Course Contents

First Year

B. Tech. in Civil Engineering

In line with National Education Policy 2020

(Effective from AY 2023-24 for University Department only)

Dr. Babasaheb Ambedkar Technological University

Lonere 402 103, Dist- Raigad, Maharashtra, INDIA

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Course Structure, Guidelines, Rules and Regulations

Preamble

Economic advancement of a country is closely tied to the quality of technical education it offers. Engineering education is reaching new heights and plays a significant role in the overall education system. The preparation of engineering graduates shall focus on enhancing their employability and sustainability in response to evolving industry and societal needs. As technology advances and expectations change rapidly, updating the curriculum to be contemporary and relevant is imperative.

In order to align our technical education system with global standards and practices, based on performance and assessment system was implemented earlier for all Undergraduate Programs (UG). Now as per National

Education Policy-2020 framework we are incorporating project-based learning. The realm of engineering and technology, characterized by its interdisciplinary nature, demands the synthesis of knowledge from a wide array of domains including humanities, arts, and advanced technologies. However, what distinguishes technologists is their proficiency in design and their ability to adeptly apply this knowledge across diverse disciplines to achieve effective problem-solving.

In response to these needs, aspiring engineers need thorough preparation and a deep understanding of the latest technological trends and industrial requirements. This calls for studying under a modern and adaptable curriculum that mirrors the global environment. As part of this initiative, there is a push to integrate recent advancements and enrich course content with pertinent and up-to-date subjects. Consequently, a revised structure and curriculum will debut from the academic year 2023-24 for First Year Civil Engineering, with intentions to progressively implement these updates across second, third- and fourth-year engineering programs.

Project-based learning has been introduced alongside traditional classroom teaching and laboratory-based learning to enhance the overall learning experience. The objective is to encourage students to learn collaboratively in groups of 3 to 4, focusing on solving meaningful problems. These problems can be theoretical, practical, social, technical, symbolic, cultural, or scientific, arising from students' curiosity across various disciplines and professional contexts. The selected problems shall be exemplary and may require an interdisciplinary approach for both analysis and resolution. This approach aims to develop students' capacity for learning through shared cognition.

- Laboratory Course: This is focused on completing experiments and assignments related to the courses of the Semester.
- Seminar: This aspect will revolve around state-of-the-art topics selected by students and approved by the authority. Students are required to submit a certified seminar report in a standard format, evaluated by their assigned guide and the department/institute head for satisfactory completion of the work.
- Project Work in Final Year: Project work in the seventh Semester is integral to the curriculum. It involves applying knowledge gained throughout the graduation program, ideally addressing societal needs. The project provides an opportunity for students to design and construct complete systems or subsystems, specializing in areas of their interest. Students must prepare a certified final project report in standard format, evaluated by their guide and the department/institute head for satisfactory completion of the work.
- Internship: Internships are crucial for educational and career development, offering practical experience in field of discipline. It plays a significant role as employers seek well-trained employees. The primary objective is to expose technical students to real-world industrial environments, providing insights into the social, economic, and administrative factors influencing organizational operations. Students may choose internships in industries, government agencies, NGOs, MSMEs, rural settings, innovation hubs, intellectual property rights (IPR), or entrepreneurship initiatives. They can opt to focus on innovation, leading to start-up's, or gain experience in industry/NGO/government/MSME settings to prepare for professional roles. The conduction, monitoring, assessment, and evaluation of internships follow guidelines provided by AICTE.

Definition of Credit **

1 Hour Lecture (L) per week	1 credit for 1 Hour
Tutorial (T) per week	1 credit for 1 Hour
Practical(P) per week 2 Hours Practical (Lab)/week	1 credit for 2 Hours

** The head of Tutorial and Practical (as a special case) may be merged for common credit with the permission of authority.

Rule No. 1: Eligibility for Admission

Eligibility Criteria

Students seeking admission to the first year of the Bachelor's degree course in Engineering and Technology must fulfil the eligibility criteria as laid down from time to time by the following authorities:

- **Dr. Babasaheb Ambedkar Technological University (DBATU)**
- **Government of Maharashtra**
- **All India Council for Technical Education (AICTE)**

Rule No. 2: Scheme of Assessment

Eligibility for the Degree of Bachelor of Engineering and Technology

To be eligible for the degree of Bachelor of Engineering and Technology, a candidate must:

1. **Appearing for Examinations**:
    - A candidate is required to appear for all prescribed examinations during the course of study. This includes theory exams, practical exams, term-work assessments, project evaluations, and any other form of examination as specified in the syllabus.
2. **Passing of Examinations**:
    - A candidate must pass all the prescribed examinations. The passing criteria, including minimum marks required in theory, practical, term-work, and other components, will be as per the rules laid down by the university.

Components of Assessment

The scheme of assessment typically includes the following components:

1. **In semester Evaluation (ISE)**
    - Continuous assessment of assignments, tutorials, tests and project work throughout the Semester.
    - Includes the evaluation of written assignments, presentations, and project reports.
    - Regular assessments conducted throughout the Semester.
    - Includes quizzes, class tests, mid-term exams, and participation in class activities.

2. Mid Semester Examination (MSE)

- Includes the evaluation through examination during the semester.

3. End Semester Examinations (ESE)

- Conducted at the end of each Semester.
- Assess the theoretical understanding of the subjects.

4. Practical Examinations:

- Conducted to assess the practical skills and application of knowledge.

- Includes laboratory work, experiments, and practical assignments.

5. **Project Work:**
   - Assessment of project-based learning and final year projects.
   - Includes continuous assessment by the faculty and final evaluation through project reports, presentations, and viva-voce.

General Rules and Regulations

1. The normal duration of the course leading to B.Tech degree will be EIGHT semesters.
2. The normal duration of the course leading to M.Tech. degree will be FOUR semesters.
3. Each academic year shall be divided into 2 semesters, each of 20 weeks duration, including evaluation and grade finalization, etc. The Academic Session in each semester shall provide for at least 90 Teaching Days, with at least 40 hours of teaching contact periods in a five to six days session per week. The semester that is typically from Mid-July to November is called the ODD SEMESTER, and the one that is from January to Mid-May is called the EVEN SEMESTER. Academic Session may be scheduled for the Summer Session/Semester as well. For 1st year B. Tech and M. Tech the schedule will be decided as per the admission schedule declared by Government of Maharashtra.
4. The schedule of academic activities for a Semester, including the dates of registration, mid-semester examination, end-semester examination, inter-semester vacation, etc. shall be referred to as the Academic Calendar of the Semester, which shall be prepared by the Dean (Academic), and announced at least TWO weeks before the Closing Date of the previous Semester.
5. The Academic Calendar must be strictly adhered to, and all other activities including co-curricular and/or extra -curricular activities must be scheduled so as not to interfere with the Curricular Activities as stipulated in the Academic Calendar.

Registration:

1. Lower and Upper Limits for Course Credits Registered in a Semester, by a Full- Time Student of a UG/PG Program:

   A full time student of a particular UG/PG program shall register for the appropriate number of course credits in each semester/session that is within the minimum and maximum limits specific to that UG/PG program as stipulated in the specific Regulations pertaining to that UG/PG program.
2. Mandatory Pre-Registration for higher semesters: In order to facilitate proper planning of the academic activities of a semester, it is essential for the every institute to inform to Dean (Academics) and COE regarding details of total no. of electives offered (Course-wise) along with the number of students

opted for the same. This information shall be submitted within two weeks from the date of commencement of the semester as per academic calendar.

3. PhD students can register for any of PG/PhD courses and the corresponding rules of evaluation will apply.
4. Under Graduate students may be permitted to register for a few selected Post Graduate courses, in exceptionally rare circumstances, only if the DUGC/DPGC is convinced of the level of the academic achievement and the potential in a student.

Course Pre-Requisites:

1. In order to register for some courses, it may be required either to have exposure in, or to have completed satisfactorily, or to have prior earned credits in, some specified courses.
2. Students who do not register on the day announced for the purpose may be permitted LATE REGISTRATION up to the notified day in academic calendar on payment of late fee.
3. REGISTRATION IN ABSENTIA will be allowed only in exceptional cases with the approval of the Dean (Academic) / Principal.
4. A student will be permitted to register in the next semester only if he fulfills the following conditions:
   i) Satisfied all the Academic Requirements to continue with the program of Studies without termination
   ii) Cleared all Institute, Hostel and Library dues and fines (if any) of the previous semesters;
   iii) Paid all required advance payments of the Institute and hostel for the current semester;
   iv) Not been debarred from registering on any specific ground by the Institute.

Evaluation System:

1. Absolute grading system based on absolute marks as indicated below will be implemented from academic year 2023-24, from I year B. Tech.

Percentage of marks	Letter Grade	Grade Point
91-100	EX	10.0
86-90	AA	9.0
81-85	AB	8.5
76-80	BB	8.0
71-75	BC	7.5
66-70	CC	7.0
61-65	CD	6.5

56-60	DD	6.0
51-55	DE	5.5
40-50	EE	5.0
<40	EF	0.0

2. Class is awarded based on CGPA of all eighth semester of B.Tech Program.

CGPA for pass is minimum 5.0	
CGPA upto <5.50	Pass class
CGPA ≥ 5.50&<6.00	Second Class
CGPA ≥ 6.00&<7.5	First Class
CGPA >7.50	Distinction
[Percentage of Marks =CGPA*10.0]	

3. A total of 100 Marks for each theory course are distributed as follows:

Mid Semester Exam (MSE) Marks	20
Continuous Assessment Marks	20
End Semester Examination(ESE)Marks	60

4. A total of 100 Marks for each practical course are distributed as follows

1.	Continuous Assessment Marks	40
2.	End Semester Examination (ESE)Marks	60

- It is mandatory for every student of B. Tech to score a minimum of 40 marks out of 100, M. Tech to score a minimum of 45 marks out of 100 with a minimum of 20 marks out of 60 marks in End Semester Examination for theory course.
- This will be implemented from the first year of B. Tech starting from Academic Year 2023-24

5. **Description of Grades**

EX Grade: An 'EX' grade stands for outstanding achievement.

EE Grade: The 'EE' grade stands for minimum passing grade.

The students may appear for the remedial examination for the subjects he/she failed for the current semester of admission only and his/her performance will be awarded with EE grade only.

If any of the students remain absent for the regular examination due to genuine reason and the same will be verified and tested by the Dean (Academics) or committee constituted by the University Authority.

FF Grade: The 'FF' grade denotes very poor performance, i.e. failure in a course due to poor performance. The students who have been awarded 'FF' grade in a course in any semester must repeat the subject in next semester.

6. Evaluation of Performance

a. Semester Grade Point Average (SGPA)

The performance of a student in a semester is indicated by Semester Grade Point Average (SGPA) which is a weighted average of the grade points obtained in all the courses taken by the student in the semester and scaled to a maximum of 10. (SGPI is to be calculated up to two decimal places). A Semester Grade Point Average (SGPA) will be computed for each semester as follows:

$$SGPA = \frac{[\sum_{i=1}^{n} c_i g_i]}{[\sum_{i=1}^{n} c_i]}$$

Where

'n' is the number of subjects for the semester,

'c_i' is the number of credits allotted to a particular subject, and

'g_i' is the grade-points awarded to the student for the subject based on his performance as per the above table.

