ambedkar Marathwada University, Chhatrapati Sambhajinagar.

Dr. Babasaheb Ambedkar Marathwada University

Chhatrapati Sambhajinagar- 431001

Four Year UG Engineering Programme

First Year Course Structure and Curriculum

(Revised)

(AS PER NEP-2020)

Group B

(Computer Science and Engineering; AI&ML; Electrical and Electronics Engineering)

Effective from 2024-25

Dr. B.S. Sonawane

Dr. S. P. Bhosle

Dr. Hamed Sable

Dr. A. J. Kedar

National Education Policy (NEP) Based Programme Structure:

The National Education Policy 2020, lays emphasis on of making the education more holistic andeffective by integration of general (academic) and vocational education while ensuring the vertical and horizontal mobility of students and learners between academic and vocational streams. NEP strives to transform India into a vibrant knowledge society to become a global knowledge superpower.

The National Credit Framework (NCrF) is an inclusive umbrella Framework to seamlessly integrate the credits earned through school education, higher education and vocational and skill education. For creditisation and integration of all learning, the National Credit Framework (NCrF) shall encompass the qualification frameworks for higher education, vocational and skill education and school education, namely National Higher Education Qualification Framework (NHEQF), National Skills Qualification Framework (NSQF) and National School Education Qualification Framework (NSEQF) also popularly known as National Curricular Framework (NCF)respectively. The implementation of NCrF will help in realizing the vision and intent of NEP by removing distinction, ensuring flexibility and mobility and establishing academic equivalence between general and vocational education. The National Credit Framework (NCrF) provides for broad based, multi-disciplinary, holistic education, allowing imaginative and need based curricular structures and enabling creative combinations of subjects and disciplines. The Framework has been built on the strength of existing regulations, guidelines and qualification frameworks of UGC, AICTE, NCVET, NCERT, CBSE and NIOS so that the options for Multiple Entry-Multiple Exit (ME-ME) are accessible and applicable across the higher education, school education and vocational education.

Multiple Entry Multiple Exit Criteria:

For Multiple Entry Multiple Exit (MEME), at the end of one year study, an equivalent degree can be awarded. The NCrF credit levels for school education are upto level 4, while for higher education from Level 4.5 to level 8 (Under-Graduate Levels 4.5, 5.0, 5.5 and 6.0, Post Graduate Levels 6.0, 6.5 and 7.0, and PhD Level 8) and for vocational education and training at level 4.5 to level 8.

Credit Framework under Four-Years UG Engineering Programme withMultiple Entry and Multiple Exit options:

The Four-year Bachelor's Multidisciplinary Engineering Degree Programme allows the students to experience the full range of holistic and multidisciplinary education in addition to a focus on the chosen major and minors as per their choices and the feasibility of exploring learning in different institutions. The minimum and maximum credit structure for different levels under the Four-year Bachelor's Multidisciplinary Engineering UG Programme with multiple entry and multiple exit options are as given below**:**

Table 1: Program Level, Credit, Exit-Equivalence

Levels	Qualification Title	Credit Requirements	Semester	Year
4.5	One Year UG Certificate inEngg./ Tech.	44	2	1
5.0	Two Years UG Diploma in Engg./ Tech.	88	4	2
5.5	Three Years Bachelor's Degree in Vocation (B. Voc.) or B. Sc. (Engg./ Tech.)	132	6	3
6.0	4-Years Bachelor's degree (B.E./B.Tech. or Equivalent)in Engg./ Tech. with Multidisciplinary Minor	176	8	4
6.0	4-Years Bachelor's degree(B.E./ B.Tech. or Equivalent) in Engg./Tech.- Honors and Multidisciplinary Minor	194	8	4
6.0	4-Years Bachelor's degree(B.E./ B.Tech. or Equivalent) in Engg./ Tech.- Honors with Research and Multidisciplinary Minor	194	8	4
6.0	4-Years Bachelor's degree(B.E./ B.Tech. or Equivalent) in Engg./	194	8	4
	Tech.- Major Engg. Discipline with Double Minors(Multidisciplinary and Specialization Minors)			

1. With effect from Academic Year 2024-25, the first year of 4-Year Multidisciplinary Bachelor's Degree in Engg./ Tech. Program (B.E./ B.Tech. or Equivalent) will be introduced. Thus, the Fourth Year of Bachelor's Engg./ Tech. Degree (Level 6.0) with various options- Bachelor's Engg./ Tech. Degree in chosen Major Engg./ Tech. Discipline with Multidisciplinary Minor (176 credits), OR Bachelor's Engg./ Tech. Honours Degree in chosen Major Engg./ Tech. Discipline with Multidisciplinary Minor (194 credits) OR Bachelor's Engg./ Tech. Honours with Research Degree in chosen Major Engg./ Tech. Discipline withMultidisciplinary Minor (194 credits) OR Bachelor's Engg./ Tech. Degree inchosen Major Engg./ Tech. Discipline with Double Minor (Multidisciplinary andSpecialization Minor, 194 credits) will begin with effect from Academic

Year 2027-28.

2. Under Bachelor's Engg./ Tech. Honours with Research Degree in chosen Major Engg./ Tech. Discipline with Multidisciplinary Minor (194credits), the students will work on a research project or dissertation for 18 credits in the fourth year in therespective Major Engg./ Tech. Discipline. The decision regarding the distribution of 18 credits for Research Project in Semesters VII and VIII of the Fourth Year will be taken by Academic Authorities of institute. These 18 Credits will be over and above the min. 194 Credits prescribed for Four Year Multidisciplinary Bachelor's Degree in Engg./ Tech. Program.

3. The Bachelor's Engg./ Tech. Honours Degree in chosen Major Engg./ Tech. Discipline with Multidisciplinary Minor (186 credits) enables students to take up five-six additional coursesin the same Engg./ Tech. discipline of 18 credits distributed over semesters III to VIII. The decision regarding the mechanism of distribution of these 18 credits over semesters III to VIII, which are over and above the min. 194 Credits prescribed for Four Year Multidisciplinary Bachelor's Degree in Engg./ Tech., will be taken by Academic Authoritiesof institute.

4. Under Bachelor's Engg./ Tech. Degree in chosen Major Engg./ Tech. Discipline with Double Minor (Multidisciplinary and Specialization Minor, 186 credits), students would take up five-six additional courses of 18 credits in another Engg./ Tech. discipline/ Emerging Areas Specialization distributed over semesters III to VIII. The decision regarding the mechanism of distribution of these 18 credits over semesters III to VIII, which are over and above the min. 194 prescribed for Four Year Multidisciplinary Bachelor's Degree in Engg./ Tech., will be taken by Academic Authorities Institute.

Distribution of Credits across Four Years Engg./Tech. Degree Programmes In general, for the four years' bachelor's degree programme, the distribution of credits will be asfollows:

1. Major (Core) Subject comprising Mandatory and Elective Courses:
   - **(a)** Minimum 50% of total credits corresponding to Three/Four – year UG Degree-Mandatory Courses offered in all Four years;
   - **(b)** Elective courses of Major will be offered in the third and/or final year.
   - **(c)** Vocational Skill Courses, Internship/ Apprenticeship, Community EngagementProject (CEP)/ Field Projects (FP), Research Projects connected to Major
   - **(d)** Compulsory Multidisciplinary Minor Subject: 14 Credits
     i. The Minor subjects may be from the different disciplines of the Engineering faculty, or they can be from different faculty altogether.
     ii. The credits of compulsory Minor subjects shall be completed from the secondyear to the final year of UG Programme.
   - **(e)** Generic/ Open Elective Courses (OE): 08 credits
     i. It is to be offered in Second and/or Third year
     ii. Faculty-wise baskets of OE shall be prepared by University/Autonomous Engineering Colleges.

iii. OE is to be chosen compulsorily from faculty other than that of the Major Discipline.

(f) Vocational and Skill Enhancement Courses (VSEC): 08 credits

- Vocational Skill Courses (VSC): 04 credits, including Hands on Training corresponding to the Major and/or Minor Subject:

i. To be offered in first three years;
ii. Wherever applicable vocational courses will include skills based on advanced laboratory practicals of Major.

- Skill Enhancement Courses (SEC) : 04 credits

i. To be offered in first three years;
ii. To be selected from the basket of Skill Courses approved by University/ Autonomous Engineering Colleges

(g) Ability Enhancement Courses (AEC), Indian Knowledge System (IKS) and Value Education Courses (VEC): 10 Credits

- AEC: 04 credits

i. To be offered in First and Second year
ii. English: 02 Credits
iii. Modern Indian Language: 02 credits
iv. To be offered from the Basket approved by University / AutonomousCollege;

The focus for both languages should be on linguistic and communication skills.

- IKS: 02 Credits

i. To be offered in First Year
ii. Courses on IKS to be selected from the basket of IKS courses approved by
iii. University/ Autonomous Colleges or as per UGC Guidelines on IKS.

- VEC: 04 Credits

i. To be offered in Second year
ii. Value Education Courses (VEC) such as Understanding India, Environmental Science/Education, and Digital and Technological Solutions.

(h) Field Projects/ Internship/ Apprenticeship/ Community Engagement Projects corresponding to the Major (Core) Subject, Co-curricular Courses (CC).

- Internship/Apprenticeship corresponding to the Major (Core) Subject: 12 Credits. Internship of One Semester duration shall be offered either in the VIIor VIII semesters. Courses offered during the Internship Semester shall be offered in online mode.
- Field Projects/Community Engagement Projects corresponding to the Major (Core) Subject: minimum 02 credits
  - To be offered in Second year of UG Degree Programmes.
- Co-curricular Courses (CC) such as Health and Wellness, Yoga education sports, and fitness, Cultural Activities, NSS/NCC and Fine/ Applied/ Visual/Performing Arts: 04 credits
  - To be offered in First year

(i) Additional Credits for Bachelor's Degree- with Double Minor OR Honours: 18-20 Credits

- These are additional credits to be offered from the second year to thefinal year and will be offered as an option to students.

(j) Additional Credits for Bachelor's Degree- Honours with Research: Minimum 18 Credits

- These are additional credits to be offered in the final year and will be offered as an option to students.

The UGC Regulations, 2021 permit up to 40% of the total courses being offered in a particular programme in a semester through the **Online Learning Courses** offered through the **SWAYAM** platform and/or other State Level Common Platforms which can be developed in due course with the participation of different Universities/ HTEIs.

Illustrative Semester wise Credit distribution structure for Four Year UG Engineering Program – One Major, One Minor

Semester		**I**	**II**	**III**	**IV**	**V**	**VI**	**VII**	**VIII**	**Total Credits**
Basic Science Course	BSC/ESC	06-08	08-10		--	--	--	--	--	14-18
Engineering Science Course		10-08	06-04		--	--	--	--	--	16-12
Programme Core Course(PCC)	Program Courses	--	02	08-10	08-10	10-12	08-10	04-06	04-06	44-56
Programme Elective Course(PEC)		--	--	--	--	04	08	02	06	20
Multidisciplinary Minor(MD M)	Multidisciplinary Courses		-	02	02	04	02	02	02	14
Open Elective (OE) Otherthan a particular program		--	--	04	02	02	--	--	--	08
Vocational and Skill Enhancement Course(VSEC)	Skill Courses	02	02	--	02	--	02	--	--	08
Ability Enhancement Course(AEC -01, AEC-02)	Humanities Social Science and Management (HSSM)	02	--	--	02	--	--	--	--	04
Entrepreneurship/Economics/ Management Courses		--		02	02	--	--	--	--	04
Indian Knowledge System(IKS)			02		--	--	--	--	--	02
Value Education Course(VEC)		--	--	02	02	--	--	--	--	04
Research Methodology	Experiential Learning Courses	--	--	--	--	--	--		04	04
Comm. Engg. Project (CEP)/Field Project (FP)		--	--	02	--	--	--	-	-	02
Project		--	--	--	--	--	--		04	04
Internship/ OJT		--	---			--	--	-	12	12
Co-curricular Courses (CC)	Liberal Learning Courses	02	02		--	--	--	--	-	04
Total Credits (Major)		**20-22**	**20-22**	**20-22**	**20-22**	**20-22**	**20-22**	**20-22**	**20-22**	**160-176**

Abbreviations: Generic/ Open Electives: OE; Vocational Skill and Skill Enhancement Courses: VSEC; Vocational Skill Courses: VSC; Skill Enhancement Courses: SEC; Ability Enhancement

Courses: AEC; Indian Knowledge System: IKS; Value Education Courses: VEC; OJT: On Job Training: Internship/ Apprenticeship; Field projects: FP; Community engagement project: CEP; Co-curricular Courses: CC; RM: Research Methodology; Research Project: RP, Liberal Learning Course: Lib. Learn, Courses on Humanities, Social Science, and Management: HSSM

Note: The Credit Distribution Table given above is illustrative only. The Universities/ Autonomous Colleges may suitably modify within the broader framework of credit distribution across seven verticals and as per the AICTE rules and regulations.

Credit Specifications

i. Theory Courses: 15 hours of teaching per credit is required in a semester.

ii. Laboratory Course: 30 hours in laboratory activities per credit is required in a semester.

iii. Studio activities: Studio activities involve the engagement of students increative or artistic activities. Every student is engaged in performing a creativeactivity to obtain a specific outcome. Studio-based activities involvevisual- or aesthetic-focused experiential work. A minimum of 30 hours in studioactivities per credit in a semester is required.

iv. Workshop-based activities: Courses involving workshop-based activities require the engagement of students in hands-on activities related to work/vocation or professional practice. Every student is engaged inperforming a skill-based activity. Related to specific learning outcome(s). 30 hours of workshop-based activities per credit in a semester is required.

v. Seminar/ Group Discussion: 15 hours of participation in seminar/ Group Discussion activity per credit in a semester is required.

vi. Internship: Credits for internship shall be one credit per two weeks of internship (or 36-40 hours of engagement), The internship shall be monitoredjointly by the faculty and Industry/ Organization Mentor. Internship of OneSemester duration shall be offered either in the VII or VIII semesters. Coursesoffered during the Internship Semester shall be offered in online mode.

vii. Field-based Learning/ Practices: These are the courses requiring students to participate in field-based learning/projects generally under the supervision of faculty. A minimum of 26-30 hours of learning activities per credit in a semester is required.

viii. Community Engagement Projects: These are the courses requiring students to participate in field-based learning/projects generally under the supervision of faculty. The curricular component of 'community engagement and service' will involve activities that would expose students to the socio-economic issuesin society so that the theoretical learning can be supplemented by actual life experiences to generate solutions to real-life problems. 30 hours of contacttime per credit in a semester along with 15 hours of activities such as preparation for community engagement and service, preparation of reports,

etc., and independent reading and study with 2 credit courses.

Academic Bank of Credits (ABC), Admission System, Multiple Entryand Exit Path and Lateral Entry

(a) Enrolment of Students and Registration of Colleges on ABC

All the students shall register on ABC at the time of admission. Since Credits awarded to a student for one programmes from an institution may be transferred/redeemed by another institution upon the student's consent throughABC, it is essential that all students should get enrolled on ABC, create ABC ID, and share these ABC IDs with Academic Institutions where they areenrolled. Credits Earned by the student will reflect in the student's ABC account.

Multi-institutional learning permission: The student shall be allowed to earn some credits from institutions/colleges other than the Main/ Parent College i.e. a college where students earn all their major credits (more than 50%) including credits for the core subject. Students enrolled in the degree programmes may avail of other elective credits from two different colleges affiliated with the same University and/or online courses available within the 40% cap mentioned by UGC.

(b) Multiple Exits: Students will have the flexibility to enter a programme in odd semesters and exit a programme after the successful completion of even semesters as per their future career needs.

- Students exiting the First Year programme after securing minimum 44credits will be awarded UG Certificate in the relevant Discipline /Subject provided they secure 8 credits in work-based vocational courses or internship / Apprenticeship offered during summer vacation in addition to 4 credits from skill-based courses earned during the first and second semester.
- Students exiting the Second Year Programme after securing minimum 88 credits will be awarded UG Diploma in the relevant Discipline /Subject provided they secure additional 8 credits in skill-based vocational courses (skill-based courses, internship, mini projects etc) offered during summer vacation after the second year.
- Students exiting the 3-year UG program will be awarded B.Voc. in the relevant Discipline /Subject upon securing minimum 132 credits with additional 8 credits in skill-based vocational courses (skill-based courses, internship, mini projects etc.) offered during summer vacation after the sixth

semester.

- Exit options shall be provided with Certification, Diploma and B. Vocational degrees to the students at the end of the second, fourth and sixth semester, respectively, in the four-year degree programme. Students will receive a Bachelor's degree with the single minor on successfully completing all eight semesters of the UG Programmes either at a stretch or with opted exits and re-entries. In addition to this, student will receive a Bachelor's degree with Double Minor/Honours/ Research subject to earning additional 18 credits.

Re-entry or Lateral Entry: Students, opting for exits at any level, will have the option to re-enter the programme from where they had left off, in the same or ina different higher education institution within four years of exit and complete the degree programme within the stipulated maximum period of eight years from the date of admission to first year UG. Re-entry at various levels for lateralentrants in academic programmes shall be based on the earned and valid credits as-deposited and accumulated in the Academic Bank of Credits (ABC) through Registered Higher & Technical Education Institutions (RHTEI) and proficiencytest records. Lateral entry into the programme of study leading to the UG Diploma/ B. Vocational/ UG Bachelor's Degree with single minor/ UG Bachelor's Degree with Double Minor/ Honours /Research will be based on the validation of prior learning outcomes achieved and subject to availability based on intake capacity.

(c) Eligibility for admission to the UG Bachelor's Degree with Double Minor/ Honours /Research as per UGC guidelines: Minimum CGPA/CPI of 7.5 or minimum 75% after second semester for UG Bachelor's Degree with Double Minor/ Honours and Minimum CGPA/CPI of 7.5 or minimum 75% after sixth semester for UG Bachelor's Degree with Research.

Validity of Programme

Validity of the credit earned for UG is 8 years, that is, the maximum duration from entering into program level 4.5 to exit from program level 6.0 is 8 years, after that the credit earned at any level cannot be utilized towards earning UG degree, i.e., B.Tech. degree.

Program Outcomes

PO1: Engineering Knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2:-Problem Analysis: Identify, formulate, review research literature, and analyse complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural science and engineering sciences.

PO3: Design & Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet specified needs with appropriate consideration for the public health and safety and the cultural ,societal and environmental considerations.

PO4: Conduct Investigations of Complex Problems: Use research based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of information to provide valid conclusions.

PO5: 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.

PO6: 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.

PO7: 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.

PO8: Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9: Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10: 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.

PO11: 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.

PO12: Life-Long Learning : Recognize the need for, and have the preparation and ability to engage in independent and lifelong learning in the broadest context of technological change.

F. Y. B.E. Syllabus Structure w.e.f. 2024-25 (NEP 2020 Based Curriculum)

Group B (Computer Science and Engineering; AI&ML; Electrical and Electronics Engineering)

Semester –I

Orientation Program + Foundation Course (3 Weeks) : Mandatory

Sr. No.	Course Category	Course Code	Course Title	Contact Hours per week		Credits		Scheme of Examination		
				Theory	Practical	Theory	Practical	CIA	SEE	Total
1	BSC	BSC101A	Applied Mathematics-I	3	----	3	----	40	60	100
2	BSC	BSC102A/ 103A	Engineering Physics / Engineering Chemistry	3	----	3	----	40	60	100
3	ESC	ESC108	Principles of Programming Language	3	----	3	----	40	60	100
4	ESC	ESC109	Basics of Electrical Engineering	3	----	3	----	40	60	100
5	VSEC	VSE106	Design Thinking	2	----	2	----	20	30	50
6	HSSM	HSM107	Professional Communication Skills	2	----	2	----	20	30	50
7	BSC	BSC121A/ 122A	Engineering Physics / Engineering Chemistry LAB	----	2	----	1	20	30	50
8	ESC	ESC127	Principles of Programming Language LAB	----	2	----	1	20	30	50
9	ESC	ESC128	Basics of Electrical Engineering LAB	----	2	----	1	20	30	50
10	ESC	ESC129	Fundamentals of Web Programming	----	2	----	1	20	30	50
11	LLC	LLC126 A	Yoga	----	4	----	2	20	30	50
				16	12	16	6	300	450	750

Semester –II

Sr. No.	Course Category	Course Code	Course Title	Contact Hours per week		Credits		Scheme of Examination		
				Theory	Practical	Theory	Practical	CIA	SEE	Total
1	BSC	BSC151A	Applied Mathematics-II	3	----	3	----	40	60	100
2	BSC	BSC102A/ 103A	Engineering Physics / Engineering Chemistry	3	----	3	----	40	60	100
3	ESC	ESC158	Engineering Graphics	3	----	3	----	40	60	100
4	ESC	ESC110	Basics of Electronics Engineering	3	----	3	----	40	60	100
5	ESC	ESC159	Programming for Problem Solving	2	----	2	----	20	30	50
6	IKS	IKS156	Indian Knowledge System	2	----	2	----	20	30	50
7	VSEC	VSE157	Experiential Learning Lab	----	2	----	1	20	30	50
8	BSC	BSC121B/ 122B	Engineering Physics / Engineering Chemistry LAB	----	2	----	1	20	30	50
9	ESC	ESC171	Basics of Electronics Engineering LAB	----	2	----	1	20	30	50
10	ESC	ESC172	Engineering Graphics LAB	----	2	----	1	20	30	50
11	LLC	LLC126 B	Health and Wellness	----	4	----	2	20	30	50
				16	12	16	6	300	450	750

Exit Course-Electrical & Electronics

Exit option: Award of UG Certificate in Major with 44 credits and an additional 8 credits from following Exit Courses				
Sr. No.	**Course Code**	**Course Title**	**Mode**	**Credits**
1	EE-EC-0101	Industrial Training / Internship	Online/offline certification Course	8
		OR		
2	EE-EC-0102	Building Electrification		4
	EE-EC-0104	Building Electrification Lab		4
		OR		
3	EE-EC-0103	Repair & Maintenance Electronics appliances		4
	EE-EC-0105	Repair & Maintenance Electronics appliances Lab		4

Exit Course- Computer Science and Engineering; AI&ML

Exit option: Award of UG Certificate in Major with 44 credits and an additional 8 credits from following Exit Courses				
Sr. No.	**Course Code**	**Course Title**	**Mode**	**Credits**
1	CSE-EC-0101	Industrial Training / Internship	Online/offline certification Course	8
		OR		
2	CSE-EC-0102	IT Support Engineering		4
	CSE-EC-0104	IT Support Engineering Lab		4
		OR		
3	CSE-EC-0103	Web Development		4
	CSE-EC-0105	Web Development Lab		4

Semester I

Faculty of Science & Technology Syllabus of F. Y. B.E (Computer Science and Engineering; AI&ML; Electrical and Electronics Engineering) (Semester I)		
Course Code: BSC101A Course: Applied Mathematics-I Credits: 3 Theory: 03Hrs/week ; 45 Hrs / Semester		
Prerequisite	**Section**	Students required the knowledge of all basic concepts related to calculus and differential equations.
Objectives		1. To develop skills and create interest to use mathematics in Engineering & technology 2. To know how the real word problems governed by the first order differential equations and calculus. 3. To understand the importance of differential calculus and differential equations in Engineering & technology. 4. To learn formation and solving various types of differential equations.
Course Outcomes		1. Solve the problems of partial and total differentiation of functions of two variables. 2. Examine functions for maxima and minima 3. Use method of curve tracing to trace curves. 4. Evaluate integration of various types of functions by reduction formulas, beta function and gamma function. 5. Determine the value of double and triple integrals. **6.** Apply multiple integrals toarea, volume and surfaces.
Unit-I	**A**	**Differential Calculus**: Taylor's Series, Maclaurin's Series, Indeterminate Forms: L' Hospital's Rule (Without Proof), Evaluation of Limits. (7 Hrs)
	B	**Infinite Series**: Sequences, Introduction to Infinite Series, Convergence and Divergence of Infinite Series: Comparison Test, D' Alembert's Ratio Test, Cauchy's N^{th} Root Test. (8 Hrs)
Unit-II	**A**	**Partial Differentiation**: Partial Derivatives - Introduction, Homogeneous Functions of Two Variables - Euler's Theorem, Implicit Functions, Total Derivative, Change of Variables. (8 Hrs)
	B	**Applications of Partial Differentiation**: Maxima and Minima of Functions of Two Variables, Jacobians and Its Properties. (7Hrs)
Unit-III	**A**	**Differential Equations**: Solution of First Order and First Degree Differential Equation: Exact, Linear and Bernoulli's Equation (Reducible to Linear) (8 Hrs)
	B	**Application Of Differential Equations**: Application of First Order and First-Degree Differential Equations: Electrical Circuit, Mechanics. (7 Hrs)