SGPA will be rounded off to the second place of decimal and recorded as such.

b. Cumulative Grade Point Average (CGPA):

An up to date assessment of the overall performance of a student from the time he entered the Institute is obtained by calculating Cumulative Grade Point Average (CGPA) of a student. The CGPA is weighted average of the grade points obtained in all the courses registered by the student since s/he entered the Institute. CGPA is also calculated at the end of every semester (upto two decimal places).Starting from the first semester at the end of each semester (S), a Cumulative Grade Point Average (CGPA) will be computed as follows:

$$CGPA = \frac{[\sum_{i=1}^{m} c_i g_i]}{[\sum_{i=1}^{m} c_i]}$$

Where,

'm' is the total number of subjects from the first semester onwards up to and including the semester S,

'ci' is the number of credits allotted to a particular subject, and

'gi' is the grade-points awarded to the student for the subject based on his/her performance as per the above table.

CGPA will be rounded off to the second place of decimal and recorded as such.

7. Attendance Requirements:

a. All students must attend every lecture, tutorial and practical classes.

b. To account for approved leave of absence (eg. representing the Institute in sports, games or athletics; placement activities; NCC/NSS activities; etc.) and/or any other such contingencies like medical emergencies, etc., the attendance requirement shall be a minimum of 75% of the classes actually conducted. If the student failed to maintain 75% attendance, he/she will be detained for appearing the successive examination. The Dean (Academics)/ Principal is permitted to give 10% concession for the genuine reasons as such the case may be. In any case the student will not be permitted for appearing the examination if the attendance is less than 65%.

c. The course instructor handling a course must finalize the attendance 3 calendar days before the last day of classes in the current semester and communicate clearly to the students by displaying prominently in the department and also in report writing to the head of the department concerned.

d. The attendance records are to be maintained by the course instructor and he shall show it to the student, if and when required.

8. Transfer of Credits:

The courses credited elsewhere, in Indian or foreign University/Institutions/ Colleges/Swayam Courses by students during their study period at DBATU may count towards the credit requirements for the award of degree. The guidelines for such transfer of credits are as follows:

a. 20 % of the total credit will be considered for respective calculations.

b. Credits transferred will be considered for overall credits requirements of the program.

c. Credits transfer can be considered only for the course at same level i.e UG, PG etc.

d. A student must provide all details (original or attested authentic copies) such as course contents, number of contact hours, course instructor /project guide and evaluation system for the course for which he is requesting a credits transfer. He shall also provide the approval or acceptance letter from the other side. These details will be evaluated by the concerned Board of Studies before giving approval. The Board of Studies will then decide the number of equivalent credits the student will get for such course(s) in DBATU. The complete details will then be forwarded to Dean for approval.

e. A student has to get minimum passing grades/ marks for such courses for which the credits transfers are to be made.

f. Credits transfers availed by a student shall be properly recorded on academic record(s) of the student.

g. In exceptional cases, the students may opt for higher credits than the prescribed.

Table A: Credit Structure for UG program in Engineering

Course Category	Recommended (for 4 years)	Provided (for 1st year)
Basic Science Course (BSC)	14 to 18	14
Engineering Science Course (ESC)	12 to 16	16
Program Core Course (PCC)	44 to 56	0
Multidisciplinary Minor (MDM)	14	0
Humanities Social Science and Management (HSSM-IKS/VEC/AEC)	14	5
Vocational and Skill Enhancement Course (VSEC)	08	4
Open Elective (OE) Other than a particular program	08	0
Program Elective Course (PEC)	20	0
Experiential Learning Courses (ELC)	22	0
Co-curricular Courses (CC)	02-04	2
TOTAL	**160 to 176**	**41**

Type of course:

Basic Science: **BS**	Engineering Science: **ES**
Program Elective: **PE**	Program Core: **PC**
Modern Indian Language: **MIL**	Indian Knowledge System: **IK**
Value Education Course: **VEC**	Ability Enhancement Course: **AE**
Vocational and Skill Enhancement: **VS**	Audit Course: **AU**
Open Elective: **OE** (Other than particular program)	Co-curricular & Extracurricular Activities: **CC**
Humanities, Management, language and Commerce: **HM**	Multidisciplinary Courses: **MD**

Dr. Babasaheb Ambedkar Technological University, Lonere

Teaching & Evaluation Scheme for First Year B. Tech.

Civil Engineering

Sr. No.	Course Code	Course Title	Teaching Scheme			Evaluation Scheme				Credit
			L	T	P	ISE	MSE	ESE	Total	
Semester- I										
1	23UD1000BS101T	Engineering Mathematics-I	3	0	0	20	20	60	100	3
2	23UD1000BS102T	Engineering Physics	3	0	0	20	20	60	100	3
3	23UD1191OE103T	Engineering Graphics & Design	2	0	0	20	20	60	100	2
4	23UD1000ES104T	Basic Civil Engineering	3	0	0	20	20	60	100	3
5	23UD1000AE105T	Communication Skill	2	0	0	20	20	60	100	2
6	23UD1000VS106T	Design Thinking	2	0	0	20	20	60	100	2
7	23UD1000BSL107P	Engineering Physics Lab	0	0	2	60	-	40	100	1
8	23UD1000ESL108P	Engineering Graphics & Design Lab	0	0	2	60	-	40	100	1
9	23UD1000AEL109P	Communication Skill Lab	0	0	2	60	-	40	100	1
10	23UD1000CC110AP	A) NSS B) NCC C) Yoga Education D) UHV-I	0	0	2	60	-	40	100	1
Total			**15**	**00**	**08**	**360**	**120**	**520**	**1000**	**19**
Semester- II										
1	23UD1000BS201T	Engineering Mathematics-II	3	0	0	20	20	60	100	3
2	23UD1000BS202T	Engineering Chemistry	3	0	0	20	20	60	100	3
3	23UD1000ES203T	Computer Programming	2	0	0	20	20	60	100	2
4	23UD1191ES204T	Engineering Mechanics	3	0	0	20	20	60	100	3
5	23UD1000OE205T	Basic Electrical & Electronics Engineering	3	0	0	20	20	60	100	3
6	23UD1000IK206T	History of Indian Civil Engineering	2	0	0	20	20	60	100	2
7	23UD1000BSL207P	Engineering Chemistry Lab	0	0	2	60	-	40	100	1
8	23UD1191ESL208P	Computer Programming Lab	0	0	2	60	-	40	100	1
9	23UD1000ESL209P	Engineering Mechanics Lab	0	0	2	60	-	40	100	1
10	23UD1000CC210P	Workshop Practices	0	0	4	60	-	40	100	2
11	23UD1000BS201P	A) Health & Wellness B) Fine Arts C)Performing Arts	0	0	2	60	-	40	100	1
Total			**16**	**00**	**12**	**420**	**120**	**560**	**1100**	**22**

Dr. Babasaheb Ambedkar Technological University, Lonere

Teaching & Evaluation Scheme for First Year B. Tech.

Civil Engineering

Sr. No.	Course Code	Course Title	Teaching Scheme			Evaluation Scheme				Credit
			L	T	P	ISE	MSE	ESE	Total	
Semester- I										
1	23UD1000BS101T	Engineering Mathematics-I	3	0	0	20	20	60	100	3
2	23UD1000BS102T	Engineering Physics	3	0	0	20	20	60	100	3
3	23UD1191OE103T	Engineering Graphics & Design	2	0	0	20	20	60	100	2
4	23UD1000ES104T	Basic Civil Engineering	3	0	0	20	20	60	100	3
5	23UD1000AE105T	Communication Skill	2	0	0	20	20	60	100	2
6	23UD1000VS106T	Design Thinking	2	0	0	20	20	60	100	2
7	23UD1000BSL107P	Engineering Physics Lab	0	0	2	60	-	40	100	1
8	23UD1000ESL108P	Engineering Graphics & Design Lab	0	0	2	60	-	40	100	1
9	23UD1000AEL109P	Communication Skill Lab	0	0	2	60	-	40	100	1
10	23UD1000CC110P	A) NSS B) NCC C) Yoga Education D) UHV-I	0	0	2	60	-	40	100	1
Total			**15**	**00**	**08**	**360**	**120**	**520**	**1000**	**19**

Detailed Syllabus

SUBJECT CODE	Engineering Mathematics-I	CREDITS
23UD1000BS101T		3

Teaching Work Load/week (Hrs.)				Examination Scheme(Marks)			
Theory	Tutorial	Laboratory	Total	ISE	MSE	ESE	Total
3	0	0	03	20	20	60	100

Course Objectives:	
CO1	To know the application of the matrix technique (Linear algebra) to find solutions of system of linear equations arising in many engineering problem
CO2	To know and apply the concept partial derivatives and their applications to Maxima/ Minima , series expansion of multi valued functions.
CO3	To understand Computation of Jacobian of functions of several variables and their applications to engineering problems
CO4	To identify and sketch of curves in various coordinate system.
CO5	To evaluate multiple integrals and their applications to area and volume.

Course Outcomes: Students will be able to	
CO1	Apply the matrix technique (Linear algebra) to find solutions of system of linear equations arising in many engineering problem
CO2	Demonstrate the concept partial derivatives and their applications to Maxima/ Minima, series expansion of multi valued functions.
CO3	Compute Jacobian of functions of several variables and their applications to engineering problems
CO4	Identify and sketch of curves in various coordinate system.
CO5	Evaluate multiple integrals and their applications to area and volume.

SYLLABUS

Module 1	**Linear Algebra- Matrices**	**Hrs. 6**
Inverse of a matrix by Gauss-Jordan method; Rank of a matrix; Normal form of a matrix; Consistency of non- homogeneous and homogeneous system of linear equations; Eigen values and eigen vectors; Properties of eigen values and eigen vectors (without proofs); Cayley- Hamilton's theorem (without proof) and its applications.		
Module 2	**Partial Differentiation**	**Hrs. 6**
Partial derivatives of first and higher orders; Homogeneous functions – Euler's Theorem for functions containing two and three variables (with proofs); Total derivatives; Change of variables.		
Module 3	**Applications of Partial differentiation**	**Hrs. 6**
Jacobians - properties; Taylor's and Maclaurin's theorems (without proofs) for functions of two variables; Maxima and minima of functions of two variables; Lagrange's method of undetermined multipliers.		
Module 4	**Reduction Formulae and Tracing of Curves**	**Hrs. 6**
Reduction formulae for $\int_0^{\pi/2} \sin^n x \ dx \int_0^{\pi/2} \cos^n x \ dx \int_0^{\pi/2} \sin^m x \ \cos^n x \, dx$; Tracing of standard curves given in Cartesian, parametric & polar forms.		

Module 5	Multiple Integra	Hrs. 6
Double integration in Cartesian and polar co-ordinates; Evaluation of double integrals by changing the order of integration and changing to polar form; Triple integral; Applications of multiple integrals to find area as double integral , volume as triple integral and surface area.		

Text Books:	
1	Higher Engineering Mathematics by B. S. Grewal, Khanna Publishers, New Delhi.
2	Higher Engineering Mathematics by H. K. Das and Er. Rajnish Verma, S. Chand & CO. Pvt. Ltd., New Delhi.
3	A course in Engineering Mathematics (Vol I) by Dr. B. B. Singh, Synergy Knowledgeware, Mumbai.
4	Higher Engineering Mathematics by B. V. Ramana, Tata McGraw-Hill Publications, New Delhi.

Reference Books:	
1	Advanced Engineering Mathematics by Erwin Kreyszig, John Wiley & Sons, New York.
2	A Text Book of Engineering Mathematics by Peter O‟ Neil, Thomson Asia Pte Ltd., Singapore.
3	Advanced Engineering Mathematics by C. R. Wylie & L. C. Barrett, Tata McGraw-Hill Publishing Company Ltd., New Delhi.

SUBJECT CODE	Engineering Physics			CREDITS			
23UD1000BS102T				3			
Teaching Work Load/week (Hrs.)				Examination Scheme(Marks)			
Theory	Tutorial	Laboratory	Total	ISE	MSE	ESE	Total
3	0	0	03	20	20	60	100

Course Objectives:	
CO1	To provide a firm grounding in the basic physics principles and concept to resolve many Engineering and Technological problems.
CO2	To understand and study the Physics principles behind the developments of Engineering materials.