		Sr. No.	Title	Author	Publication	Edition
Textbooks / Reference Books		1.	Advanced Engineering Mathematics	Louis C. Barrett, Ray Wylie C	McGraw-Hill Publishing Company Ltd, New Delhi, 2003.	6th Edition
		2.	Engineering Mathematics-Volume I	Venkatraman. M.K	National publishing company, Chennai, 2008.	4th edition
		3.	Higher Engineering Mathematics	Dr. Grewal. B.S.	Khanna Publications, New Delhi, 2007.	40th Edition
		4.	Advanced Engineering Mathematics	H. K. Dass.	S. Chand And Co. Ltd	18th Edition
		5.	Advanced Engineering Mathematics	Erwin Kreyszig	Willey Eastern Ltd. Mumbai	10th Edition
		6.	Advanced Engineering Mathematics	M. D. Greenberg	Pearson Publication	2nd Edition
		7.	A Textbook of Engineering Mathematics	Peter O'Neil	Thomson Asia Pvt. Ltd., Singapore	7th Edition

Faculty of Science & Technology **Syllabus of F. Y. B.E (Computer Science and Engineering ;AI&ML ;Electrical and Electronics Engineering) (Semester I)**	
Course Code: BSC102A Course: Engineering Physics Credits: 3 Theory: 03 Hrs/week ; 45 Hrs / Semester	
Objectives	1. To let the engineering undergraduates study physical properties, concepts and physical quantities required for the solution of complex engineering problems 2. To make the engineering undergraduates learn basic principles of Physics and laws of scientific investigation to identify, formulate and analyse complex engineering problems 3. To equip engineering undergraduates with competencies of scientific methods required in engineering career by upgrading skills on the basis of learning achieved from physical science perspectives. 4. To engage engineering undergraduatesextensively in scientific investigation for interdisciplinary graduate programs and a wide variety of other lifelong learning opportunities.
Course Outcomes	1. Recall basics of Optics, Sound and Modern Physics 2. Explain phenomenon in Optics, Sound and Modern Physics 3. Apply concepts of Optics, Sound and Modern Physics to solve complex engineering problems 4. Analyze the concepts of Optics, Sound and Modern Physics 5. Interpret the characteristics of Solar cell, Zener diode, Transistor, Planks constant curve, GM Counter curve 6. Experiment with Reverberation Time, Energy Band Gap, Wavelength of Light, Dielectric Constant, Specific Rotation, Wavelength of Ultrasonic waves, divergence of the laser beam, and hall coefficient
Unit-I	**A:Optics** The wave equation, Introduction to electromagnetic waves and electromagnetic spectrum, Newton's ring, Michelson interferometer, Applications of interference Diffraction of light, diffraction grating, resolving power of grating, Application of diffraction grating in spectroscopic devices. (8 Hrs)
	B: Acoustics Acoustic terminology and definitions, Acoustic Wave Equation and its Basic Physical Measures, Sabine's formula (derivation not necessary) acoustics factor in architectural design. **C:Ultrasonics** Properties, Production of ultrasonic waves by piezo-electric and magnetostriction generator, engineering applications of ultrasonic waves.

<table>
<tr><td></td><td colspan="5">(8 Hrs)</td></tr>
<tr><td rowspan="2">Unit-II</td><td colspan="5">A:X-Rays
Basics of X-Rays, Production and Detection of X-Rays, Continuous and characteristics spectrum, Bragg’s law of X-ray diffraction, Bragg’s spectrometer, Intensity of diffracted Beams, Particle Size Determination by XRD, Precise Lattice Parameter Determination (7 Hrs)</td></tr>
<tr><td colspan="5">B:Nuclear Physics
Nuclear force, liquid drop model, shell model, Nuclear fission and fusion, Q-value of nuclear reaction, nuclear reactor, P-P cycle, C-N cycle, cyclotron, GM counter, applications of nuclear physics in various fields.
C:Modern Physics
Black body radiation, Planck’ s law, Photoelectric effect, Wave particle duality, De- Broglie’s concept of matter wave, Davisson-Germer experiment, Scanning tunneling microscope, Time-dependent and time-independent Schrodinger equation for wave function, Quantum computing.
(8 Hrs)</td></tr>
<tr><td rowspan="2">Unit-III</td><td colspan="5">A:Introduction to solids
Superconductivity: Superconductivity, effect of temperature and magnetic fields, Meissner effect, type I and II superconductors, BCS theory, Applications.
Free electron theory of metals, Fermi level, density of states, Application to white dwarfs and neutron stars, Bloch’s theorem for particles in a periodic potential, Kronig-Penney model and origin of energy bands
Magnetic Materials: Magnetic susceptibility and diamagnetic materials, paramagnetic, ferromagnetic, and, BH characteristics, applications.(8 Hrs)</td></tr>
<tr><td colspan="5">B:Laser
Einstein’s theory of matter radiation interaction and A and B coefficients, Properties of laser, spontaneous and stimulated emission, ruby laser, He-Ne laser, CO_2 laser and semiconductor Laser, applications of lasers in science, engineering and medicine.
C:Fiber Technology
Propagation of light through optical fiber, acceptance angle and cone numerical aperture, Single and Multi-Mode Fibers, applications, sensors.
(7Hrs)</td></tr>
<tr><td rowspan="4">Textbooks/ Reference Books</td><td>Sr. No.</td><td>Title</td><td>Author</td><td>Publication</td><td>Edition</td></tr>
<tr><td>1.</td><td>A Text book of Engineering Physics</td><td>M. N. Avadhanulu P. G. Kshirsagar</td><td>S. Chand & Co.</td><td>7th Edition</td></tr>
<tr><td>2.</td><td>A Text book of Engineering Physics</td><td>R. K. Gaur S. L. Gupta</td><td>Dhanpat Rai</td><td>3rd Edition</td></tr>
<tr><td>3.</td><td>Fundamentals of Physics</td><td>David Halliday, Jearl Walker,</td><td>Wiley</td><td>6th Edition</td></tr>
</table>

			and Robert Resnick		
	4.	Elements of X-ray Diffraction	B. D. Cullity	Addison-Wesley Metallurgy Series	1st Edition
	5.	Nuclear Physics	Irving Kaplan	Narosa Publishing house	2nd Edition
	6.	Introduction to Solid State Physics	C. Kittel	John Wiley & Sons, Inc	8th Edition
	7.	Lasers and Non-Linear Optics	B.B. Laud	New Age International	3rd Edition
Websites and online courses	1.	http://science.howstuffworks.com/laser1.htm			
	2.	http://hyperphysics.phy-astr.gsu.edu/hbase/hframe.html			
	3.	http://nptel.ac.in/courses/122107035/			
	4.	http://nptel.ac.in/courses/122104016/			
	5.	https://www.coursera.org/learn/intro-to-acoustics			
	6.	https://nptel.ac.in/courses/112/106/112106227/			
	7.	https://nptel.ac.in/courses/113/104/113104081/			
	8.	https://nptel.ac.in/courses/115/102/115102017/			

Faculty of Science & Technology **Syllabus of F. Y. B.E (Computer Science and Engineering ;AI&ML ;Electrical and Electronics Engineering) (Semester I)**	
Course Code: BSC103A Course: Engineering Chemistry Credits: 3 Theory: 03 Hrs/week ; 45 Hrs / Semester	
Objectives	1. To relate the concepts of Chemistry in all Engineering Disciplines. 2. To make the engineering undergraduates acquainted with modern techniques in engineering and industrial Chemistry. 3. To equip engineering undergraduates with the knowledge of advanced and existing Engineering Materials. 4. To develop the awareness about powering the future using advanced energy Storage Systems.
Course Outcomes	1. Recall the basics of fuels, lubricants, water parameters, and advanced Engineering materials 2. Explain the advanced methods to produce engineering materials and soft water for industrial and domestic use 3. Summarize properties and applications of fuels, lubricants, advanced engineering materials 4. Apply the knowledge of lubricants, corrosion, advanced energy systems and modern metallurgical processesto solve the engineering problems 5. Analyze the samples for estimating the aggregate impurities in water, coal, metals, and lubricant samples 6. Examine the synthetic scheme for thermosetting polymers and fundamental nanomaterials
Unit-I	**A: Advanced Engineering Materials** **Industrial Polymers**: Thermoplastics (PVC) & Thermosetting polymers (Bakelite), Biodegradable polymers (PVa), Properties, Applications **Nanomaterials**: Preparation of nano materials by Laser method, properties and applications of CNTs. **Composite Materials**: Ceramic matrix composites, carbon- carbon composites **Reinforcements**: Silicon carbide, Fiber glass. (8Hrs)
	B: Water Technology: Water Parameters: Total Dissolved Solids (TDS), Dissolved Oxygen (DO), Chemical Oxygen Demand (COD), pH, Hardness of water: types and units, Estimation of hardness by EDTA method, numerical on hardness; Boiler troubles: scale, sludge, priming, foaming and caustic embrittlement; Water treatment: Ion exchange process, Ultra filtration, Nano filtration (7 Hrs)
Unit-II	**A: Fuels and Energy Storage Systems:** Fuels: Gross and net calorific value, Solid fuels: proximate analysis of coal &importance, gaseous fuels: composition properties and application of natural gases-CNG, LNG. Energy Storage Systems: Bio electrochemical batteries, lithium-ion battery, alkaline fuel cell (AFC) (8Hrs)

	B: Lubricants and Coolants Lubricants: Introduction, Properties of liquid lubricants: viscosity and viscosity index, flash point and fire point, acid value. Numerical on viscosity index. Coolants: Introduction, properties and uses of water and ethylene glycol as coolant. (7 Hrs)				
Unit-III	**A: Corrosion and its prevention** Definition, types, mechanism of dry and wet corrosion, Corrosion testing methods: ultrasonic testing, computed &digital radiography, Prevention of corrosion: Methods-sacrificial anodic protection, Electroplating, Powder coating. (8Hrs)				
	B: Metallurgical processes Calcination, smelting, ore dressing, roasting, refining of metals, Metalworking processes: casting, forging, rolling, machining, sintering, Laser cladding, 3D printing (7Hrs)				
Textbooks/ Reference Books	**Sr. No.**	**Title**	**Author**	**Publication**	**Edition**
	1.	Engineering Chemistry	B. Siva Shankar	Mc Graw Hills Publications	3rd Edition
	2.	Engineering Chemistry	Shelly, Oberi and Malik	Cingage Publication	1st Edition
	3.	Principles of Polymerization	Odian, G.G	John Wiley & Sons, Inc	4th Edition
	4.	Engineering Chemistry	Jain & Jain	Dhanpat Rai Publishing	16th Edition
	5.	Polymer Chemistry	Malcolm P. Stevens	Oxford University Press	3rd Edition
	6.	A Textbook of Engineering Chemistry	Shashi Chawla	Dhanpat Rai & CO	10th Edition
	7.	Material Science & Engineering	William Callister and V. Raghavan	Wiley	9th Edition
Websites and online courses	1.	Unit- I – https://onlinecourses.nptel.ac.in/noc21_ch49/preview https://www.explainthatstuff.com/composites.html			
	2.	Unit- II – https://nptel.ac.in/content/storage2/courses/116104045/lecture8.pdf https://nptel.ac.in/content/storage2/courses/116104045/lecture6.pdf			
	3.	Unit- III – https://nptel.ac.in/content/storage2/courses/121106014/Week12/lecture38.pdf https://www.sciencedirect.com/topics/engineering/proximate-analysis			
	4.	Unit- IV – https://nptel.ac.in/courses/112/102/112102014/ https://nptel.ac.in/content/storage2/courses/112105127/pdf/LM-12.pdf			
	5.	Unit- V - https://nptel.ac.in/courses/113/108/113108051/			
	6.	Unit- VI -https://nptel.ac.in/courses/112/107/112107144/			

<table>
<tr><td colspan="2">Faculty of Science & Technology
Syllabus of F. Y. B.E (Computer Science and Engineering ;AI&ML ;Electrical and Electronics Engineering) (Semester I)</td></tr>
<tr><td colspan="2">Course Code: ESC108
Course: Principles of Programming Language
Credits:

Theory: 03 Hrs/week ; 45 Hrs / Semester</td></tr>
<tr><td>Objectives</td><td>1. To introduce the various programming paradigms and evolution of programming languages.
2. To introduce the principles and techniques involved in design and implementation of modern programming languages.
3. To introduce the notations to describe the syntax and semantics of programming languages.
4. To develop logics which will help them to create programs, applications in C.</td></tr>
<tr><td>Course Outcomes</td><td>1. Gain a broad perspective about the uses of computers in the engineering industry and C Programming
2. Develop the basic concept of algorithm, algorithmic thinking and flowchart
3. Apply the use of C programming language to implement various algorithms and develop the basic concepts and terminology of programming in general
4. Use the more advanced features of the C language
5. Identify tasks in which the numerical techniques learned are applicable and apply them to write programs and hence use computers effectively to solve the task</td></tr>
<tr><td rowspan="2">Unit-I</td><td>A:Introduction to programming languages
Introduction to computers, input and output devices, programming languages, programming domains, language evaluation criteria, influences on language design, language categories.
Programming Paradigms-Imperative, Functional Programming language, assembler, compiler, interpreter, Syntax and Semantics, Algorithm, Flowchart, pseudocode (7Hrs)</td></tr>
<tr><td>B:Names, Bindings, and Scopes
Introduction, names, variables and identifiers, concept of binding, scope and lifetime
Data types: Introduction, primitive, character, string types, user defined ordinal types, Data types in c
Expressions and Statements: Arithmetic expressions, type conversions, relational and Boolean expressions, short- circuit evaluation, assignment statements, mixed mode assignment, Expression and statements in C
(8 Hrs)</td></tr>
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<tr><td rowspan="2">Unit-II</td><td colspan="5">A:Control Structure and Loops in C
Control Structures – introduction, selection statements, iterative statements, unconditional branching, guarded commands.
If-else, conditional operators, switch and break, nested conditional branching statements, loops: do while, while, for, Nested loops, break and continue.(7Hrs)</td></tr>
<tr><td colspan="5">B:Subprograms And Blocks
Fundamentals of Subprograms, difference between procedures and functions.
Functions in C: Introduction to functions, Function definition, function declaration, function call, return statement, passing parameters to functions, scope of variables, recursive functions, concept of pointers, call by value, call by reference. (8 Hrs)</td></tr>
<tr><td rowspan="2">Unit-III</td><td colspan="5">A:Arrays in C
Declaration of arrays, accessing the elements of an array, storing values in arrays, Operations on arrays, Passing arrays to functions, two dimensional arrays, operations on two-dimensional arrays
String: String declaration, initialization, string manipulation with/without using library functions (8 Hrs)</td></tr>
<tr><td colspan="5">B:Structures in C
Introduction, defining a structure, declaring structure variables, accessing structure members, structure initialization, array of structures, Union and Enumeration. (7 Hrs)</td></tr>
<tr><td rowspan="5">Textbooks / Reference Books</td><td>Sr. No.</td><td>Title</td><td>Author</td><td>Publication</td><td>Edition</td></tr>
<tr><td>1.</td><td>Concepts of Programming Languages</td><td>Robert .W. Sebesta</td><td>Pearson Education</td><td>10th</td></tr>
<tr><td>2.</td><td>Programming Language Design Concepts</td><td>D. A. Watt</td><td>Wiley India Edition</td><td>1st</td></tr>
<tr><td>3.</td><td>Programming in ANSI C</td><td>E. Balaguruswamy</td><td>McGraw Hill Publications</td><td>8th Edition, 2019</td></tr>
<tr><td>4.</td><td>Let Us C</td><td>Yashavant P. Kanetkar</td><td>BPB Publications</td><td>16th</td></tr>
</table>

Faculty of Science & Technology Syllabus of F. Y. B.E (Computer Science and Engineering ;AI&ML ;Electrical and Electronics Engineering) (Semester I)	
Course Code: ESC109 Course: Basics of Electrical Engineering Credits: 3-0-0 Theory : 3 Hrs./ Week ; 45 Hrs / Semester	
Prerequisites	Knowledge of Physics and Mathematics
Objectives	1. The objective is to present essential principles, laws, and theorems related to electrical systems. 2. The aim is to provide a foundational understanding of electrical fundamentals, encompassing current, voltage, power, energy, and frequency. 3. The goal is to familiarize students with key parameters like resistance, inductance, capacitance, magnetic circuits, AC and DC circuits.
Course Outcomes	1. Recall basic concepts of Electrical Engineering 2. Illustrate the principles of DC networks, electrostatic & magnetic circuits and AC circuits 3. Analyze and solve electrical problems using Kirchhoff's laws, series-parallel techniques for resistances, and phasor diagrams.Apply electrical laws to calculate effective resistances in electrical circuits 4. Explain the behaviour of RLC circuits, resonance, and three-phase balanced systems. 5. Study different three phase Balanced Systems.
Unit-I	A: Introduction Effect of temperature on resistance, Resistance coefficient, Derivation for relations between α1, α2,OhmsLaw, Work, Power energy, and the relationship between Thermal, and electrical units.) Series and parallel combination of resistors(simple problems based on above) (8Hrs)
	B: D.C. Networks, Kirchhoff's laws, Ideal & Practical sources, source conversions Loop and nodal analysis, Superposition Theorem,(with two sources, no current source in numerical) Thevenin's, & Maximum power transfer theorem (No super node or mesh) (Numerical)(7Hrs)
Unit-II	A: Electrostatics: Electric potential, potential difference, electric potential, Conductors and insulators, capacitance, a combination of capacitors in series and in parallel, energy stored in a capacitor.(No Numerical)(7 Hours)
	B: Magnetic Circuits: BH Curve, Inductance, Induced emf, its types static and dynamic – Self &mutual induced emf, series magnetic circuits, coefficient of coupling (Derivation) comparison of Electrical and magnetic circuits) (Numerical on single reluctance magnetic circuits) (8Hrs)

Unit-III	A: A.C. Circuits Sinusoidal voltage and current waveforms, RMS and average value. Form factor and crest factor R-L, R-C, RLC series circuits, Phaser diagram, power and power factor, seriesresonance.(Simple numerical) (7Hrs)				
	B: Three Phase Balanced Systems, Three phase voltage generation and waveform star and delta balanced systems,Relationship between phase and line quantities, Phasor diagram, power in a three-phase circuit(No numerical) (8Hrs)				
References	Sr. No.	Title	Author	Publication	Edition
	1	Electrical Technology Vol.I&II	B. L. Thereja	S. Chand Publishing	24th Edition
	2	Basic Electrical Engineering	J.B. Gupta	Katsons Books	14th Edition
	3	Basic Electrical Engineering	V.K.Mehta	S. Chand Publishing	2nd Edition
	4	ABC of Electrical Engineering	B.L.Thereja A.K.Thereja	S. Chand Publishing	1st Edition
	5	Basic Electrical Engineering	E.Huges	Mc-GrawHill	10th Edition

Faculty of Science & Technology **Syllabus of F. Y. B.E (Computer Science and Engineering ;AI&ML ;Electrical and Electronics Engineering) (Semester I))**	
Course Code: VSE106 Course: Design Thinking Credits: 2 Theory: 02 Hr/week ; 30 Hrs / semester	
Objectives	• To familiarize students with the fundamental concepts and stages of the Design Thinking process. • To enable students to generate innovative solutions and develop strategic plans for implementing these solutions in real-world engineering contexts. • To equip students with the ability to create and testlow-fidelity prototypes.
Course Outcomes	1. Understand the concepts of design thinking approaches. 2. Demonstrate effective decision making through design thinking. 3. Explain the importance of user empathy and problem definition in the Design Thinking process. 4. Analyse user research data to identify core problems and formulate problem statements. 5. Develop low fidelity type prototype for innovative solution.
Unit-I	**Introduction to Design Thinking:** Introduction, Design Thinking, Key principles, history, and benefits, Human-centered design approach, design challenges and opportunities. (5 Hrs)
	Design Thinking process: General design process, Scope for design, Design thinking process, Relevance to engineering. (5 Hrs)
Unit-II	**Empathy:** Identifying customer Needs, Techniques for user research, building empathy map, Showcase empathy driven design.(5 Hrs)
	Defining problem: Methods to identify core problems, crafting problem statements, case studies on problem definition.(5 Hrs)
Unit-III	**Ideation techniques:** Brainstorming, brainwriting, mind mapping, out-of-box thinking, creativity Brainstorming techniques for generating ideas, Idea selection and evaluation methods. (5 Hrs)
	Prototyping and Testing: Definition and purpose of prototyping, Difference between low-fidelity and high-fidelity prototypes, Benefits of prototyping in iterative design processes, Tools and material used for prototyping.

	Definition and purpose of testing in the design process, Importance of user feedback in refining prototypes, Testing as an iterative process. (5 Hrs)				
Textbooks/ Reference Books	**Sr. No**	**Title**	**Author**	**Publication**	**Edition**
	1.	Engineering Design: A Project Based Introduction	C.L. Dym, P. Little	WileyPublication	4th Edition
	2.	Project Design & Development	Karl Ulrich	McGraw Hill Publication	5th Edition
	3.	Human factors in product design: current practice and future trends..	Green, W., & Jordan, P. W.	CRC Press (1999)	1st Edition

Faculty of Science & Technology
Syllabus of F. Y. B.E (Computer Science and Engineering ;AI&ML ;Electrical and Electronics Engineering) (Semester I)

Course Code: HSM107
Course: Professional Communication Skills
Credits: 1

Theory :02 Hrs/week ; 30 Hrs / Semester

Course Objectives	1. To apply English parts of speech in day to day communication. 2. To apply English Tenses in situational communication 3. To apply transformation of sentences in professional communication 4. To pronounce English words and sentences accurately 5. To communicate in English effectively by using updated vocabulary.	
Course Outcomes	1. Apply English parts of speech in day to day communication 2. Analyze, interpret and effectively summarize a variety of textual content 3. Develop vocabulary and language skills relevant to engineering as a profession	
Sr. No.	Section	Contents
Unit-I	Grammar	Parts of Speech Tenses with Timeline Transformation of sentences: Simple, compound and complex Active and passive voice Conditional Clauses 10Hrs
Unit-II	A:Introduction to Phonetics	Phonetics and problems in learning and using pronunciation, • Vowel sounds & Consonant Sounds, • Articulation of Sounds • Word accent 10Hrs
	B:Vocabulary Enhancement	• Types of Vocabulary • Basic techniques to Enhance Vocabulary • Vocabulary Enhancing Activities 10Hrs

Textbooks/ Reference Books

Sr. No.	Title	Author	Publication	Edition
1.	The Essence of Effective Communication	Adrian Budday, Ron Ludlow and Fergus' Panton	Prentice Hall of India-Private Ltd.	1992
2.	Professional Communication Skills	A. K. Jain, Pravin, S. R. Bhatia, A. M. Sheikh	S. Chand & Company Ltd.	2018
3.	Business Communication	Urmila Rai, S. M. Rai	Himalya Publishing House	9th Edition
4.	Technical Communication-Principles and Practice	Meenakshi Raman &Sangeeta Sharma	Oxford University Press	2nd Edition
5.	A course in Phonetics & Spoken English	J. Sethi, P.V. Dharmatma	PHI Publication	2nd Edition
6.	Communication Skills for Engineers	Sunita Mishra, C. Murli Krishna	Pearson Education	2nd Edition
7.	Grammar of Spoken and Written English	Dauglas Biber, Geoffrey Leech	Longman	1st Edition
8.	English Grammar and Composition	Wren and Martin,	S. Chand Publications	1st Edition

Mode of Conduct	Use of audio video sessions, demonstrations, group activities and games, simulation activities

<table>
<tr><td colspan="2">Faculty of Science & Technology
Syllabus of F. Y. B.E (Computer Science and Engineering ;AI&ML ;Electrical and Electronics Engineering) (Semester I)</td></tr>
<tr><td colspan="2">Course Code: BSC121A
Course: Engineering Physics LAB
Credits: 1

Practical:02Hrs/week / 30 Hrs / Semester</td></tr>
<tr><td>List of Practical</td><td>Any 10 practical to be conducted
1. Newton’s ring: To determine wavelength of monochromatic light
2. G. M. Counter: dead time calculation
3. Grating: To determine wavelength of LASER light.
4. Characteristics of solar cell
5. Ultrasonic interferometer
6. Dielectric constant: to determine dielectric constant.
7. Forbidden gap: To determine forbidden gap of semiconductors.
8. To determine the Hall coefficient of a semiconductor material and then evaluate carrier type and its density of charge carrier.
9. Determination of Planck's Constant
10. To determine the elastic constant of wire Y and n of stainless steel wire by Searle’s method.
11. Determination of Young’s modulus by bending beam
12. To find the time period of a simple pendulum anddetermine acceleration due to gravity</td></tr>
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Faculty of Science & Technology Syllabus of F. Y. B.E (Computer Science and Engineering ;AI&ML ;Electrical and Electronics Engineering) (Semester I)	
Course Code: BSC122A Course: Engineering Chemistry LAB Credits: 1 Practical:02Hrs/week / 30 Hrs / Semester	
List of Practical	Any 10 practical to be conducted: 1. Analysis of Chemical parameters of water (Lab performance/Virtual performance) 2. Analysis of physical parameters of water 3. Determination of percentage of moisture and ash in given coal sample. 4. Preparation of polymer 5. Electro gravimetric Estimation of Metals (Virtual experiment) 6. Determination of chloride content of water by Mohr's method (Lab performance /Virtual experiment) 7. Determination of melting or boiling point of organic compound. (Virtual experiment) 8. Determination of Viscosity of given specimen. 9. Determination of rate of corrosion in different pH media. (Lab performance /Virtual experiment) 10. Chromatography- Separation technique (Lab performance /Virtual experiment) 11. Determination of acid value of lubricating oil by titration method. 12. Determination of percentage of moisture in given soil sample. 13. Determination of pH in given soil sample. 14. Separation of chemical compounds by column chromatography technique. (Virtual experiment)