Course Outcomes: Students will be able to	
CO1	Students will familiar with the principles of acoustic design of a hall and also methods of production of ultrasonic and its applications in various fields and also understand the concept of dielectric and polarization types.
CO2	Students acquired basic knowledge of interference, polarization. Students are able to understand the light propagation in fibre and use of Laser in Science and Engineering.
CO3	Students can apply the knowledge of quantum mechanics to set Schrödinger’s equations.
CO4	Students are able to understand key principle and application of nuclear physics. Identify planes in crystal and characteristics measurements of cubic system.
CO5	Assimilate wide scope of advanced materials in modern developments and its role in

SYLLABUS

Module 1	Acoustics, Ultrasonic and Dielectrics	Hrs. 8
Acoustics: Introduction, Reflection of sound (reverberation and echo), absorption coefficient, Sabine's formula, Acoustical planning of building and factors affecting architectural acoustics of building. Ultrasonic Waves: properties, Production of ultrasonic waves: Magnetostriction method and Piezoelectric method, Applications (any three in detail). Dielectrics: Polar and non-polar dielectrics, Polarization, Types of Dielectric polarization		
Module 2	**Engineering Optics**	**Hrs. 8**
Interference in thin film due to reflected light, Wedge shaped film, Newton‟ Rings, Applications, Polarization: Introduction, types of polarization, definition of optical activity & specific rotation, Lasers: Characteristics, spontaneous emission and stimulated emission; metastable state, population inversion, types of pumping, resonant cavity, He-Ne Laser, semiconductor laser, Applications of Lasers, Optical fibre: Acceptance cone, Numerical aperture, applications of fibre optics.		
Module 3	**Quantum Mechanics**	**Hrs. 6**
De-Broglie hypothesis of matter waves, Wave function and its physical significance, Heisenberg's uncertainty principle and its application, Schrodinger's time dependent wave equation, Schrodinger's time independent wave equation, Introduction to quantum computing (bits & qubits, difference between classical and quantum computers).		
Module 4	**Crystal Structure and Nuclear Physics**	**Hrs. 6**
Crystal Structure: Fundamental concepts (lattice, basis, unit cell, crystal systems), Cubic structure: Number of atoms per unit cell, atomic radius, co-ordination number, packing fraction, Comparison of Aluminum (FCC) and Iron (BCC) at room temperature, Miller indices, Relation between "ρ" and "a". Nuclear Physics: Introduction to mass defect, Q value of nuclear reaction, properties of α, β and γ rays, GM Counter.		
Module 5	**Physics of Advanced Materials**	**Hrs.6**
Magnetic Materials: Types of magnetic materials, magnetic domain and hysteresis curve, Semiconductors: Conductivity of semiconductors, Hall Effect (derivation & Applications) Superconductors: Definition, critical temperature, critical magnetic field, Meissner effect, type I & II superconductors, Introduction to BCS theory. Nanomaterials: Introduction, top-down and bottom-up approach, Introduction to XRD, FESEM, VSM and CNT, Applications of nanomaterials.		

Text Books:	
1	Introduction to Electrodynamics –David R. Griffiths.
2	Concept of Modern Physics – Arthur Beizer. Tata McGraw-Hill Publishing Company Limited.
3	Optics –Ajoy Ghatak. MacGraw Hill Education (India) Pvt. Ltd.
4	Science of Engineering Materials - C.M.Srivastava and C. Srinivasan. New Age International Pvt. Ltd.
5	Solid State Physics – A.J. Dekker. McMillan India –Limited

Reference Books:	
1	The Feynman Lectures on Physics Vol I, II, III.
2	Introduction to solid state physics – Charles Kittel. John Willey and Sons
3	Engineering Physics – M.N. Avadhanulu and P.G. Kshirsagar. S. Chand and Company LTD.
4	Engineering Physics - R.K. Gaur and S. L. Gupta. Dhanpat-Rai Publications Pvt. Ltd.- New Delhi.
5	Fundamental of Physics - Halliday and Resnik. Willey Eastern Limited.

SUBJECT CODE	Engineering Graphics & Design			CREDITS			
23UD1191OE103T				2			
Teaching Work Load/week(Hrs.)				Examination Scheme(Marks)			
Theory	Tutorial	Laboratory	Total	ISE	MSE	ESE	Total
2	0	0	02	20	20	60	100

Course Objectives:	
CO1	To make use of drawing instruments effectively for drawing and dimensioning.
CO2	To understand the conventions and methods of engineering drawing.
CO3	To know the concept of projections of points, lines, planes, solids and section of solids.
CO4	To understand the Construction isometric and orthographic views of given objects.

Course Outcomes: Students will be able to	
CO1	Use of drawing instruments effectively for drawing and dimensioning.
CO2	Explain conventions and methods of engineering drawing.
CO3	Apply concept of projections of points, lines, planes, solids and section of solids.
CO4	Construct isometric and orthographic views of given objects.
CO5	Students able to explain fundamental concepts of magnetism and they shall analyze the properties of semiconducting materials and describe various applications of superconductor.

SYLLABUS

Module 1	**Drawing standards and geometrical construction:**	**Hrs. 6**
Drawing standard SP: 46, Type of lines, lettering, dimensioning, scaling conventions. Geometrical construction: Dividing a given straight line into any number of equal parts, bisecting a given angle, drawing a regular polygon given one side, special methods of constructing a pentagon and a hexagon.		
Module 2	**Orthographic Projections and Projections of Points:**	**Hrs. 6**
Introduction to orthographic projection, drawing of orthographic views of objects from their isometric views. Projection of points lying in four quadrants.		
Module 3	**Projections of Straight Lines and Planes and their Traces**	**Hrs. 6**
Projections of lines parallel and perpendicular to one or both planes, projections of lines inclined to one or both planes. Traces of lines. Projections of planes parallel and perpendicular to one or both planes, projection of planes inclined to one or both planes.		
Module 4	**Projections of Solids**	**Hrs. 6**
Types of solids, projections of solids with axis perpendicular and parallel to HP and VP, solids with axis inclined to one or both the planes. Projections of spheres touching each other.		
Module 5	**Sectioning of Solids, Isometric Projections**	**Hrs. 6**

Sectioning of solids: Section planes perpendicular to one plane and parallel or inclined to other plane. Isometric projections: Isometric scale, drawing of isometric projections from given orthographic views.

Text Books:	
1	N. D. Bhatt, Engineering Drawing, Charotar Publishing House, 46th Edition,2003.
2	V. Nataraajan, A textbook of Engineering Graphic, Dhanalakshmi Publishers, Chennai, 2006.
3	Venugopal and V. Prabhu Raja, Engineering Graphics, New Age International (P) Ltd, 2008.

Reference Books:	
1	Dhananjay A. Jolhe, Engineering Drawing with an Introduction to Autocad, McGraw Hill Education, 2017

SUBJECT CODE	Basic Civil Engineering			CREDITS			
23UD1000ES104T				3			
Teaching Work Load/week(Hrs.)				Examination Scheme(Marks)			
Theory	Tutorial	Laboratory	Total	ISE	MSE	ESE	Total
3	0	0	03	20	20	60	100

Course Objectives:	
CO1	To identify various Civil Engineering materials with their properties.
CO2	To know principles of building planning symbols and components of building.
CO3	To know principles of environmental engineering.
CO4	To identify various components of road.
CO5	To know and apply principles of surveying to solve engineering problem

Course Outcomes: Students will be able to	
CO1	Understand properties of different construction materials.
CO2	Learn components of building planning.
CO3	Learn about of environmental pollution and wastewater treatment.
CO4	Understand the components of highways.
CO5	Learn the principles of surveying.

SYLLABUS

Module 1	**Properties and uses of construction materials**	**Hrs. 6**
Various Branches, role of civil engineer in various construction activities, basic engineering properties and uses of materials: earth, bricks, timber, stones, sand, aggregates, cement, mortar, concrete, steel, bitumen, glass etc.		
Module 2	**Building Planning**	**Hrs. 8**

Components of building: Foundation and superstructure, functions of foundation, types of shallow and deep foundations, suitability in different situation, plinth, walls, lintels, beams, columns, slabs, roofs, staircases, floors, doors, windows, sills.Principles of Building Planning, Symbols used in Civil Engineering Drawings, Study of Building Plans, Plans, Elevation, Section.		
Module 3	**Environmental Engineering**	**Hrs. 6**
Environmental Engineering. Prevention of environmental impact. Pollution, waste and water Treatment.		
Module 4	**Highway & Traffic Engineering**	**Hrs. 6**
Pavement, Components of Pavement: Sub-grade, Sub-Base, Base-course, Wearing course. Classification of Roads. Road Sign, Road Safety measures.		
Module 5	**Surveying**	**Hrs. 8**
Principles of survey, elements of distance and angular measurements, plotting of area, base line and offsets, introduction to Plane table surveying, introduction to levelling, concept of bench marks.		

Text Books:	
1	Anurag Kandya, "Elements of Civil Engineering", Charotar Publishing ,Anand
2	M. G. Shah, C. M. Kale, and S. Y. Patki, "Building Drawing", Tata McGrawHill
3	Sushil Kumar, "Building Construction", Standard PublishersDistributors
4	M. S. Palani Gamy, "Basic Civil Engineering", Tata Mc-Graw Hill Publication
5	G. K. Hiraskar, "Basic Civil Engineering", Dhanpat RaiPublications

Reference Books:	
1	Punmia, "Surveying", Vol.- I, Vol.-II, Vol.-III, Laxmi Publications
2	Kanetkar T. P. and Kulkarni S. V., "Surveying and Levelling", Vols. I, II and III, Vidyarthi Gruh Prakashan,Pune
3	Gopi Satheesh, "Basic Civil Engineering", PearsonEducation

SUBJECT CODE	Communication Skill			CREDITS			
23UD1000AE105T				2			
Teaching Work Load/week(Hrs.)				Examination Scheme(Marks)			
Theory	Tutorial	Laboratory	Total	ISE	MSE	ESE	Total
2	0	0	02	20	20	60	100

Course Objectives:	
CO1	Identify and control the tone while speaking
CO2	Develop the ability to plan and deliver the well-argued presentations
CO3	Students would be more confident while using English.
CO4	Engage in analysis of speeches or discourses and several articles
CO5	Prepared to take the examinations like GRE/TOFEL/IELTS

Course Outcomes: Students will be able to	
CO1	Learn different communication process.
CO2	Understand means of verbal and non-verbal communication.
CO3	Identify and control anxiety while delivering speech.
CO4	Learn about English grammar.
CO5	Write appropriate communications (Academic/Business).

SYLLABUS

Module 1	**Communication and Communication Processes**	**Hrs. 6**
Introduction to Communication, Forms and functions of Communication, Barriers to Communication and overcoming them, Verbal and Non-verbal Communication Reading: Introduction to Reading, Barriers to Reading, Types of Reading: Skimming, Scanning, Fast Reading, Strategies for Reading, Comprehension. Listening : Importance of Listening, Types of Listening, Barriers to Listening.		
Module 2	**Verbal & Non-verbal Communication**	**Hrs. 6**
Use of Language in Spoken Communication, Principles and Practice of Group Discussion, Public Speaking (Addressing Small Groups and Making Presentation), Interview Techniques, Appropriate Use of Non-verbal Communication, Presentation Skills, Extempore, Elocution.		
Module 3	**Study of Sounds in English**	**Hrs. 6**
Introduction to phonetics, Study of Speech Organs, Study of Phonemic Script, Articulation of Different Sounds in English.		
Module 4	**English Grammar**	**Hrs. 4**
Grammar: Forms of Tenses, Articles, Prepositions, Use of Auxiliaries and Modal Auxiliaries, Synonyms and Antonyms, Common Errors.		
Module 5	**Writing Skills, Reading Skills & Listening Skills**	**Hrs. 6**
Features of Good Language, Difference between Technical Style and Literary Style, Writing Emails, Formal and Informal English, Technical Reports: Report Writing: Format, Structure and Types Letter Writing: Types, Parts, Layouts, Letters and Applications, Use of Different Expressions and Style, Writing Job Application Letter and Resume.		

Text Books:	
1	Mohd. Ashraf Rizvi, Communication Skills for Engineers, Tata McGraw Hill
2	Sanjay Kumar, Pushp Lata, Communication Skills, Oxford University Press,2016
3	Meenakshi Raman, Sangeeta Sharma, Communication Skills, Oxford University Press,2017
4	Teri Kwal Gamble, Michael Gamble, Communication Works, Tata McGraw Hill Education, 2010
5	Anderson, Kenneth. Joan Maclean and Tossny Lynch. Study Speaking: A Course in Spoken English for Academic Purposes. Cambridge: CUP, 2004

Reference Books:	
1	Aswalthapa, K. Organizational Behaviour, Himalayan Publication, Mumbai(1991).
2	Atreya N and Guha, Effective Credit Management, MMC School of Management, Mumbai (1994).
3	Balan, K. R. and Rayudu C.S., Effective Communication, Beacon New Delhi(1996).
4	Bellare, Nirmala. Reading Strategies. Vols. 1 and 2. New Delhi. Oxford University Press, 1998.
5	Bhasker, W. W. S & Prabhu, N. S.: English through Reading, Vols. 1 and 2. Macmillan, 1975.

SUBJECT CODE	Design Thinking						CREDITS
23UD1000VS106T							2
Teaching Work Load/week(Hrs.)				Examination Scheme(Marks)			
Theory	Tutorial	Laboratory	Total	ISE	MSE	ESE	Total
2	0	0	02	20	20	60	100

Course Objectives:	
CO1	Inculcate the fundamental concepts of design thinking
CO2	Develop the students as a good designer by imparting creativity and problem solving ability
CO3	Conceive, conceptualize, design and demonstrate innovative ideas using prototypes

Course Outcomes: Students will be able to	
CO1	Demonstrate the critical theories of design, systems thinking, and design methodologies
CO2	Produce great designs, be a more effective engineer, and communicate with high emotional and intellectual impact
CO3	Understand the diverse methods employed in design thinking and establish a workable design thinking framework to use in their practices
CO4	Conceive, organize, lead and implement projects in interdisciplinary domain and address social concerns with innovative approaches
CO5	Apply design thinking tools to make decisions and attain a feasible solution.

SYLLABUS

Module 1	Fundamentals of Design Thinking	Hrs. 6
Design Thinking Process: Types of the thinking process, Common methods to change the human thinking process, Design thinking: Definition, Origin of design thinking, Importance of design thinking, Design vs Design thinking, Problem solving, the need of design thinking; An approach to design thinking, Design thinking Process model, Design thinking tools. Case Studies: General, Engineering and Service applications Activities: Identify an Opportunity and Scope of the Project Explore the possibilities and prepare a design brief		
Module 2	**Empathize and Define**	**Hrs. 6**
Design thinking phases, how to empathize, Role of empathy in design thinking, the purpose of empathy maps, Things to be done prior to empathy mapping, Activities during and after the session, Understanding		

empathy tools: Customer Journey Map, Personas. **Define**- Methods of Define Phase: Storytelling, Critical items diagrams, Define success **Activities:** Apply the methods of empathizing and Define Phases Finalize the problem statement		
Module 3	**Ideation**	**Hrs. 6**
Challenges in idea generation, Visualize, Empathize, and Ideate method, Importance of visualizing and empathizing before ideating, Applying the method, Create Thinking, Generating Design Ideas, Lateral Thinking, Analogies, Brainstorming, Mind mapping, National Group Technique, Synectic's, Development of work, Analytical Thinking, Group Activities. Ideation Tools: How Might We? (HMW), Storyboard, Brainstorming. What is design innovation? A mindset for innovation, and asking "What if?" asking "What wows?" and "What works?" **Activities-** Apply the methods of Ideate Phase: Generate Lots of Ideas		
Module 4	**Prototyping**	**Hrs. 8**
What is a prototype? - Prototyping as a mindset, prototype examples, prototyping for products; Why we prototype? Fidelity for prototypes, Process of prototyping- Minimum Viable prototype. **Activities:** Apply the Methods of the Prototype Phase: Create prototypes for selected ideas		
Module 5	**Testing Prototypes**	**Hrs. 8**
Prototyping for digital products: What's unique for digital products, Preparation; Prototyping for physical products: What's unique for physical products, Preparation; Testing prototypes with users. Create a Pitch-Plan for scaling up-Road map for Implementation, Fine-tuning and Submission of the project report **Activities:** Collect feedback; iterate and improve the ideas.Present your solution using the Storytelling method		

Text Books:	
1	Tim Brown, Change by Design: How Design Thinking Transforms Organizations and Inspires Innovation, HarperCollins Publishers Ltd.
2	Idris Mootee, Design Thinking for Strategic Innovation,2013, John Wiley & Sons Inc.

SUBJECT CODE	Engineering Physics Lab			CREDITS			
23UD1000BSL107P				1			
Teaching Work Load/week(Hrs.)				Examination Scheme(Marks)			
Theory	Tutorial	Laboratory	Total	ISE	MSE	ESE	Total
0	0	2	02	60	-	40	100

Course Contents

At least 08 experiments shall be performed from the following list.

Experiment No.1	Newton's rings - Determination of radius of curvature of Plano convex lens / wavelength of light.
Experiment No.2	Wedge Shaped film - Determination of thickness of thin wire.
Experiment No.3	Half shade Polarimeter - Determination of specific rotation of optically active material.
Experiment No.4	Laser - Determination of wavelength of He-Ne laser light.
Experiment No.5	G.M. Counter - Determination of operating voltage of G.M. tube

Experiment No.6	Crystal Plane – Study of planes with the help of models related Miller Indices
Experiment No.7	P-N Junction Diode Characteristics.
Experiment No.8	Hall Effect -Determination of Hall Coefficient
Experiment No.9	Four Probe Method-Determination of resistivity of semiconductor
Experiment No.10	Measurement of Band gap energy of Semiconductors
Experiment No.11	Experiment on fibre optics
Experiment No.12	B-H Curve Experiment
Experiment No.13	Ultrasonic interferometer

SUBJECT CODE	Engineering Graphics & Design Lab						CREDITS
23UD1000ESL108P							1
Teaching Work Load/week(Hrs.)				Examination Scheme(Marks)			
Theory	Tutorial	Laboratory	Total	ISE	MSE	ESE	Total
0	0	2	02	60	-	40	100

Course Outcomes: Students will be able to	
CO1	Get acquainted with the knowledge of various lines, geometrical constructions and construction of various kinds of scales.
CO2	Improve their imagination skills by gaining knowledge about points, lines and planes.
CO3	Become proficient in drawing the projections of various solids.
CO4	Gain knowledge about orthographic and isometric projections.
CO5	Understand different concepts of sectioning.

Course Contents

Students shall draw sheets from the following list.

Experiment No.1	Lines, lettering, and dimensioning.
Experiment No.2	Geometrical Constructions.
Experiment No.3	Orthographic projections.
Experiment No.4	Projections of points and straight lines
Experiment No.5	Projections of planes.
Experiment No.6	Projections of solids.
Experiment No.7	Section of solids.
Experiment No.8	Isometric Projections

SUBJECT CODE	Communication Skill Lab						CREDITS
3UD1000AEL109P							1
Teaching Work Load/week(Hrs.)				Examination Scheme(Marks)			
Theory	Tutorial	Laboratory	Total	ISE	MSE	ESE	Total
0	0	2	2	60	-	40	100

Course Outcomes: Students will be able to	
CO1	Learn to introduce themselves.
CO2	Understand phonemics symbols.
CO3	Learn the process of group discussion.
CO4	Understand about dictionary transcriptions.
CO5	Learn about Interview process.

Course Contents

At least 08 experiments shall be performed from the following list.

Experiment No.1	How to introduce oneself?
Experiment No.2	Introduction to Phonemic symbols.
Experiment No.3	Articulation of sounds in English with proper manner.
Experiment No.4	Practice and exercises on articulation of sounds.
Experiment No.5	Read Pronunciations/transcriptions from the dictionary.
Experiment No.6	Practice and exercises on pronunciations of words.
Experiment No.7	Introduction to stress and intonation.
Experiment No.8	Rapid reading sessions.
Experiment No.9	Know your friend.
Experiment No.10	How to introduce yourself.
Experiment No.11	Extempore.
Experiment No.12	Group discussion.
Experiment No.13	Participating in a debate.
Experiment No.14	Presentation techniques.
Experiment No.15	Interview techniques.

SUBJECT CODE	A -NATIONAL SERVICE SCHEME(NSS)						CREDITS
23UD1000CC110P							1
Teaching Work Load/week(Hrs.)				Examination Scheme(Marks)			
Theory	Tutorial	Laboratory	Total	ISE	MSE	ESE	Total
0	0	02	02	20	20	60	100

Course Objectives:	
CO1	Students should have service-oriented mindset and social concern.
CO2	Students should have dedication to work at any remote place, any time with available resources and proper time management for the other works.
CO3	Students should be ready to sacrifice some of the timely will and wishes to achieve service-oriented targets on time.

Course Outcomes: Students will be able to	
CO1	Understand the importance of his/her responsibilities towards society.
CO2	Analyze the environmental and societal problems/ issues and will be able to design solutions for the same.
CO3	Evaluate the existing system and to propose practical solutions for the same for sustainable development.

Course content

Module 1	**Introduction and Basic Concepts of NSS**	**Hrs. 10**
History, Philosophy, Aims & objectives of NSS Organizational structure, Concept of regular activities, Special camping, Day Camps. Basis of adoption village/slums, Methodology of conducting Survey.		
Module 2	**Youth and community mobilization**	**Hrs. 10**
Definition, Profile of youth, Categories of youth, Issues, Challenges and opportunities for youth, Youth as an agent of social change, Youth-adult partnership, Mapping of community stakeholders, Identifying methods of mobilization, Needs & importance of volunteerism.		
Module 3	**Importance and Role of Youth Leadership**	**Hrs. 10**
Meaning and types of leadership, Qualities of good leaders; Traits of leadership, Importance and role of youth leadership.		

SUBJECT CODE	B-NATIONAL CADET CORPS(NCC)						CREDITS
23UD1000CC110P							1
Teaching Work Load/week(Hrs.)				Examination Scheme(Marks)			
Theory	Tutorial	Laboratory	Total	ISE	MSE	ESE	Total
0	0	02	02	20	20	60	100

Course Objectives:	
CO1	Students should have service-oriented mindset and social concern.
CO2	Students should have dedication to work at any remote place, any time with available resources and proper time management for the other works.
CO3	Students should be ready to sacrifice some of the timely will and wishes to achieve service-oriented targets on time.

Course Outcomes: Students will be able to	
CO1	Understand that drill as the foundation for discipline and to command a group for common goal.
CO2	Understand the importance of a weapon its detailed safety precautions necessary for prevention of accidents and identifying the parts of weapon.
CO3	Understand that trekking will connect human with nature and cross the obstacles to experience army way of life.
CO4	Understand the various social issues and their impact on social life, Develop the sense of self-less social service for better social & community life.