<table>
<tr><td colspan="2">Faculty of Science & Technology
Syllabus of F. Y. B.E (Computer Science and Engineering ;AI&ML ;Electrical and Electronics Engineering) (Semester I)</td></tr>
<tr><td colspan="2">Course Code: ESC127
Course: Principles of Programming Language LAB
Credits: 1

Practical: 2 Hrs/week ; 30 Hrs / Semester</td></tr>
<tr><td>Objectives</td><td>1. To teach the student to write programs in C and to solve the problems.
2. Implement different programming constructs and decomposition of problems into functions.
3. Use and implement data structures like arrays and structures to obtain solutions.</td></tr>
<tr><td>List of Practical</td><td>Exercise 1: Basics
1. Write a program to print sample strings like “hello world”, “Welcome to C Programming” with different formats using escape sequences.
2. Write a Program to print different data types in ‘C’ and their ranges.
3. Write a Program to initialize, assignment & printing variables of different data types.
Exercise 2: Operators
1. Write a Program to demonstrate arithmetic operators. (+,-,*,/,%)
2. Write a Program to demonstrate logical operators.(logical AND, logical OR)
3. Write a Program to read radius value from the keyboard and calculate the area of circle and print the result in both floating and exponential notation.
4. Write a Program to calculate simple interest.
5. Write a Program to convert temperature. (Fahrenheit –Centigrade and vice-versa)
Exercise 3: Operators 1
Write a Program to demonstrate relational operators.(<,>,<=,>=,==,!=)
2. Write a program to check equivalence of two numbers using conditional operator.
3. Write a Program to demonstrate pre increment and post increment.(++a, a++ where a is a value to be initialized)</td></tr>
</table>

	4. Write a Program to demonstrate pre decrement and post decrement.(--a, a-- where a is a value to be initialized) Exercise 4: Decision Statements 1. Write a Program to read marks of a student in six subjects and print whether pass or fail (using if-else). 2. Write a Program to calculate roots of quadratic equation (using if-else). 3. Write a Program to calculate electricity bill. Read starting and ending meter reading. The charges are as follows. No. of Units Consumed Rate in(Rs) 1-100 1.50 per unit 101-300 2.00 per unit for excess of 100 units 301-500 2.50 per unit for excess of 300 units 501-above 3.25 per unit for excess of 500 units Exercise 5: Switch operations 1. Write a Program to perform arithmetic operations using switch case. 2. Write a Program to display colors using switch case (VIBGYOR). 3. Write a Program to display vowels and consonants using switch case. 4. Write a Program to display names of days in a Week using switch case. Exercise 6: Basic Loop operations Do the Following Programs Using for, while, do-while loops. 1. Write a program to calculate sum of individual digits of a given number. 2. Write a program to check whether given number is palindrome or not. 3. Write a program to print prime numbers in the given range. 4. Write a program to display multiplication tables from 1 to 10 except 3 and Exercise 7: Advanced loops 1. Write a program to print the Fibonacci series for given 'N' value. 2. Write a program to check whether a given number is a Fibonacci number or not. 3. Write a program to read 2 numbers x and n then compute the sum of the Geometric Progression. 1+x+ x2+x3+ - - - - - - - +xn 4. Write a program to print the following formats. 1 * 1 2 * * 1 2 3 * * * 1 2 3 4 * * * * Exercise 8: Arrays 1. Write a program to store 10 elements in the 1-D array and print sum of the array. 2. Write a program to print minimum and maximum elements in the 1-D array.

	3. Write a program to add two matrices Exercise 9: Functions 1. Write a program to find sum of two numbers using functions. 2. Write a program to find product of two numbers using functions without arguments, without return type. 3. Write a program to find difference of two numbers using functions without arguments, with return type. 4. Write a program to find sum of two numbers using functions with arguments &without return type. 5. Write a program to find product of two numbers using functions with arguments, with return type. 6. Write a program to swap two numbers using a) Call By Value B) Call By Reference. Exercise 10: Strings 1. Write a program to perform various string manipulations using built-in functions. 2. Write a program to print the given strings in ascending order. 3. Write a program to verify the given string is palindrome or not (without built-in functions, with using built-in functions). Exercise 11: Structures 1. Write a program to create structure for an account holder in a bank with following Fields: name, account number, address, balance and display the details of five account holders. 2. Write a program to find total marks of individual student and average marks for 10 students using structures.

Faculty of Science & Technology Syllabus of F. Y. B.E (Computer Science and Engineering ;AI&ML ;Electrical and Electronics Engineering) (Semester I)	
Course Code: ESC128 Course: Basics of Electrical Engineering LAB Credits: 1 Practical: 02 Hrs/Week ; 30 Hrs / Semester	
Prerequisites	Programming skills, understanding of data types, structures and Statistics.
Objectives	1. Gain hands-on experience in applying electrical fundamentals and laws and theorems to extract insights, draw meaningful conclusions. 2.Enhance Practical skills related to electrical elements.
Course Outcomes	1. Gain practical knowledge and awareness of electrical accessories, safety measures, and basic wiring concepts for household applications. 2. Develop hands-on skills in various electrical circuits, and understanding fundamental of electrical laws and theorems through practical experimentation.
	Any 08 practical to be conducted on 1 To Perform and Verify the Ohms Law of a given network. 2To Perform and verify Kirchhoff's Law (KVL and KCL). 3To Perform and Verify equivalent resistance for series and parallel combinations. 4To perform and verify Superposition Theorem. 5To perform and verify Thevenin's Theorem. 6To perform and verify Maximum Power Transfer Theorem. 7To verify phase and line voltage magnitudes for three-phase star / Delta supply. 8To study Resonance in RLC series circuit. 9To understand the concept of Magnetic circuits and inductance measurements. 10To study all tariff calculations of household Energy Meter 11To study the concept of Power factor improvement with and without using Capacitance in an RLC circuit.

Faculty of Science & Technology **Syllabus of F. Y. B.E (Computer Science and Engineering ;AI&ML ;Electrical and Electronics Engineering) (Semester I)**	
Course Code: ESC129 Course: Fundamentals of Web Programming Credits: 1 Practical: 2 Hrs/week ; 30 Hrs / Semester	
Prerequisites	Programming skills, understanding of data types, structures and Statistics.
Objectives	1. Design and develop simple web pages using suitable client side and server side code. 2. Implement web based application using database access.
Course Outcomes	1. Demonstrate and understand the basic concepts of web programming 2. Write well-structured, easily maintained, standards-compliant, web pages using HTML and CSS code.
	1. Introduction to HTML and basic tags of HTML. Write a program to create a simple webpage using HTML 2. PHP Introduction, PHP Installation, Advantages of PHP, PHP Syntax. Steps to Execute PHP Program. 3. Create a simple HTML form and accept the user name and display the name through PHP echo statement. 4. Common PHP Script Elements I: PHP constants Variables, PHP Operators, Program on PHP Conditional statements and PHP Switch. 5. Common PHP Script Elements II: Develop Program on PHP Looping . 6. Common PHP Script Elements III: Develop program using PHP Arrays. 7. Common PHP Script Elements IV: Develop Program on PHP String and PHP Functions. 8. Working With Forms: A) Create a PHP Forms, use PHP $_GET and PHP $_POST method to accept data . B) Form Validation in PHP: Validate contents in above form: 9. Develop a PHP program to store current date-time in a COOKIE and display the 'Last visited on' date-time on the web page upon reopening of the same page. 10. Develop a PHP program to store page views count in SESSION, to increment the count on each refresh, and to show the count on web page.

Faculty of Science & Technology **Syllabus of F. Y. B.E (Computer Science and Engineering ;AI&ML ;Electrical and Electronics Engineering) (Semester I)**	
Course Code: LLC126 A Course: Yoga Credits: 2 Practical: 04 Hrs/Week ; 60 Hrs / Semester	
Objectives	1. To identity common stressors inherent in today's global marketplace. 2. To develop an understanding of the impact of stress on physiological, emotional and cognitive processes. 3. To learn to manage the stress through art of Yoga .
Course Outcomes	1. Gain practical knowledge and awareness of electrical accessories, safety measures, and basic wiring concepts for household applications. 2. Develop hands-on skills in various electrical circuits, and understanding fundamental of electrical laws and theorems through practical experimentation.
Unit-I	Mental Health : Meaning and importance; Yogic Perspective of Mental Health, Indicators of Mental Health, Stress: Meaning and Definition; Symptoms, Causes and Consequences of Stress, Meaning of Management- Stress Management, Stress in Modern Cultue & Society. (10Hrs) And Practice Based on above topics
Unit-II	Concept of Stess according to Yoga, Assessing your Stress & Building Resilience. And Practice Based on above topics (10 Hrs)
Unit-III	Physiology of Stress on: Autonomic Nervous System (ANS), Edocrine System, Hypothalamus, Cerebral Cortex and Neurohumours. (10 Hrs) And Practice Based on above topics
Unit-IV	Mechanism of Stress related diseases: Psychic, Psychosomatic, Somatic and Organic phase. Role of Meditation & Pranayama on stress- physiological aspect of meditation, constant stress & strain, anxiety. (10 Hrs) And Practice Based on above topics
Unit-V	Meaning and definition of Health: various dimensions of health (Physical, Mental, Social and Spiritual) Yoga and Health- Yoga as therapy, Physical fitness. Stress control exercise- Sitting meditation, Walking meditation, Progressive muscular relaxation, Gentle stretches and Massage. (10 Hrs) And Practice Based on above topics
Unit-VI	Preventive and curative effects of Yoga on stress related disorders: Hypertension, Heart problems, Bronchial Asthma, Peptic Ulcer, Diabetes Mellitus, Arthritis, Anxiety Neurosis and Headache. (10 Hrs) And Practice Based on above topics

Text books and References

Sr. No.	Title	Author	Publication	Edition
1.	Stress Control for peace of Mind	Linda Wasmer Andrews	Main Street	2005
2	Yoga for stress	Vimla Lalvani	Hamlyn	1998
3.	Yoga perspective in stress management	H.R.Nagendra, and R. Nagarathana.	Swami Vivekananda Yoga Prakashana	2004
4.	Yoga practices for anxiety & depression	H.R. Nagendra, and R. Nagarathana,	Swami Sukhabodhanandha Yoga Prakshna	2004
5.	Stress management by Yoga	K.N.Udupa.	Motilal Banaridass Publishers Private Limited.	1996

Reference

Sr.No.	Title	Author	Publication
1.	Light on Yoga	B.K.S.Lyengar	Thorsons
2.	The Yoga Sutras of Patanjali	Sri Swami Satchidananda	Yoga Publication Trust
3.	The Yamas and Niyamas	Debrah Adele	Yoga Publications Trust
4.	Patanjali Yoga Sutra	Swami Vivekanand	Yoga Publication Trust

Semester II

Faculty of Science & Technology Syllabus of F. Y. B.E (Computer Science and Engineering ;AI&ML ;Electrical and Electronics Engineering) (Semester II)	
Course Code: BSC151B Course: Applied Mathematics-II Credits: 3 Theory: 03 Hrs/week ; 45 Hrs / Semester	
Prerequisite	Students requires sufficient amount of knowledge of certain topics related to Statistics and Integral Calculus.
Objectives	1. To provide basic ideas of statistics including measures of central tendency and dispersion. 2. To develop mathematical skills and logical understanding of the subject. 3. To analyze and find solutions of problems in engineering. 4. To apply knowledge of mathematics in engineering and technology.
Course Outcomes	1. Discuss the need and use of complex variables to find roots, to separate complex quantities and to establish relation between circular and hyperbolic functions. 2. Solve first and higher order differential equations and apply them as a mathematical modelling in electric and mechanical systems. 3. Determine Fourier series representation of periodic functions over different intervals. 4. Demonstrate the concept of vector differentiation and interpret the physical and geometrical meaning of gradient, divergence & curl in various engineering streams. 5. Apply the principles of vector integration to transform line integral to surface integral, surface to volume integral & vice versa using Green's, Stoke's and Gauss divergence theorems.
Unit-I	**A:Statistics-I** Introduction to Statistics, Measures of central tendency: Mean, Median and Mode. Measures of dispersion: Quartiles, Quartile deviation, Coefficient of Quartile deviation, Mean deviation, Coefficient of Mean deviation, (7 Hrs)
	B:Statistics-II Standard deviation, Variance, Coefficient of variation, Skewness, Measures of Skewness: Karl Pearson's coefficient of skewness, Bowley's coefficient of skewness.(8Hrs)
Unit-II	**A:Curve Tracing and Rectification** Tracing of curves in Cartesian form, Tracing of curves in Polar form, Rectification of plane curves (Cartesian and Polar)(8 Hrs)
	B:Integral Calculus

	Reduction Formulae, Beta Function, Gamma Function, Relation between Beta and Gamma Function (without proofs)(7 Hrs)				
Unit-III	**A:Multiple Integrals** Double Integration in Cartesian and Polar co-ordinates, Change to polar co-ordinates,. (7 Hrs)				
	B:Applications of Multiple Integrals Application to areas, volumes, surfaces areas and volume of revolutions, Triple integral (8Hrs)				
Textbooks/ Reference Books	**Sr. No.**	**Title**	**Author**	**Publication**	**Edition**
	1.	A Text Book of Applied Mathematics Volume-I	P. N. Wartikar J. N. Wartikar	Pune VidyarthiGrihaPrakashan, Pune	9th Edition
	2.	Advanced Engineering Mathematics	H. K. Dass.	S.Chand and Co.Ltd	18th Edition
	3.	Higher Engineering Mathematics	Dr. B. S. Grewal	Khanna Publishers	46th Edition
	4.	Higher Engineering Mathematics	B.V. Ramana	Tata McGraw-Hill Publishing Co.Ltd.	1st Edition
	5.	Advanced Engineering Mathematics	Erwin Kreyszig	Wiley eastern Ltd. Mumbai	10th Edition
	6.	A Text Book of Engineering Mathematics	Peter O'Neil	Thomson Asia Pvt. Ltd., Singapore	7thEdition
	7.	Advanced Engineering Mathematics	C. R. Wylie & Barrett	Mc Graw Hill Publishing Company Ltd	6th Edition
	8.	Advanced Engineering Mathematics	M.D. Greenberg	Pearson Education	2nd Edition

Faculty of Science & Technology Syllabus of F. Y. B.E (Computer Science and Engineering ;AI&ML ;Electrical and Electronics Engineering) (Semester II)	
Course Code: BSC102B Course: Engineering Physics Credits: 3 Theory: 03 Hrs/week ; 45 Hrs / Semester	
Objectives	1. To let the engineering undergraduates study physical properties, concepts and physical quantities required for the solution of complex engineering problems 2. To make the engineering undergraduates learn basic principles of Physics and laws of scientific investigation to identify, formulate and analyse complex engineering problems 3. To equip engineering undergraduates with competencies of scientific methods required in engineering career by upgrading skills on the basis of learning achieved from physical science perspectives. 4. To engage engineering undergraduatesextensively in scientific investigation for interdisciplinary graduate programs and a wide variety of other lifelong learning opportunities.
Course Outcomes	1. Recall basics of Optics, Sound and Modern Physics 2. Explain phenomenon in Optics, Sound and Modern Physics 3. Apply concepts of Optics, Sound and Modern Physics to solve complex engineering problems 4. Analyze the concepts of Optics, Sound and Modern Physics 5. Interpret the characteristics of Solar cell, Zener diode, Transistor, Planks constant curve, GM Counter curve 6. Experiment with Reverberation Time, Energy Band Gap, Wavelength of Light, Dielectric Constant, Specific Rotation, Wavelength of Ultrasonic waves, divergence of the laser beam, and hall coefficient
Unit-I	**A:Optics** The wave equation, Introduction to electromagnetic waves and electromagnetic spectrum, Newton's ring, Michelson interferometer, Applications of interference Diffraction of light, diffraction grating, resolving power of grating, Application of diffraction grating in spectroscopic devices. (7 Hrs)
	B: Acoustics Acoustic terminology and definitions, Acoustic Wave Equation and its Basic Physical Measures, Sabine's formula (derivation not necessary) acoustics factor in architectural design. **C:Ultrasonics** Properties, Production of ultrasonic waves by piezo-electric and magnetostriction generator, engineering applications of ultrasonic waves. (8 Hrs)
Unit-II	**A:X-Rays**

	Basics of X-Rays, Production and Detection of X-Rays, Continuous and characteristics spectrum, Bragg's law of X-ray diffraction, Bragg's spectrometer, Intensity of diffracted Beams, Particle Size Determination by XRD, Precise Lattice Parameter Determination (7 Hrs)				
	B:Nuclear Physics Nuclear force, liquid drop model, shell model, Nuclear fission and fusion, Q-value of nuclear reaction, nuclear reactor, P-P cycle, C-N cycle, cyclotron, GM counter, applications of nuclear physics in various fields. **C:Modern Physics** Black body radiation, Planck' s law, Photoelectric effect, Wave particle duality, De- Broglie's concept of matter wave, Davisson-Germer experiment, Scanning tunneling microscope, Time-dependent and time-independent Schrodinger equation for wave function, Quantum computing. (8 Hrs)				
Unit-III	**A:Introduction to solids** Superconductivity: Superconductivity, effect of temperature and magnetic fields, Meissner effect, type I and II superconductors, BCS theory, Applications. Free electron theory of metals, Fermi level, density of states, Application to white dwarfs and neutron stars, Bloch's theorem for particles in a periodic potential, Kronig-Penney model and origin of energy bands Magnetic Materials: Magnetic susceptibility and diamagnetic materials, paramagnetic, ferromagnetic, and, BH characteristics, applications.(8 Hrs)				
	B:Laser Einstein's theory of matter radiation interaction and A and B coefficients**,** Properties of laser, spontaneous and stimulated emission, ruby laser, He-Ne laser, CO_2 laser and semiconductor Laser, applications of lasers in science, engineering and medicine. **C:Fiber Technology** Propagation of light through optical fiber, acceptance angle and cone numerical aperture, Single and Multi-Mode Fibers, applications, sensors. (7 Hrs)				
Textbooks/ Reference Books	**Sr. No.**	**Title**	**Author**	**Publication**	**Edition**
	8.	A Text book of Engineering Physics	M. N. Avadhanulu P. G. Kshirsagar	S. Chand & Co.	7th Edition
	9.	A Text book of Engineering Physics	R. K. Gaur S. L. Gupta	Dhanpat Rai	3rd Edition
	10.	Fundamentals of Physics	David Halliday, Jearl Walker, and Robert Resnick	Wiley	6th Edition

	11.	Elements of X-ray Diffraction	B. D. Cullity	Addison-Wesley Metallurgy Series	1st Edition
	12.	Nuclear Physics	Irving Kaplan	Narosa Publishing house	2nd Edition
	13.	Introduction to Solid State Physics	C. Kittel	John Wiley & Sons, Inc	8th Edition
	14.	Lasers and Non-Linear Optics	B.B. Laud	New Age International	3rd Edition
Websites and online courses	1.	http://science.howstuffworks.com/laser1.htm			
	2.	http://hyperphysics.phy-astr.gsu.edu/hbase/hframe.html			
	3.	http://nptel.ac.in/courses/122107035/			
	4.	http://nptel.ac.in/courses/122104016/			
	5.	https://www.coursera.org/learn/intro-to-acoustics			
	6.	https://nptel.ac.in/courses/112/106/112106227/			
	7.	https://nptel.ac.in/courses/113/104/113104081/			
	8.	https://nptel.ac.in/courses/115/102/115102017/			

Faculty of Science & Technology **Syllabus of F. Y. B.E (Computer Science and Engineering ;AI&ML ;Electrical and Electronics Engineering) (Semester II)**	
Course Code: BSC103B Course: Engineering Chemistry Credits: 3 Theory: 03 Hrs/week ; 45 Hrs / Semester	
Objectives	1. To relate the concepts of Chemistry in all Engineering Disciplines. 2. To make the engineering undergraduates acquainted with modern techniques in engineering and industrial Chemistry. 3. To equip engineering undergraduates with the knowledge of advanced and existing Engineering Materials. 4. To develop the awareness about powering the future using advanced energy Storage Systems.
Course Outcomes	1. Recall the basics of fuels, lubricants, water parameters, and advanced Engineering materials 2. Explain the advanced methods to produce engineering materials and soft water for industrial and domestic use 3. Summarize properties and applications of fuels, lubricants, advanced engineering materials 4. Apply the knowledge of lubricants, corrosion, advanced energy systems and modern metallurgical processesto solve the engineering problems 5. Analyze the samples for estimating the aggregate impurities in water, coal, metals, and lubricant samples 6. Examine the synthetic scheme for thermosetting polymers and fundamental nano-materials
Unit-I	**Advanced Engineering Materials** **Industrial Polymers**: Thermoplastics (PVC) & Thermosetting polymers (Bakelite), Biodegradable polymers (PVa), Properties, Applications **Nanomaterials**: Preparation of nano materials by Laser method, properties and applications of CNTs. **Composite Materials**: Ceramic matrix composites, carbon- carbon composites **Reinforcements**: Silicon carbide, Fiber glass. (8Hrs)
	Water Technology: Water Parameters: Total Dissolved Solids (TDS), Dissolved Oxygen (DO), Chemical Oxygen Demand (COD), pH, Hardness of water: types and units, Estimation of hardness by EDTA method, numerical on hardness; Boiler troubles: scale, sludge, priming, foaming and caustic embrittlement; Water treatment: Ion exchange process, Ultra filtration, Nano filtration (7 Hrs)
Unit-II	**Fuels and Energy Storage Systems:** Fuels: Gross and net calorific value, Solid fuels: proximate analysis of coal &importance, gaseous fuels: composition properties and application of natural gases- CNG, LNG. Energy Storage Systems: Bio electrochemical batteries, lithium-ion battery, alkaline fuel cell (AFC) (8Hrs)

<table>
<tr><td></td><td colspan="5">Lubricants and Coolants
Lubricants: Introduction, Properties of liquid lubricants: viscosity and viscosity index, flash point and fire point, acid value. Numerical on viscosity index. Coolants: Introduction, properties and uses of water and ethylene glycol as coolant. (7 Hrs)</td></tr>
<tr><td rowspan="2">Unit-III</td><td colspan="5">Corrosion and its prevention
Definition, types, mechanism of dry and wet corrosion, Corrosion testing methods: ultrasonic testing, computed &digital radiography, Prevention of corrosion: Methods- sacrificial anodic protection, Electroplating, Powder coating
(8Hrs)</td></tr>
<tr><td colspan="5">Metallurgical processes
Calcination, smelting, ore dressing, roasting, refining of metals, Metalworking processes: casting, forging, rolling, machining, sintering, Laser cladding, 3D printing (7Hrs)</td></tr>
<tr><td rowspan="8">Textbooks/ Reference Books</td><td>Sr. No.</td><td>Title</td><td>Author</td><td>Publication</td><td>Edition</td></tr>
<tr><td>1.</td><td>Engineering Chemistry</td><td>B. Siva Shankar</td><td>Mc Graw Hills Publications</td><td>3rdEdition</td></tr>
<tr><td>2.</td><td>Engineering Chemistry</td><td>Shelly, Oberi and Malik</td><td>Cingage Publication</td><td>1st Edition</td></tr>
<tr><td>3.</td><td>Principles of Polymerization</td><td>Odian, G.G</td><td>John Wiley & Sons, Inc</td><td>4th Edition</td></tr>
<tr><td>4.</td><td>Engineering Chemistry</td><td>Jain & Jain</td><td>Dhanpat Rai Publishing</td><td>16th Edition</td></tr>
<tr><td>5.</td><td>Polymer Chemistry</td><td>Malcolm P. Stevens</td><td>Oxford University Press</td><td>3rd Edition</td></tr>
<tr><td>6.</td><td>A Textbook of Engineering Chemistry</td><td>Shashi Chawla</td><td>Dhanpat Rai & CO</td><td>10th Edition</td></tr>
<tr><td>7.</td><td>Material Science & Engineering</td><td>William Callister and V. Raghavan</td><td>Wiley</td><td>9th Edition</td></tr>
<tr><td rowspan="6">Websites and online courses</td><td>1.</td><td colspan="4">Unit- I – https://onlinecourses.nptel.ac.in/noc21_ch49/preview
https://www.explainthatstuff.com/composites.html</td></tr>
<tr><td>2.</td><td colspan="4">Unit- II – https://nptel.ac.in/content/storage2/courses/116104045/lecture8.pdf
https://nptel.ac.in/content/storage2/courses/116104045/lecture6.pdf</td></tr>
<tr><td>3.</td><td colspan="4">Unit- III – https://nptel.ac.in/content/storage2/courses/121106014/Week12/lecture38.pdf
https://www.sciencedirect.com/topics/engineering/proximate-analysis</td></tr>
<tr><td>4.</td><td colspan="4">Unit- IV – https://nptel.ac.in/courses/112/102/112102014/
https://nptel.ac.in/content/storage2/courses/112105127/pdf/LM-12.pdf</td></tr>
<tr><td>5.</td><td colspan="4">Unit- V - https://nptel.ac.in/courses/113/108/113108051/</td></tr>
<tr><td>6.</td><td colspan="4">Unit- VI -https://nptel.ac.in/courses/112/107/112107144/</td></tr>
</table>

Faculty of Science & Technology
Syllabus of F.Y.B.E (Computer Science and Engineering ;AI&ML ;Electrical and Electronics Engineering) (Semester II)

Course Code: ESC158
Course: Engineering Graphics
Credits: 3

Lecture: 03Hr/week ; 45 Hrs / Semester

Objectives	1. Engineering drawing being the principle method of communication for engineers, the objective is to introduce the students, the techniques of constructing the various types of polygons, curves and scales. 2. The objective is also to visualize and represent the 3D objects in 2D planes with proper dimensioning, scaling etc
Course Outcomes	1. Perform free hand sketching of basic geometrical constructions and multiple views of objects 2. Draw the projections of points, straight lines and plane surfaces in given quadrant 3. Understand the projection of solids in various positions in first quadrant 4. Draw projections and solids and development of surfaces 5. Prepare isometric and perspective sections of simple solids

UNIT-I

A:Projections of Point & Line:

Concept of orthographic projections. Projections of points situated in different quadrants. Projections of a line parallel to one of the reference planes and inclined to the other plane, line inclined to both the reference planes. 8 Hrs.