Course content

Module 1	**Drill**	**Hrs. 10**
Foot Drill- Drill ki Aam Hidayaten, Word ki Command, Savdhan, Vishram, Aram Se, Murdna, Kadvar Sizing, Teen Line Banana, Khuli Line, Nikat Line, Khade Khade Salute Karna		
Module 2	**Weapon Training (WT):**	**Hrs.07**
Introduction & Characteristics of 7.62 Self Loading rifle, Identification of rifle parts		
Module 3	**Adventure activities:**	**Hrs. 07**
Trekking and obstacle course		
Module 4	**Social Service and Community Development (SSCD)**	**Hrs. 07**
Students will participate in various activities throughout the semester e.g., Blood donation Camp, Swachhata Abhiyan, Constitution Day, All National Festival		

SUBJECT CODE	C-Yoga Education						CREDITS
23UD1000CC110P							1
Teaching Work Load/week(Hrs.)				Examination Scheme(Marks)			
Theory	Tutorial	Laboratory	Total	ISE	MSE	ESE	Total
0	0	02	02	20	20	60	100

SYLLABUS

Course Objectives:	
CO1	To learn Message of Vedas and Upanishads
CO2	To learn Four Streams of Yoga,
CO3	To learn Shaddarshanas or the SIX systems of Indian Philosophy,
CO4	To introduce with Hatha Yoga and Patanjali Yoga Sutras
CO5	To understand Life and message of spiritual masters and Indian Culture

Course Outcomes: Students will be able to	
CO1	Students shall be able to learn Message of Vedas And Upanishads
CO2	Students shall be able to learn Four Streams of Yoga,
CO3	Students shall be able to learn Shaddarshanas or the SIX systems of Indian Philosophy,
CO4	Students shall be able to introduce with Hatha Yoga and Patanjali Yoga Sutras
CO5	Students shall be able to understand Life and message of spiritual masters and Indian Culture

Course content

Module 1	**Changing trends & Career in Physical Education-**	**Hrs. 6**
Anatomy and Physiology, Yoga and Exercise Physiology, Yoga & Health - Concept of Health and Pancha Kosha Vivek, Yogic Concept of Health and Disease Meaning & definition of physical education; its aims & objectives; career options		
Module 2		**Hrs. 6**
Streams of Yoga: Bhakti Yoga, Raja Yoga - Antaranga Yoga, Bahiranga Yoga, Karma Yoga -Secrets of Action, Jnana Yoga		
Module 3		**Hrs. 6**
Shaddarshanas – Nyaya, Vaishesika, Sankhya, Uttaramimamsa, Purvamimamsa.		
Module 4		**Hrs. 6**
Message of Vedas and Upanishads: Search for Happiness, Search for Reality.Life and Message of Spiritual Masters –Sri Ramakrishna Paramahamsa, Maa Sharada Devi, Swami Vivekananda, Indian Culture		
Module 5		**Hrs. 6**
Anatomy and Physiology, Yoga and Exercise Physiology, Yoga & Health - Concept of Health and Pancha Kosha Vivek, Yogic Concept of Health and Disease		

SUBJECT CODE	D-Universal Human Values (UHV-I)	CREDITS
23UD1000CC110P		1
Teaching Work Load/week(Hrs.)		Examination Scheme(Marks)

Theory	Tutorial	Laboratory	Total	ISE	MSE	ESE	Total
0	0	02	02	20	20	60	100

Course Outcomes: Students will be able to	
CO1	Explain need and process for value education
CO2	Demonstrate right understanding of happiness and prosperity
CO3	Explain the correct understanding of harmony, prosperity, physical need and swasthya
CO4	Differentiate between harmony in family, society and human relationship
CO5	Explain the harmony at all levels of human existence

Course content

Module 1	**Need, basic guidelines, contents and process for value education**	**Hrs. 6**
Understanding the need, basic guidelines, content and process for Value Education, Self- Exploration-what is it? – its content and process; „Natural Acceptance‟ and Experiential Validation- as the mechanism for self- exploration, Continuous Happiness and Prosperity- A look at basic Human Aspirations, Right understanding, Relationship and Physical Facilities- the basic requirements for fulfilment of aspirations of every human being with their correct priority, Understanding Happiness and Prosperity correctly- A critical appraisal of the current scenario, Method to fulfil the above human aspirations: understanding & living in harmony at various levels.		
Module 2	**Understanding harmony in human being- harmony in myself**	**Hrs. 6**
The understanding human being as a co-existence of the sentient „T‟ and the material „Body, Understanding the needs of Self („T‟) and „Body‟ – Sukh and Suvidha, Understanding the Body as an instrument of „T‟ (I being the doer, seer, and enjoyer), Understanding the characteristics and activities of „T‟ and harmony in T, Understanding the harmony of I with the Body: Sanyam and Swasthya; correct appraisal of Physical needs, meaning of Prosperity in detail, Programs to ensure Sanyam & Swasthya.		
Module 3	**Understanding harmony in family and society - harmony in human relationship. YSELFN RELATIONSHIP**	**Hrs. 6**
Understanding harmony in the Family- the basic unit of human interaction; Understanding values in human-human relationship; meaning of Nyaya and program for its fulfillment to ensure Ubhay tripti; Trust (Vishwas) and Respect (Samman) as the foundational vales of relationship; Understanding the meaning of Vishwas; Difference between intention and competence; Understanding the meaning of Samman; Difference between respect and differentiation; the other salient values in relationship; Understanding the harmony in the society (society being an extension of family): Samadhan, Samridhi, Abhay, Sah-astitva as comprehensive Human Goals;Visualizing a universal harmonious order in society; Undivided Society (Akhand Samaj); Universal Order (Sarvabhaum Vyawastha) – from family to world family.		
Module 4	**Understanding harmony in the nature and in existence IT-4: UNDERSTAINY**	**Hrs. 6**
Understanding the harmony in the Nature; Interconnectedness and mutual fulfilment among the four orders of nature – recyclability and self-regulation in nature; Understanding Existence as Co-existence (Sah-astitva) of mutually interacting units in all-pervasive space; Holistic perception of harmony at all levels of existence.		

Module 5	Implications of the above holistic understanding harmony on professional ethics,	Hrs. 6
Natural acceptance of human values, The definitiveness of Ethical Human Conduct, The basis for Humanistic Education, Humanistic Constitution and Humanistic Universal Order, Competence in Professional Ethics: a) Ability to utilize the professional competence for augmenting universal human order, b) Ability to identify the scope and characteristics of people-friendly and eco-friendly production systems, technologies and management models, Case studies of typical holistic technologies, management models and production systems, Strategy for the transition from the present state to Universal Human Order: a) At the level of the individual: as socially and ecologically responsible engineers, technologists and managers, b) At the level of society: as mutually enriching institutions and organizations.		

Text Books:	
1	A Foundation Course in Human Values and Professional Ethics, R. R. Gaur, R. Asthana, G. P. Bagaria, 2nd Revised Edition, Excel Books, New Delhi, 2019, ISBN 978-93-87034-47-1
2	Teachers‟ Manual for A Foundation Course in Human Values and Professional Ethics, R. R. Gaur, R. Asthana, G. P. Bagaria, 2nd Revised Edition, Excel Books, New Delhi, 2019, ISBN 97893- 87034-53-2

Dr. Babasaheb Ambedkar Technological University, Lonere

Teaching & Evaluation Scheme for First Year B. Tech.

Civil Engineering

Sr. No.	Course Code	Course Title	Teaching Scheme			Evaluation Scheme				Credit
			L	T	P	ISE	MSE	ESE	Total	
Semester- II										
1	23UD1000BS201T	Engineering Mathematics-II	3	0	0	20	20	60	100	3
2	23UD1000BS202T	Engineering Chemistry	3	0	0	20	20	60	100	3
3	23UD1000ES203T	Computer Programming	2	0	0	20	20	60	100	2
4	23UD1191ES204T	Engineering Mechanics	3	0	0	20	20	60	100	3
5	23UD1000OE205T	Basic Electrical & Electronics Engineering	3	0	0	20	20	60	100	3
6	23UD1000IK206T	History of Indian Civil Engineering	2	0	0	20	20	60	100	2
7	23UD1000BSL207P	Engineering Chemistry Lab	0	0	2	60	-	40	100	1
8	23UD1191ESL208P	Computer Programming Lab	0	0	2	60	-	40	100	1
9	23UD1000ESL209P	Engineering Mechanics Lab	0	0	2	60	-	40	100	1
10	23UD1000CC210P	Workshop Practices	0	0	4	60	-	40	100	2
11	23UD1000BS201P	A) Health & Wellness B) Fine Arts C) Performing Arts	0	0	2	60	-	40	100	1
Total			**16**	**00**	**12**	**420**	**120**	**560**	**1100**	**22**

Detailed Syllabus

SUBJECT CODE	Engineering Mathematics-II			CREDITS			
23UD1000BS201T				3			
Teaching Work Load/week(Hrs.)				Examination Scheme(Marks)			
Theory	Tutorial	Laboratory	Total	ISE	MSE	ESE	Total
3	0	0	03	20	20	60	100

Course Objectives:	
CO1	To know and discuss the need and use of complex variables to find roots, to separate complex quantities and to establish relation between circular and hyperbolic functions.
CO2	To understand and solve first and higher order differential equations and apply them as a mathematical modeling in electric and mechanical systems.
CO3	To determine Fourier series representation of periodic functions over different intervals.
CO4	To Demonstrate the concept of vector differentiation and interpret the physical and geometrical meaning of gradient, divergence &curl in various engineering streams.
CO5	To know and apply the principles of vector integration to transform line integral to surface integral, surface to volume integral &vice versa using Green's, Stake's and Gauss divergence theorems.

Course Outcomes: Students will be able to	
CO1	Discuss the need and use of complex variables to find roots ,to separate complex quantities and to establish relation between circular and hyperbolic functions.
CO2	Solve first and higher order differential equations and apply them as a mathematical modeling in electric and mechanical systems.
CO3	Determine Fourier series representation of periodic functions over different intervals.
CO4	Demonstrate the concept of vector differentiation and interpret the physical and geometrical meaning of gradient, divergence &curl in various engineering streams.
CO5	Apply the principles of vector integration to transform line integral to surface integral ,surface to volume integral &vice versa using Green's , Stake's and Gauss divergence theorems.

SYLLABUS

Module 1	**Complex Numbers**	**Hrs. 7**
Definition and geometrical representation ; De-Moivr's theorem(without proof) ; Roots of complex numbers by using De-Moivr's theorem ; Circular functions of complex variable – definition ; Hyperbolic functions ; Relations between circular and hyperbolic functions ; Real and imaginary parts of circular and hyperbolic functions ; Logarithm of Complex quantities.		
Module 2	**Ordinary Differential Equations of First Order and First Degree and Their Applications**	**Hrs. 7**
Linear equations; Reducible to linear equations (Bernoulli"s equation); Exact differential equations; Equations reducible to exact equations ; Applications to orthogonal trajectories , mechanical systems and electrical systems.		
Module 3	**Linear Differential Equations with Constant Coefficients**	**Hrs. 6**

Introductory remarks - complementary function, particular integral ; Rules for finding complementary functions and particular integrals ; Method of variation of parameters ; Cauchy's homogeneous and Legendre's linear equations.		
Module 4	**Fourier Series**	**Hrs. 8**
Introductory remarks- Euler's formulae ; Conditions for Fourier series expansion – Dirichlet's conditions ; Functions having points of discontinuity ; Change of interval ; Odd and even functions expansions of odd and even periodic functions ; Half-range series. Lubricants: Introduction, classification of lubricants - Solid, Semi –solid and Liquid Lubricants , properties of lubricants, Physical properties – Viscosity, Viscosity index, surface tension, Flash point and Fire point. Chemical properties – Acidity, Saponification.		
Module 5	**Vector Calculus**	**Hrs. 7**
Scalar and vector fields:Gradient , divergence and curl ; Solenoidal and irrotational vector fields; Vector identities (statement without proofs) ; Green‟s lemma , Gauss‟ divergence theorem and Stokes‟ theorem (without proofs)		

Text Books:	
1	Higher Engineering Mathematics by B. S. Grewal, Khanna Publishers, New Delhi.
2	Advanced Engineering Mathematics by Erwin Kreyszig, John Wiley & Sons, New York.
3	A Course in Engineering Mathematics (Vol II) by Dr. B. B. Singh, Synergy Knowledge ware, Mumbai.
4	A Text Book of Applied Mathematics (Vol I & II) by P. N. Wartikar and J. N. Wartikar, Pune Vidyarthi Griha Prakashan, Pune.
5	Higher Engineering Mathematics by H. K. Das and Er. Rajnish Verma, S. Chand & CO. Pvt. Ltd., New Delhi.