B:Projections of Planes:

Projections of a plane perpendicular to one of the reference planes and inclined to the other, Projections of a plane inclined to both the reference planes. 7 Hrs.

UNIT-II

A: Projection of Solids:

Types of solids, projections of solids like cube, Prism, Pyramid, Cone and Cylinder with its axis inclined to one or both the reference planes. 8 Hrs.

B:Section of Solids:

Projections of regular solids like Cube, Prism, Pyramid, Cone and Cylinder cut by cutting plane inclined to one plane. Determination of true shape of section. 7 Hrs.

UNIT-III

A:Orthographic Projection:

Introduction to orthographic projection, Concept of first and third angle projection method. Drawing of orthographic views of simple machine components from isometric view. 7 Hrs.

B:Isometric Views:

Isometric axes, Isometric lines, Isometric Planes, Isometric scale, Isometric Views, Isometric projections, drawing of isometric views from given orthographic views. 8 Hrs.

Text/Reference Books:

1. Bhatt N.D., Panchal V.M. & Ingle P.R., (2014), Engineering Drawing, Charotar Publishing.
2. Jain, Maheshwari, Gautam (2008), Engineering Drawing, Tata McGraw-Hill Publishing.
3. Shah, M.B. & Rana B.C. (2008), Engineering Drawing and Computer Graphics, Pearson.
4. Agrawal B. & Agrawal C. M. (2012), Engineering Graphics, TMH Publication.
5. Narayana, K.L. & P Kannaiah (2008), Text book on Engineering Drawing, Scitech Publishers

Faculty of Science & Technology Syllabus of F. Y. B.E (Computer Science and Engineering ;AI&ML ;Electrical and Electronics Engineering) (Semester II)	
CourseCode:ESC110 Course: Basics of Electronics Engineering Credits: 3 Theory :3Hrs./ Week ; 45 Hrs / Semester	
Prerequisites	Basic Sciences
Objectives	1. To provide knowledge of some electronic devices and rectifier circuits. 2. To understand configuration of operational amplifier and know its applications. 3. To study Logic gates and their usage in digital circuits. 4. To expose the students to working of transducers and their applications. 5. To introduce basic aspects of an electronic communication system.
Course Outcomes	1. Use semiconductor diode in regulated power supply 2. Illustrate operation of semiconductor devices, operational amplifiers, and transducers. 3. Design basic digital circuits 4. Explain fundamental elements used in communication systems 5. Conduct experiments on basic electronic components and verify their characteristics 6. Demonstrate experiments on Basic circuits and Interpret the output
Unit-I	**A: Fundamentals of Electronics:** Active & Passive components, Electronics materials, Semiconductor and its types, PN Junction Diode, Zener Diode, LED: Construction, Symbol, Characteristics; Basic blocks of Regulated Power Supply: Transformers, Rectifiers, Filters & 3 terminal Fixed Regulators: Definition, Types, Circuits, Waveforms; Ripple factor, Efficiency, PIV & Comparison (8 Hrs.)
	B: Semiconductor devices and its applications: BJT:-Types, construction, Symbols, Configurations, characteristics and Applications as an amplifier and as a switch. FET- Types, construction, Symbols, characteristics, and applications. MOSFET- Types, construction, Symbols, characteristics, and applications. (7 Hrs)
Unit-II	**A: Introduction to Operational Amplifier:** Block diagram of Operational Amplifier, Symbol, OP AMP IC Pin Configuration, Inverting and Non-InvertingConfiguration and parameters,

<table>
<tr><td></td><td colspan="5">Ideal Characteristics, Op-Amp as Summing amplifier, Difference amplifier, Integrator, Differentiator and Comparator (7 Hrs.)</td></tr>
<tr><td></td><td colspan="5">B: Fundamentals of Digital Circuit:
Analog And Digital Signals, Number Systems- Decimal, Binary, Octal, Hexadecimal & their conversion, Logic Gates-Types, Symbols, IC Pin Configurations, Boolean algebra,De Morgan’s Theorem, Introduction to Combinational and Sequential Circuits, Multiplexer, De-multiplexer (8Hrs.)</td></tr>
<tr><td>Unit-III</td><td colspan="5">A: Transducers:
Definition, Classification of Transducers, Operation & applications of Transducers –Temperature Measurement -RTD, Thermocouple, Thermistor,Pressure measurement- Strain Gauge, Displacement measurement - LVDT (8 Hrs.)</td></tr>
<tr><td></td><td colspan="5">B: Basics of Communication system:
The elements of Communication System, Transmission Media, Need ofModulation& its types, Introduction to Mobile Communication (7 Hrs.)</td></tr>
<tr><td rowspan="6">References</td><td>Sr.No.</td><td>Title</td><td>Author</td><td>Publication</td><td>Edition</td></tr>
<tr><td>1</td><td>Principles of Electronics</td><td>V.K. Mehta</td><td>S.ChandPublishing</td><td>12th Edition</td></tr>
<tr><td>2</td><td>Modern Digital Electronics</td><td>R.P.Jain</td><td>TataMc-Graw Hill</td><td>3rdEdition</td></tr>
<tr><td>3</td><td>Electronics Instrumentation</td><td>H. S. Kalasi</td><td>TataMc-Graw Hill</td><td>2nd Edition</td></tr>
<tr><td>4</td><td>Linear Integrated Circuit and operational amplifier</td><td>Ramakant Gaikwad</td><td>Pearson Education</td><td>4th Edition.</td></tr>
<tr><td>5</td><td>Electronics Communication System</td><td>George Kenedy</td><td>TataMc-Graw Hill</td><td>4th Edition.</td></tr>
</table>

Faculty of Science & Technology **Syllabus of F. Y. B.E (Computer Science and Engineering ;AI&ML ;Electrical and Electronics Engineering) (Semester II)**	
Course Code: ESC159 Course: Programming for Problem Solving Credits: 2 Theory : 02 Hrs. / week ; 30 Hrs / Semester	
Prerequisite	Basic Mathematics
Objectives	1. To introduces basic constructs and terminology of python programming language. 2. Student should be able to develop Programming logic using python
Course Outcomes	1. Explain the basic concepts of python programming language 2. Write a program using conditional statements – simple if, if-else, etc 3. Implement programs using loops – for loop, while loop for a given problem 4. Design a modular solution using functions by breaking down the problem into parts using python programming language 5. Implement programs using lists and sets to find the solutions for computational problem 6. Apply the concepts of tuples and dictionary to develop python programs
Unit-I	A: An Introduction to Python Programming Introduction to Python- The Python Programming Language, History, features, Applications, Installing Python, Running Simple Python program. B: Basics of Python- Numbers, Variables, Constants, Python identifiers and reserved words, Input/output with print and input, Standard data types - basic, none, Boolean (true & False), program based on operations on data such as assignment, arithmetic, relational, logical and bitwise operations etc. (5 Hrs)
	C: Control Statements Sequence Control – Precedence of operators, Type conversion. B: Conditional Statements: Program based on if statement, if…else statement, if..elif..else statement, Nested if statement. (5 Hrs)
Unit-II	A: Looping Loops: Program based onwhile loop, for loop, nested loops, *range()* function, Program based on loop control statements (break, continue, pass) Strings: Declaration, manipulation, special operations, escape character, string formatting operator, Raw String, Unicode strings, Program based on built- in String methods. (5 Hrs)
	Functions B: Definitions and Uses, Function Calls, Program based on Built-In Functions, Program based on Function Definition and Calling the Function, Flow of Execution, Parameters and Arguments, Variables and Parameters Commonly Used Modules, The *return* Statement. Introduction to standard libraries and packages. (5 Hrs)
Unit-III	A: Python Lists and Sets Python List- syntax, program based on creating and accessing elements, updating & deleting lists, program based on Traversing a List, modify, slice, program based on Built- in List functions with example.

	Python Set- syntax, definition, program based on add-remove item, item access, modify, program based on transaction of set (Union, Intersection, Difference, and Symmetric Difference), working with sets, Compare list and set. Applications of list and set. (5 Hrs)				
	B: Python Tuples and Dictionary Python Tuple- Accessing values in Tuples, Tuple Assignment, program based on basic tuples operations, Concatenation, Repetition, in Operator, program based on built-in tuple functions, indexing and slicing Python Dictionary- program based on Creating a Dictionary, Accessing Values in a dictionary, Updating Dictionary, Deleting Elements from Dictionary, Built-In Dictionary Functions, applications of dictionary. (5 Hrs)				
References	Sr. No.	Title	Author	Publication	Edition
	1	Think Python	Allen B. Downey	O'Really	Second
	2	Dive into Python 3	Mark Pilgrim	Apress	Second
	3	Learning with Python	Allen B. Downey	Dreamtech	First
	4	The Complete Reference Python	Martin C. Brown	Mc Graw Hill	Indian
	5	Head First Python	Paul Barry	O'Really	Second

Faculty of Science & Technology
Syllabus of F. Y. B.E (Civil Engineering & Mechanical Engineering) (Semester II)

Course Code: IKS156
Course: Indian Knowledge System
Credits: 2

Theory : 02 Hrs/week ; 30 Hrs / Semester

Prerequisite	Nil			
Objectives	The objective of this course is 1. To explain the historicity of Indian Knowledge System, key features of Indian Numeral System and appreciate the key role it has played in the advancement of Science & Technology. 2. To develop familiarity with the science, engineering & technology heritage of ancient and medieval India.			
Course Outcomes	1. Draw connections between the historical artifacts and contemporary objects from the immediate surroundings. 2. Encourage themselves as an art practitioner, aspiring art historians, educators, and those preparing for competitive examinations in India. 3. Direct the possible ways of exploring these thematic.			
Unit-I	**A:** Introduction to Indian Knowledge System (IKS): What is IKS, why do we need IKS, Organization, Historicity and salient aspects of IKS. Understanding Historic architectural Heritage in Marathwada a. What is historical heritage? b. Type of historic heritage c. Importance of historic architectural heritage to understand history of Marathwada (05 Hrs)			
	B: Historic architectural Heritage in Marathwada a. Religious Architecture – Hindu, Buddhist, and Jain b. Mughal Architecture c. Non-religious historic architectural heritage. (05 Hrs)			
Unit-II	**A:** Introduction to Vedas : Introduction to Vedas, a Synopsis of four Vedas and their sub-classification, messages in Vedas and introduction to Vedangas. (05 Hrs) **B:** Number Systems and Unit of Measurement: Number systems in India- Historical evidence, Salient aspects of Indian Mathematics Bhūta-Saṃkhyā system, Kaṭapayādi system, Measurements for time, distance, and weight, Piṅgala and the Binary system. (05 Hrs)			
Unit-III	**A:** Mathematics: Introduction to Indian Mathematics, Unique aspects of Indian Mathematics, Indian Mathematicians and their Contributions. Algebra, Geometry, Trigonometry, Magic squares in India.(05 Hrs)			
	B: Astronomy: Introduction to Indian astronomy, Indian contributions in astronomy, The celestial coordinate system, Elements of the Indian calendar, Notion of years and months. Panchanga- The Indian calendar system, Astronomical Instruments (Yantras), JantarMantar of Rājā Jai Singh Sawai.(05 Hrs)			
References	Title	Author	Publication	Edition

	Introduction to Indian Knowledge Systems: Concepts and Applications	Mahadevan, B., Bhat, VinayakRajat, NagendraPavana R.N.	PHI Learning Pvt. Ltd.	1st 2022
	Indian Knowledge Systems	Kapil Kapoor, Avadhesh Kumar Singh	D. K. PrintworldPvt. Ltd.	1st
	History of Technology in India Vol. 1	A. K. Bag	Indian National Science Academy, New Delhi	1997
	History of Astronomy in India	S. N. Sen and K. S. Shukla	Indian National Science Academy	2nd
	A Concise History of Science in India	D.N. Bose, S.N. Sen and B. V. Subbarayappa	Indian National Science Academy	1st

Faculty of Science & Technology
Syllabus of F. Y. B.E (Computer Science and Engineering ;AI&ML ;Electrical and Electronics Engineering) (Semester II)

Course Code: VSE157
Course: Experiential Learning Lab
Credits: 1
Practical: 02 Hrs/week ; 30 Hrs / Semester

<table>
<tr><td>Objectives</td><td colspan="5">• To make student understand the role of an Engineer as a problem solver.
• To make students explore different aspects of platform-based development.
• To get students familiar with engineering project management skills.
• To introduce sustainability perspectives.</td></tr>
<tr><td rowspan="2">Unit-I</td><td colspan="5">A: Project Management
Introduction to Agile practices, Significance of team work, Importance of communication in engineering profession, Project management tools: Checklist, Timeline, Gantt Chart, Significance of documentation. (4Hrs)</td></tr>
<tr><td colspan="5">B: Platform based development
Introduction to various platforms, platform-based development (Arduino) programming and its essentials, Introduction to sensors, transducers and actuators and its interfacing with Arduino microcontroller. (16 Hrs)</td></tr>
<tr><td rowspan="2">Unit-II</td><td colspan="5">A: Data Acquisition and Analysis
Types of Data, Descriptive Statistics techniques as applicable to different types of data, Types of graphs as applicable to different types of data, Data Acquisition (Temperature and humidity) using Sensors interfaced with Arduino.(6 Hrs)</td></tr>
<tr><td colspan="5">B: Sustainability in Engineering
Introduction to sustainability, Sustainability leadership, Life cycle assessment, carbon foot print. (4Hr)</td></tr>
<tr><td rowspan="6">Textbooks/ Reference Books</td><td>Sr. No.</td><td>Title</td><td>Author</td><td>Publication</td><td>Edition</td></tr>
<tr><td>1</td><td>Engineering Design: A Project Based Introduction</td><td>C.L. Dym, P. Little</td><td>Wiley Publication</td><td>4th Edition</td></tr>
<tr><td>2</td><td>Project Design & Development</td><td>Karl Ulrich</td><td>McGraw Hill Publication</td><td>5thEdition</td></tr>
<tr><td>3</td><td>Getting Started with Arduino</td><td>Massimo Banzi</td><td>O’Reilly</td><td>1stEdition</td></tr>
<tr><td>4</td><td>Project Management Methodologies and Framework</td><td>-</td><td>Active.collab</td><td>1stEdition</td></tr>
<tr><td>5</td><td colspan="4">Manuals and datasheets of respective software and hardware tools</td></tr>
</table>

Faculty of Science & Technology Syllabus of F. Y. B.E (Computer Science and Engineering ;AI&ML ;Electrical and Electronics Engineering) (Semester II)	
Course Code: BSC121B Course: Engineering Physics LAB Credits: 1 Practical:02Hrs/week ; 30 Hrs / Semester	
List of Practical	Any 10 practical to be conducted 1. Newton's ring: To determine wavelength of monochromatic light 2. G. M. Counter: dead time calculation 3. Grating: To determine wavelength of LASER light. 4. Characteristics of solar cell 5. Ultrasonic interferometer 6. Dielectric constant: to determine dielectric constant. 7. Forbidden gap: To determine forbidden gap of semiconductors. 8. To determine the Hall coefficient of a semiconductor material and then evaluate carrier type and its density of charge carrier. 9. Determination of Planck's Constant 10. To determine the elastic constant of wire Y and n of stainless steel wire by Searle's method. 11. Determination of Young's modulus by bending beam 12. To find the time period of a simple pendulum anddetermine acceleration due to gravity

Faculty of Science & Technology Syllabus of F. Y. B.E (Computer Science and Engineering ;AI&ML ;Electrical and Electronics Engineering) (Semester II)	
Course Code: BSC122B Course: Engineering Chemistry LAB Credits: 1 Practical:02Hrs/week ; 30 Hrs / Semester	
List of Practical	Any 10 practical to be conducted: 1. Analysis of Chemical parameters of water (Lab performance/Virtual performance) 2. Analysis of physical parameters of water 3. Determination of percentage of moisture and ash in given coal sample. 4. Preparation of polymer 5. Electro gravimetric Estimation of Metals (Virtual experiment) 6. Determination of chloride content of water by Mohr's method (Lab performance /Virtual experiment) 7. Determination of melting or boiling point of organic compound. (Virtual experiment) 8. Determination of Viscosity of given specimen. 9. Determination of rate of corrosion in different pH media. (Lab performance /Virtual experiment) 10. Chromatography- Separation technique (Lab performance /Virtual experiment) 11. Determination of acid value of lubricating oil by titration method. 12. Determination of percentage of moisture in given soil sample. 13. Determination of pH in given soil sample. 14. Separation of chemical compounds by column chromatography technique. (Virtual experiment)

Faculty of Science & Technology **Syllabus of F. Y. B.E (Computer Science and Engineering ;AI&ML ;Electrical and Electronics Engineering) (Semester II)**	
CourseCode:ESC130 Course: Basics of Electronics Engineering LAB Credits: 1 Practical:02Hrs./ Week ; 30 Hrs / Semester	
Prerequisites	Proficiency in Using Laboratory Tools, Basic Technical Documentation Reading Skills,Basic Troubleshooting Skills
Objectives	1. Gain practical experience working with electronic components and circuits. 2. Learn to identify, handle, and understand the behavior of basic electronic components. 3. Develop skills in building and assembling simple electronic circuits. 4. Learn to use measuring instruments like multimeter, power supply, function generator, oscilloscope,etc. to characterize and analyze circuit parameters.
Course Outcomes	1. Conduct experiments on basic electronic components and verify their characteristics. 2. Demonstrate experiments on Basic circuits and interpret the output.
List of Experiments	Any 10 practical to be conducted 1. To study characteristics of Semiconductor diode. 2. To study Half wave and Full Wave Rectifier. 3. To Plot the characteristics of BJT in CE configuration. 4. To study Application of Op-Amp as an adder. 5. To study Application of Op-Amp as a subtractor. 6. To study Use of Op-Amp as an integrator and differentiator. 7. To study logic gates. 8. To study Multiplexer. 9. Measurement of temperature using RTD/ Therocouple 10. To study application of Strain gauge as a weighing machine. 11. To study use of LVDT for displacement measurement 12. Implementation and testing of circuits like amplifier, Power supply on bread board.

Faculty of Science & Technology
Syllabus of F. Y. B.E (Computer Science and Engineering ;AI&ML ;Electrical and Electronics Engineering) (Semester II)

Course Code: ESC172
Course: Engineering Graphics LAB
Credits: 1

Practical: 02 Hr/week ; 30 Hrs / Semester

Content:

1. Drawing instruments and their uses. Lines, lettering, and Dimensioning.
2. Drawing sheet on Projection of points.
3. Drawing sheet on Projection of Lines.
4. Drawing sheet on Projection of Planes.
5. Drawing sheet on Projection of Solids.
6. Drawing sheet on sections of Solids
7. Drawing sheet on orthographic projections.
8. Drawing sheet on Isometric projections.

The assessment of term work shall be done on the basis of the following.

- Continuous assessment
- Performing the experiments in the laboratory
- Oral examination conducted on the syllabus and term work mentioned above.

Faculty of Science & Technology **Syllabus of F. Y. B.E (Computer Science and Engineering ; AI&ML; Electrical and Electronics Engineering) (Semester II)**	
Course Code: LLC126 B Course: Health and Wellness Credits: 2 Practical: 4 Hrs/week ; 60 Hrs / Semester	
Course Objectives:	a. To make aware about the concept of health and wellness with respect to physical, mental, social and emotional also to detail about the lifestyle of an individual with hypo-kinetic diseases. b. To clear the idea about the nutritional aspects viz. balance diet, malnutrition and harmful effects of ergo-genic aids. c. To make aware about obesity, overweight, underweight etc. and how to deal with these problems. d. To make the students apply the theoretical knowledge into practicalitythrough the assignments and practical projects.
Course Outcomes:	a. After completion first unit the students will have the conceptual idea about health and wellness with respect to physical, mental, social and emotional also they are enlightened with the lifestyle of an individual with hypo-kinetic diseases. b. The students will have clear dea about the nutritional aspects viz. balance diet, malnutrition and harmful effects of ergo-genic aids. c. The students can make out about the awareness of obesity, overweight, underweight etc. and how to deal with these problems. d. Through implementation of practical the students will able to apply the theoretical knowledge into practicality through the assignments andpractical projects.
Unit – I	**Course Content** **12 Hours**
	Concept of Health and Wellness: Definition, Aims and Objectives of Health (Physical, Mental, Social and Emotional) and Wellness; Importance and Scope of Health (Physical, Mental, Social and Emotional) and wellness; modern concept of Health (Physical, Mental Social and Emotional) and Wellness; Dimensions of Health and Wellness; **Wellness and Lifestyle:** Fitness- Understanding of Wellness; Modern Lifestyle and Hypo Kinetic Diseases – Prevention and Management; Physical Activity and Health (Physical, Mental, Social and Emotional) Benefits.
Unit – II	**Course Content** **10 Hours**
	Introduction to nutrition , and types of nutrition: proteins, carbohydrates, fats, vitamins, minerals, water; balanced diet, daily caloric requirement and expenditure; Nutritional Value and requirement of food in relation to exercise,Malnutrition and obesity causes, effect, prevention and treatment, Harmful effects of nutritional ergo-genic aids.
Unit – III	**Course Content** **08 Hours**

	Weight management, meaning and concept, concept of BMI (Body MassIndex), WHR (Waist-Hip Ratio) Obesity, meaning, definition and types of obesity, causes and solutions of or over coming obesity; weight gain and weigh loss diest; Steps of planning of weight management balance diet for Indian school children; diet program for sports children.
Practical:	a. Visit personally to any gym (or) ground (or) sports club where people come for regular exercises and fitness and calculate the BMI of minimum 50 members. b. Make a survey on 50 members with hypokinetic diseases on their diet and life style habits. c. Prepare a diet plan for healthy life-style of either young children (or) adults (or) Age old (or) Working Women (or) Pregnant women (or) those with hypertension and hyper glycaemia. d. Make a survey on health and lifestyle of those who are suffering from occupational hazards on any one of them viz. Bankers, Corporate sectors, IT employees, Teachers, beauticians, tailors, traffic policeman, flour mill workers, cooks, cobblers etc. **30 Hrs**

Suggested Reading –

1. आनंद योग, श्रीकृष्ण व्यवहारे, घंटाळी प्रकाशन, ठाणे. 1991.
2. Light on yoga, B.K.S. lyengar Harper Collins publisher, New Delhi, 2005.
3. Asana Pranayam mudra bandha, Swami SatyedraSaraswati, yoga publication trust, 1997.
4. Patanjaliyog Sutra, Swami Vivekanand, Geeta press Gorakhpur.
5. PranayamRahasya, Swami Ramdev, divyaPrakashanPatanjaliyogpith, Haridwar, 2009.
6. भारतीय मानसशास्त्र पतंजली योगदर्शन, कृष्णाजीकोल्हटकर, आदित्य प्रतिष्ठान पब्लिकेशन, 2016.
7. Yoga professionals official guide book for level 1., Quality council of India, Excel books New Delhi, 2016.
8. Suryanamaskar, Saraswati, Swami satyanand, Bihar School of yoga, Munger, 2006.
9. YogikSukshmvyayam, Brahmachari Swami Dhirendra, Dhirendra yoga publications, New Delhi, 1986.
10. योग साधना एवं योग चिकित्सा रहस्य, स्वामी रामदेव, दिव्य प्रकाशन, पतंजलि योगपीठहरिद्वार, 2018.