Reference Books:	
1	Higher Engineering Mathematics by B. V. Ramana, Tata McGraw-Hill Publications, New Delhi.
2	Text Book of Engineering Mathematics by Peter O‟ Neil, Thomson Asia Pte Ltd., Singapore.
3	Advanced Engineering Mathematics by C. R. Wylie & L. C. Barrett, Tata Mcgraw-Hill Publishing Company Ltd., New Delhi.

SUBJECT CODE	Engineering Chemistry			CREDITS			
23UD1000BS202T				3			
Teaching Work Load/week(Hrs.)				Examination Scheme(Marks)			
Theory	Tutorial	Laboratory	Total	ISE	MSE	ESE	Total
3	0	0	03	20	20	60	100

Course Objectives:	
CO1	To know the demonstration of knowledge of chemistry in technical fields.
CO2	To bring adaptability to new developments in Engineering Chemistry and to acquire the skills required to become a perfect engineer.
CO3	To understand and develop the importance of water in industrial and domestic usage.
CO4	To identify the concepts of Chemistry to lay the ground work for subsequent studies in various engineering fields.
CO5	To examine a fuel and suggest alternative fuels.

Course Outcomes: Students will be able to	
CO1	Demonstrate knowledge of chemistry in technical fields.
CO2	Bring adaptability to new developments in Engineering Chemistry and to acquire the skills required to become a perfect engineer.
CO3	Develop the importance of water in industrial and domestic usage.
CO4	Identify the concepts of Chemistry to lay the ground work for subsequent studies in various engineering fields.
CO5	Examine a fuel and suggest alternative fuels.

SYLLABUS

Module 1	**Water Treatment**	**Hrs. 6**
Introduction , hard and soft water, softening of water – Zeolite process, Ion exchange process, Hot Lime – Soda process, water characteristics- Hardness and its determination by EDTA method, Dissolve oxygen (DO) and its determination by Winkler‟s method.		
Module 2	**Phase Rule**	**Hrs. 6**
Phase Rule, statement, Explanation of the terms – Phase, Components, Degrees of freedom. One component system – Water and Sulphur. Reduced phase rule equation, Two components alloy system- Phase diagram of Silver- Lead alloy system.		
Module 3	**Metallurgy**	**Hrs. 6**
Introduction, Occurrence of metals, types of ores, concentration of ores by physical methods- Crushing and Sizing, Froth- Flotation, Magnetic Separation, Gravity separation method. Chemical methods- Calcination, Roasting, Reduction of Ore- by Pyrolysis, Chemical reductions, Electrolytic Refining of Metals. .		
Module 4	**Fuels and Lubricants**	**Hrs. 8**
Fuels: Introduction, classification of fuel, Calorific value of a fuel, characteristics of a good fuel, solid fuel- Coal , Various types of Coal, Analysis of coal- Proximate and Ultimate analysis, liquid fuel- Refining of Petroleum Lubricants: Introduction, classification of lubricants - Solid, Semi –solid and Liquid Lubricants , properties of lubricants ,Physical properties – Viscosity, Viscosity index, surface tension, Flash point and Fire point. Chemical properties – Acidity, Saponification.		
Module 5	**Electrochemistry**	**Hrs. 8**
Introduction - Basic concepts: Definition and units of Ohm‟s law, Specific resistance, Specific Conductance, Equivalent conductance, Molecular conductance, Method of conductance measurement by Wheatstone bridge method, Cell constant. Debye- Huckel theory of strong electrolyte, Conductometric titrations, Ostwald‟s theory of acid- base indicator, Quinonoid theory, Glass electrode.		

Text Books:	
1	Jain P.C & Jain Monica, Engineering Chemistry, Dhanpat Rai & Sons, Delhi,1992.
2	Bhal &Tuli, Text book of Physical Chemistry (1995), S. Chand &Company, New Delhi.
3	O. G. Palanna , Engineering Chemistry, Tata McGraw-Hill Publication, New Delhi.

4	S. S. Dara, A textbook of Engineering Chemistry, McGraw-Hill Publication, New Delhi.
5	Barrow G.M., Physical Chemistry, McGraw-Hill Publication, New Delhi.

Reference Books:	
1	Shikha Agarwal, Engineering Chemistry- Fundamentals and applications, Cambridge Publishers -2015.
2	WILEY, Engineering Chemistry, Wiley India, New Delhi2014.
3	Atkins, Physical chemistry.

SUBJECT CODE	Computer Programming						CREDITS
23UD1000ES203T							2
Teaching Work Load/week(Hrs.)				Examination Scheme(Marks)			
Theory	Tutorial	Laboratory	Total	ISE	MSE	ESE	Total
2	0	0	02	20	20	60	100

Course Objectives:	
CO1	To give a broad perspective about the uses of computers in engineering industry and C Programming.
CO2	To develop the basic concept of algorithm, algorithmic thinking and flowchart.
CO3	To apply the use of C programming language to implement various algorithms and develops the basic concepts and terminology of programming in general.
CO4	To make familiar the more advanced features of the C language.
CO5	To 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.

Course Outcomes: Students will be able to	
CO1	Gain a broad perspective about the uses of computers in engineering industry and C Programming.
CO2	Develop the basic concept of algorithm, algorithmic thinking and flowchart.
CO3	Apply the use of C programming language to implement various algorithms and develops the basic concepts and terminology of programming in general.
CO4	Use the more advanced features of the C language.
CO5	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.

SYLLABUS

Module 1	**Process of programming**	**Hrs. 6**
Editing, Compiling, Error Checking, executing, testing and debugging of programs. IDE commands. Eclipse for C Program development, Flowcharts, Algorithms.		
Module 2	**Types, Operators and Expressions**	**Hrs. 6**
Variable names, Data types, sizes, constants, declarations, arithmetic operators, relational and logical operators, type conversions, increment and decrement operators, bitwise operators, assignment operators and expressions, conditional expressions precedence and order of evaluation.		

Module 3	Control Flow	Hrs. 6
Statements and Blocks. If-else, else-if switch Loops while and for, do-while break and continue goto and Labels. Functions and Program Structure: Basic of functions, functions returning non- integers external variables scope rules.		
Module 4	**Arrays in C**	**Hrs. 6**
Initializing arrays, Initializing character arrays, multidimensional arrays.		
Module 5	**Structures C**	**Hrs. 6**
Basics of structures, structures and functions arrays of structures, Pointer in C. Pointers to integers, characters, floats, arrays, structures.		

Text Books:	
1	Brain W. Kernighan & Dennis Ritchie, The C Programming Language, Prentice Hall, 2nd Edition, 1988.
2	R. S. Bichkar, Programming with C, Orient Blackswan, 1st Edition,2012.
3	Herbert Schildit, C the Complete Reference, McGraw-Hill Publication,2000.
4	Balguruswamy, Programming in C,PHI.
5	Yashwant Kanitkar, Let Us C,PHI

SUBJECT CODE	Engineering Mechanics						CREDITS
23UD1191ES204T							3
Teaching Work Load/week(Hrs.)				Examination Scheme(Marks)			
Theory	Tutorial	Laboratory	Total	ISE	MSE	ESE	Total
3	0	0	03	20	20	60	100

Course Objectives:	
CO1	To understand the resolving forces and moments for a given force system.
CO2	To know and apply Conditions of static equilibrium to analyze given force system.
CO3	To compute Centre of gravity and Moment of Inertia of plane surfaces.
CO4	To compute the motion characteristics of a body/particle for a Rectilinear Motion.
CO5	To know and discuss relation between force and motion characteristics.

Course Outcomes: Students will be able to	
CO1	Apply fundamental Laws of Engineering Mechanics
CO2	Apply Conditions of static equilibrium to analyze given force system
CO3	Compute Centre of gravity and Moment of Inertia of plane surfaces
CO4	Compute the motion characteristics of a body/particle for a Rectilinear Motion
CO5	Know and discuss relation between force and motion characteristics

SYLLABUS

Module 1	Introduction and Fundamental principles	Hrs. 6

Introduction: objectives of engineering analysis and design, idealization of engineering problems, simplification of real 3D problems to 2-D and 1-D domain, basis of assumptions, introduction to types of supports and loads, free body diagram, laws of motion. **Fundamental principles:** force systems, resolution and composition of a forces, resultant, couple, moment, Lami's theorem Varignon's theorem.		
Module 2	**Equilibrium**	**Hrs. 6**
Static equilibrium: analytical and graphical conditions of equilibrium, equilibrium of coplanar concurrent forces, coplanar non concurrent forces, parallel forces. Centroid of composite shapes, moment of inertia of planer sections. **Friction:** Coulomb's laws, friction angles, wedge friction, sliding friction.		
Module 3	**Beams and Trusses**	**Hrs. 6**
Beams: Types of beam, loads and supports, beam reactions for simply supported beams, continuous beams (with 3 supports only) **Simple trusses:** Types of trusses, analysis of plane trusses by method of joints and method of sections.		
Module 4	**Kinematics of Particle**	**Hrs. 6**
Kinematics of linear motion: types of motion, laws of motion, kinematics of particles, rectilinear motion, constant and variable acceleration, study of motion diagrams, motion under gravity, projectile motion, concept of relative velocity.		
Module 5	**Kinetics and Work, Power, Energy**	**Hrs. 6**
Kinetics of particle: D'A1embert's principle: applications in linear motion, kinetics of rigid bodies, applications in translation. Work done by a force, potential energy, kinetic energy of linear motion and rotation, work energy equation, conservation of energy, power. Collision of elastic bodies, Impulse momentum principle.		

Text Books:	
1	S. Timoshenko, D. H. Young, "Engineering Mechanics", McGraw Hill, 1995.
2	Tayal A. K., "Engineering Mechanics", Umesh Publications, 2010.
3	Bhavikatti S. S., Rajashekarappa K. G., "Engineering Mechanics", New Age International Publications, 2nd Edition.
4	Beer, Johnston, "Vector Mechanics for Engineers", Vol. 1: Statics and Vol. 2: Dynamics, McGraw Hill Company Publication, 7th edition, 1995.
5	Junnarkar S.B., and Shah, H.J. "Applied Mechanics", Charotar Publication House Anand

Reference Books:	
1	Irving H. Shames, "Engineering Mechanics -Statics and Dynamics", Pearson Educations, Fourth edition, 2003.
2	McLean, Nelson, "Engineering Mechanics", Schaum's outline series, McGraw Hill Book Company, N. Delhi, Publication.
3	Singer F. L., "Engineering Mechanics -Statics & Dynamics", Harper and Row Pub. York

SUBJECT CODE	Basic Electrical & Electronics Engineering	CREDITS
23UD1000OE205T		3

Teaching Work Load/week(Hrs.)				Examination Scheme(Marks)			
Theory	Tutorial	Laboratory	Total	ISE	MSE	ESE	Total
3	0	0	03	20	20	60	100

Course Objectives:	
CO1	To know and apply basic ideas and principles of electrical engineering.
CO2	To Identify protection equipment and energy storage devices.
CO3	To differentiate electrical and electronics domains and explain the operation of diodes and transistors.
CO4	To acquire knowledge of digital electronics
CO5	To design simple combinational and sequential logic circuits.

Course Outcomes: Students will be able to	
CO1	Apply basic ideas and principles of electrical engineering.
CO2	Identify protection equipment and energy storage devices.
CO3	Differentiate electrical and electronics domains and explain the operation of diodes and transistors.
CO4	Acquire knowledge of digital electronics
CO5	Design simple combinational and sequential logic circuits.

SYLLABUS

Module 1	**Elementary Electrical Concepts**	**Hrs. 7**
Fundamental of Electrical system Potential difference, Ohm's law, Effect of temperature on resister, resistance temperature coefficient, Electrical wiring system: Study of different wire gauges and their applications in domestic and industry. Energy Resources and Utilization: Conventional and nonconventional energy resources; Introduction to electrical energy generation from different resources, transmission, distribution and utilization, Advantages & Disadvantages of AC & DC transmission. Concept of Supply Demand, Power Factor, Need of unity factor.		
Module 2	**Measurement of Electrical Quantities**	**Hrs. 6**
Measurement of Voltage, Current, and Power; Measurement of 3 phase power; Study of Energy meters. Study of Electrical Storage devices: Batteries such as Nickel-cadmium (NiCd), Lithium- ion (Li-ion), Lithium Polymer (Li-pol.) batteries. Study of circuit breakers & Actuators (MCB & MPCB, Power Contactors & Aux contactors, Electro-Mechanical & Solid state Relays)		
Module 3	**Diodes and Circuits**	**Hrs. 5**
The P-N Junction Diode, V-I characteristics, Diode as Rectifier, specifications of Rectifier Diodes, Half Wave, Full wave, Bridge rectifiers, Equations for IDCVDC VRMS, IRMS, Efficiency and Ripple Factor for each configuration. Filters: Capacitor Filter, Choke Input Filter, Capacitor InputFilter(Π Filter), Zener Diode, Characteristics, Specifications, Zener Voltage Regulator, Types of Diodes: LED,Photodiode		
Module 4	**Semiconductor Devices and Applications**	**Hrs. 5**

Transistors: Introduction, Classification, CE, CB, and CC configurations, α, β, concept of gain and bandwidth. Operation of BJT in cut-off, saturation and active regions (DC analysis). BJT as an amplifier, biasing techniques of BJT, BJT as a switch. Introduction to Digital Electronics: Number System, Basic logic Gates, Universal Gates, Boolean Postulates, De-Morgan Theorems

Text Books:	
1	N. Mittal and Arvind Mittal, Basic Electrical Engineering, McGraw-HillPublication.
2	Brijesh Iyer and S. L. Nalbalwar, A Text book of Basic Electronics, Synergy Knowledgeware Mumbai, 2017.ISBN:978-93-8335-246-3
3	Vincent DelToro, Electrical engineering Fundamentals, PHI Publication, 2nd Edition,2011.
4	Boylstad, Electronics Devices and Circuits Theory, PearsonEducation.
5	Edward Hughes, Electrical Technology, PearsonEducation

Reference Books:	
1	B. L. Theraja, Basic Electronics, S. Chand Limited,2007.
2	Millman Halkias, Integrated Electronics-Analog and Digital Circuits and Systems, McGraw-Hill Publication,2000.
3	Donald Neaman, Electronic Circuit Analysis and Design, McGraw-Hill Publication, 3rd Edition.
4	Donald Neaman, Electronic Circuit Analysis and Design, McGraw-Hill Publication, 3rd Edition.
5	Printed Circuit Boards Design &Technology,WalterC. Bosshart, McGraw-Hill Publication.

SUBJECT CODE	History of Indian Civil Engineering			CREDITS			
23UD1000IK206T				2			
Teaching Work Load/week(Hrs.)				Examination Scheme(Marks)			
Theory	Tutorial	Laboratory	Total	ISE	MSE	ESE	Total
2	0	0	02	20	20	60	100

Course Objectives:	
CO1	Understand the evolution and milestones of civil engineering in India.
CO2	Identify key historical civil engineering structures and their significance.
CO3	Explore the development of various sub-branches of civil engineering through history.
CO4	Analyze the impact of ancient engineering practices on modern civil engineering.
CO5	Appreciate the contributions of Indian civil engineers and projects to global engineering.

Course Outcomes: Students will be able to	
CO1	Describe the major historical developments in Indian civil engineering.
CO2	Recognize and discuss ancient civil engineering structures in India.
CO3	Relate historical engineering practices to current sub-disciplines in civil engineering.
CO4	Evaluate the influence of historical structures on modern engineering solutions.
CO5	Identify notable Indian engineers and their contributions to the field.

SYLLABUS

Module 1	Ancient Civil Engineering Marvels in India	Hrs.6
Overview of ancient Indian civilization and its engineering achievements. Indus Valley Civilization: Urban planning and drainage systems. Mauryan Empire: Roads, water supply, and structures.		
Module 2	**Historical Structures and Monuments**	**Hrs. 6**
Temples and religious structures: Brihadeeswarar Temple, Sun Temple, etc. Forts and palaces: Red Fort, Amer Fort, and others. Bridges and stepwells: Architecture and functionality.		
Module 3	**Evolution of Construction Techniques**	**Hrs. 6**
Materials used in ancient constructions. Techniques in masonry, stone carving, and joinery. Evolution of building techniques over different historical periods.		
Module 4	**Development of Civil Engineering Sub-branches**	**Hrs. 6**
Structural Engineering: Historical buildings and analysis. Transportation Engineering: Ancient roads and trade routes. Water Resources Engineering: Ancient irrigation and water management systems..		
Module 5	**Modern Contributions and Future Prospects**	
Key projects in post-independence India: Bhakra Nangal Dam, Konkan Railway, etc. Contributions of Indian engineers to global civil engineering. Future trends and opportunities in Indian civil engineering.		

Textbooks:	
1	A History of Civil Engineering in India by S.B. Sharma
2	Ancient Indian Architecture by Bharati S. Nagare
3	Engineering Wonders of Ancient India by Harsh Gupta
4	Monuments of India by R. Nath
5	Indian Civil Engineering: Historical Perspective by P.K. Mishra

Reference Books	
1	History of Science and Technology in India by Kalpana Rajaram
2	Engineering Heritage of India by S.R. Rao
3	India's Legendary Civil Engineers by P. Radhakrishnan
4	Historical Development of Civil Engineering in India by J. Chandra
5	Ancient Indian Construction Techniques by M.L. Varma

SUBJECT CODE	Engineering Chemistry Lab						CREDITS
3UD1000BSL207P							1
Teaching Work Load/week(Hrs.)				Examination Scheme(Marks)			
Theory	Tutorial	Laboratory	Total	ISE	MSE	ESE	Total
0	0	2	02	60	-	40	100

Course Outcomes: Students will be able to	
CO1	Student shall able to understand and perform water quality monitoring parameters such as Chloride content, Hardness and Dissolve Oxygen etc.
CO2	Student shall able to understand and perform the Physical properties in the liquid state such as Viscosity, and Surface Tension.
CO3	Student shall able to understand and perform the Chemical properties of the lubricant.
CO4	Student shall able to know and perform the rate of corrosion of metals and alloys.
CO5	Student shall able to know and perform the quantitative analysis such as pH-metry and Conductometry (Instrumental methods).

Course Contents

At least 10 experiments shall be performed from the following list.

Experiment No.1	Determination of hardness of water sample by E.D.T.A. method.
Experiment No.2	Determination of chloride content in water sample by precipitation titration method.
Experiment No.3	Determination of Viscosity of a given sample of liquid by using Ostwald's Viscometer.
Experiment No.4	Determination of Acid value of an Oil sample.
Experiment No.5	Conductometric Titration (Acid Base titration).
Experiment No.6	Determination of dissolved oxygen present in given water sample by Iodometric method (Winkler's Method).
Experiment No.7	To determine alkalinity of water sample.
Experiment No.8	To determine the percentage of available Chlorine in bleaching powder.
Experiment No.9	To determine acidity of water sample.
Experiment No.10	To determine the surface tension of given liquid at room temperature by drop number method.
Experiment No.11	pH –metric Titration (Acid Base titration).
Experiment No.12	To determine calorific value of a fuel.
Experiment No.13	Determination of saponification value of an oil sample.
Experiment No.14	Experiment on water treatment by using ion exchange resins.
Experiment No.15	To find out P-T curve diagram of steam

SUBJECT CODE	Computer Programming Lab	CREDITS
23UD1191ESL208P		1

Teaching Work Load/week(Hrs.)				Examination Scheme(Marks)			
Theory	Tutorial	Laboratory	Total	ISE	MSE	ESE	Total
0	0	2	2	60	-	40	100

Course Outcomes: Students will be able to	
CO1	Able to explain programming fundamentals.
CO2	Able to demonstrate programming with operators and control structures
CO3	Able to implement advanced programming concepts in C arrays, structures, strings, and pointers.
CO4	Able to solve real-life industrial problems using C concepts.

Course Contents

At least 10 experiments shall be performed from the following list.

Experiment No.1	Assignment on Flow Chart.
Experiment No.2	A Simple program to display a message “Hello world” on screen.
Experiment No.3	A Program to take input from user and display value entered by user on screen.
Experiment No.4	Basic example for performing different C Operations using operator. (With and without using scanf()).
Experiment No.5	Basic Program on Operator. (Using scanf()). a) Program to find and print area, perimeter and volume of geometric objects. b) Program to check a number entered by user is Perfect number or not.
Experiment No.6	Program to find maximum and minimum between two numbers given by user using if-else and conditional Operators.
Experiment No.7	Program to swap two numbers.
Experiment No.8	Program to print square and factorial of an entered number using while loop.
Experiment No.9	Program to check a number is Palindrome number or not.
Experiment No.10	Program to check Armstrong number.
Experiment No.11	Program to check and generate prime numbers up to n.
Experiment No.12	Program to find GCD of two entered numbers.
Experiment No.13	Program to find maximum and minimum from n entered numbers.
Experiment No.14	Program to print alternate numbers from n entered numbers.
Experiment No.15	Program to search an element in an Array using linear and binary search.
Experiment No.16	Program to print entered numbers in ascending order using sorting.
Experiment No.17	Program to print addition, subtraction and multiplication of Matrices.
Experiment No.18	Program to find length of string. (With and without using library function).
Experiment No.19	Programs demonstrating use of Structures, Arrays of Structures and Structure containing arrays.
Experiment No.20	Programs demonstrating use of pointers to integers, floats, char, strings, structures and arrays.

SUBJECT CODE	Engineering Mechanics Lab	CREDITS
3UD1000ESL209P		1

Teaching Work Load/week(Hrs.)				Examination Scheme(Marks)			
Theory	Tutorial	Laboratory	Total	ISE	MSE	ESE	Total
0	0	2	2	60	-	40	100

Course Objectives:	
CO1	To understand the resolving forces and moments for a given force system.
CO2	To know and apply Conditions of static equilibrium to analyze given force system.
CO3	To compute Centre of gravity and Moment of Inertia of plane surfaces.
CO4	To compute the motion characteristics of a body/particle for a Rectilinear Motion.
CO5	To know and discuss relation between force and motion characteristics.

Course Outcomes: Students will be able to	
CO1	Estimate the various engineering application and their principles
CO2	Apply conditions of equilibrium for solving problems of mechanics
CO3	Analysis the behaviour of object subjected to external loading.
CO4	Identify the surfaces and solids with respect to centre of gravity and centroid
CO5	Examine the forces acting on the object under the dynamic conditions.

Course Contents

At least 08 experiments shall be performed from the following list.

Experiment No.1	To verify the law of Force Polygon
Experiment No.2	To verify the law of Moments using Parallel Force apparatus. (simply supported type)
Experiment No.3	To verify the law of moments using Bell crank lever.
Experiment No.4	To determine support reaction for beam.
Experiment No.5	To determine the co-efficient of friction between wood and various surface (like Leather, Wood, Aluminum) on an inclined plane.
Experiment No.6	Simple / compound pendulum.
Experiment No.7	Moment of Inertia of fly wheel
Experiment No.8	To find CG and moment of Inertia of an irregular body using Computation method.
Experiment No.9	Verification of force transmitted by members of given truss.
Experiment No.10	Collision of elastic bodies (Law of conservation of momentum
Experiment No.11	Verification of law of machine by using worm and worm wheel.
Experiment No.12	Any other innovative experiment
Experiment No.13	Assignment on beam reaction with at least 05 examples
Experiment No.14	Application of spreadsheet program for determination of beam reaction, laws of moment, any other topic from the syllabus

SUBJECT CODE	Workshop Practices	CREDITS
23UD1000CC210P		2

Teaching Work Load/week(Hrs.)				Examination Scheme(Marks)			
Theory	Tutorial	Laboratory	Total	ISE	MSE	ESE	Total
0	0	4	04	60	00	40	100

Course Outcomes: Students will be able to	
CO1	Prepare simple wooden joints and parts using wood working tools and machines (Apply)
CO2	Apply the fitting and plumbing skills and produce a Fitting/Plumbing job with specified dimensions using fitting and plumbing tools (Apply)
CO3	Practice sheet metal tools and machine to develop simple sheet metal article (Apply)
CO4	Practice edge preparation for simple Lap, Butt, T joint using Arc/Gas/Resistance welding using welding hand tools and equipment (Understand)
CO5	Demonstrate machining processes including turning, facing, step turning, drilling and parting (Understand)

SYLLABUS

Module 1	**Carpentry**	**Hrs. 7**
Technical Terms related to wood working, Types of wood, Joining materials, ypes of joints - Mortise and Tenon, Dovetail, Half Lap, etc., Methods of preparation and applications, Wood working lathe, safety precautions.		
Module 2	**Welding**	**Hrs. 6**
Arc welding - welding joints, edge preparation, welding tools and equipment, Gas welding - types of flames, tools and equipment, Resistance welding - Spot welding, joint preparation, tools and equipment, safety precautions.		
Module 3	**Fitting and Plumbing:**	**Hrs. 5**
Fitting operation like chipping, filing, right angle, marking, drilling, tapping etc., Fitting hand tools like vices, cold chisel, etc. Drilling machine and its operation, Different types of pipes, joints, taps, fixtures and accessories used in plumbing, safety precautions.		
Module 4	**Sheet Metal Work**	**Hrs. 5**
Simple development and cutting, bending, Beading, Flanging, Lancing and shearing of sheet metal, Sheet metal machines - Bending Machine, Guillotine shear, Sheet metal joints, Fluxes and their use.		
Module 5	**Machine shop**	
Lathe machine, types of lathes, major parts, cutting tool, turning operations, safety precautions		

All experiments shall be performed from the following list.

Experiment No.1	Wood sizing exercises in planning, marking, sawing, chiseling and grooving to make half lap joint and cross lap joint.
Experiment No.2	A job involving cutting, filing to saw cut, filing all sides and faces, corner rounding, drilling and tapping on M. S. plates.
Experiment No.3	A job on use of plumbing tools and preparation of plumbing line involving fixing of water tap and use of elbow, tee, union and coupling, etc.

Experiment No.4	Making a small parts using GI sheet involving development, marking, cutting, bending, brazing and soldering operations- i)Tray ii) Funnel and similar articles.
Experiment No.5	Exercise in Arc welding (MMAW) to make a square butt joint.
Experiment No.6	Exercise in Resistance (Spot) welding to make a lap joint.
Experiment No.7	Ajobusing power operated tools related to sheet metal work, Welding, Fitting, Plumbing, Carpentry and patternmaking.
Experiment No.8	A job on turning of a Mild Steel cylindrical job using center lathe.

Text Books:	
1	K. C. John, Mechanical Workshop Practice, Prentice Hall Publication, New Delhi, 2010.

Reference Books:	
1	Hazra and Chaudhary, Workshop Technology-I, Media promoters & Publisher private limited.

SUBJECT CODE	A-Health & Wellness			CREDITS			
23UD1000BS201P				1			
Teaching Work Load/week(Hrs.)				Examination Scheme(Marks)			
Theory	Tutorial	Laboratory	Total	ISE	MSE	ESE	Total
0	0	2	02	60	00	40	100

Course Objectives:	
CO1	To systematically addresses the issues of health, adjustment and well-being.
CO2	To provide insights from the field of psychology to make your life more satisfying and meaningful.

Course Outcomes: Students will be able to	
CO1	Learn how to deal with mental distress and disorders
CO2	Understand and enhance positive mental health and wellbeing particularly in the field of psychology.
CO3	Gain happiness and well-being theory and research to enrich the understanding of both negative and positive side of human behaviour

SYLLABUS

Module 1	**Psychology of happiness**	**Hrs. 5**
What is happiness? What makes us happy? Socio-economic factors and happiness; Positive emotions		
Module 2	**Can we become happier?**	**Hrs. 5**
Genetic set-point and hedonic adaptation; Sustainable happiness model and intentional activities		
Module 3	**Happiness Activities 1**	**Hrs. 5**
Expressing gratitude and positive thinking; Love and kindness; Avoiding overthinking and social comparison		
Module 4	**Happiness Activities 2**	**Hrs. 5**

Identifying signature strengths; Achieving happiness with “Flow”.		
Module 5	**Is happiness sufficient?**	**Hrs. 5**
The concept of eudaimonic well-being; Self-determination and motivation		

Reference Books:	
1	W. Weiten, and M. A. Lloyd, Psychology Applied to Modern Life: Adjustment in the 21st Century, Wadsworth Publishing, 2007
2	R. Harington, Stress, Health and well-being: Thriving in the 21st century, Wadsworth Publishing, 2013.
3	I. Boniwell, Positive psychology in a nutshell, McGraw-Hill Education, 2012.
4	S. Lyubomirsky, The how of happiness, Penguine Press, 2008.

SUBJECT CODE	B-Fine Arts- Art work & Painting			CREDITS			
23UD1000BS201P				1			
Teaching Work Load/week(Hrs.)				Examination Scheme(Marks)			
Theory	Tutorial	Laboratory	Total	ISE	MSE	ESE	Total
0	0	2	02	60	00	40	100

Course Objectives:	
CO1	To systematically addresses the issues of health, adjustment and well-being.
CO2	To provide insights from the field of psychology to make your life more satisfying and meaningful.

Course Outcomes: Students will be able to	
CO1	Use lines, shapes, and colors to depict the various sentiments and moods of life and nature.
CO2	Use one's creativity to develop forms and color schemes, as well as the ability to portray them effectively in drawing and painting on paper.
CO3	Develop the ability to properly use drawing and painting materials (surfaces, tools and equipment, and so on).
CO4	Improve their observation abilities by studying everyday items as well as numerous geometrical and non- geometrical (i.e., organic) shapes found in life and nature and to hone their drawing and painting talents in response to these insights.

SYLLABUS

Contents	**Hrs. 5**
1. Use points, line and curves to create various shapes and forms 2. Use of shapes and forms to create various objects and structures 3. Recognizing distinctions in objects when viewed from various perspectives and grasping basic notions of perspective 4. Students will be introduced to the significance of color in art, as well as the principles of color theory and application. 5. Applied the concepts of unity, harmony, balance, rhythm, emphasis and proportion, abstraction and stylization to create a composition.	

6. Learn how to use which materials and for what types of art and textures.
7. Use of the above concepts to create art through the medium of collage, mosaic, painting, mural, batik, tie and dye.
8. Real world application of the above concepts in the form of book cover design and illustration, cartoon, poster, advertisements, magazine, computer graphics and animation
9. Familiarization with the many art forms and techniques of expression found throughout India.
AND
ONE EDUCATIONAL VISIT TO AN ART MUSEUM / INSTITUTE / GALLERY
Students must turn in assignments for each of the above said topics on a weekly basis and have to compulsorily take part in the museum visit. CIE will be evaluated based on a still life piece, a composition using any one of the media of composition and a presentation on Indian art styles and creation of a piece pertaining to the presented art style.

SUBJECT CODE	C-Performing Art-Hindustani Music			CREDITS			
23UD1000BS201P				1			
Teaching Work Load/week(Hrs.)				Examination Scheme(Marks)			
Theory	Tutorial	Laboratory	Total	ISE	MSE	ESE	Total
0	0	2	02	60	00	40	100

Course Objectives:	
CO1	To appreciate the diversity and uniqueness in Hindustani Music

Course Outcomes: Students will be able to	
CO1	Learn three vibrant genres of Dhrupad, Khayal and Instrumental Music, which this course explores with a focus on Khayal.
CO2	Do contemporary practice while also drawing upon historical and textual scholarship to place the music in perspective.
CO3	Get benefits from highly regarded musicians, musicologists and scholars and guided listening of recorded music.

SYLLABUS

Module 1	**Hindustani Music**	**Hrs. 5**
A World of Colour, Romance, and History, Classical or Shastriya – What‟s in a Name! Dhrupad, Khayal and Instrumental Music – A Bird‟s-eye View. Hindustani Music as Raga Sangeet, The Textual Tradition, Swara and Shruti: Tone and Microtone, Swara and Shruti in the Textual Tradition, Tanpura – The King of Overtones, Entering the World of Raga – Raga and Swara, The World of Raga – 2: Strong and Weak Notes, The World of Raga – 3: Ornament, The World of Raga – 4: Paths of a Raga, Raga and Time Association		
Module 2	**Raga Lakshana or Features of Raga**	**Hrs. 5**
Defining Raga, Classification of Ragas – the Mela or Thaat System, Classification of Ragas – the Raagaanga System, Classification of Ragas – the Raga Ragini system. Extending the Raga Corpus – Winds from the		

South, Extending the Raga Corpus– Jod Ragas, Principles of Time in Hindustani Music – Tala and Laya, Some Aspects of Tala and a Few Important Tala-s, Tabla as Keeper of Tala in Khayal, Khayal-A Compositional Form, Some Contemporary Composers of Khayal		
Module 3	**The Vilambit Khayal Improvisation in Khayal**	**Hrs. 5**
Elements of Raga Vistaar., The Eight Limbs or Ashtaanga of Khayal and the nature of Tabla accompaniment., A Typical Khayal Presentation, Raga Profiles as Captured in Bandish Gharanas of Hindustani Music – Introduction Gharanas of Hindustani Music – Early Masters Gharanas of Hindustani Music – Twentieth Century masters Gharanas of Hindustani Music – Melodic accompaniment in Khayal The Harmonium as a solo and accompanying instrument.		
Module 4	**Dhrupad**	**Hrs. 5**
Style and structure, alaap, compositional forms, song texts:The Enchanting World of Thumri Instrumental Music – an Introduction The Sarod: A Lecture demonstration by Pt Suresh Vyas The Sitar: A Lecture demonstration by Dr Supriya Shah		

Reference: NPTEL/SWAYAM Course	
NPTEL Course Name	Hindustani Music
Instructor	Prof. Lakshmi Sreeram, Prof. Srijan Deshpande
Host Institute	IIT Madras, Manipal Academy of Higher Education, Manipal