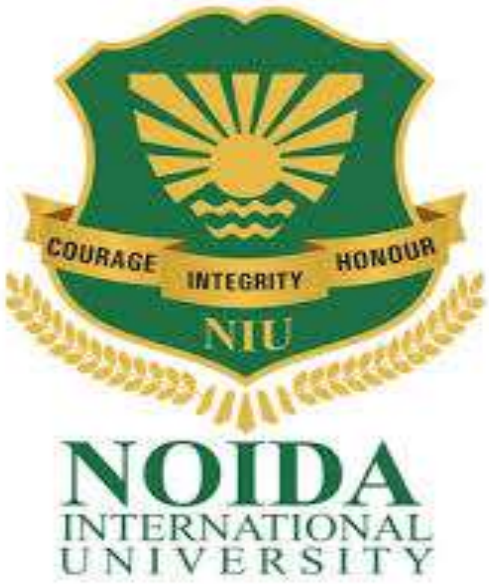
NOIDA INTERNATIONAL UNIVERSITY



EVALUATION SCHEME & SYLLABUS

For

UNDERGRADUATE DEGREE COURSE
IN

ELECTRICAL ENGINEERING

(Effective from the Session: 2019-20)

B. Tech in Electrical Engineering

Program Educational Objectives (PEOs)

The Department of Electrical Engineering has developed and maintained a well-defined set of educational objectives and desired program outcomes. Educational objectives of the program cater to the requirements of the stakeholders such as students, parents, employers, alumni, faculty etc. The program educational objectives are as follows:

- **PEO**1: Provide graduates with a strong foundation in mathematics, science and engineering fundamentals to enable them to devise and deliver efficient solutions to challenging problems in Electrical and allied disciplines.
- **PEO**2: Impart analytic and thinking skills to develop initiatives and innovative ideas for R&D, Industry and societal requirements.
- **PEO**3: Provide sound theoretical and practical knowledge of E&C Engineering, managerial and entrepreneurial skills to enable students to contribute to the well-being of society with a global outlook.
- **PEO**4: Inculcate qualities of teamwork as well as social, interpersonal and leadership skills and an ability to adapt to evolving professional environments in the domains of engineering and technology.
- **PEO**5: Motivate graduates to become good human beings and responsible citizens for the overall welfare of the society.

Program outcomes (POs)

Engineering Graduates will be able to:

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

PO2. **Problem analysis**: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

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

PO4. **Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. **Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

PO6. **The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. **Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

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

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

PO10. **Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO11. **Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO12**. Life-long learning**: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Credit System-Credit requirement for award of B.Tech:

- Every semester shall offer a minimum of **12 credits**.
- Credits for the Project or Thesis can vary from 10 to 15.
- The total number of credits for the B. tech Degree Course could vary from a **minimum of 158** credits to a **maximum of 178** credits.
- All courses of study put together would engage the students for a **minimum of 26 periods** or hours of study a week and a **maximum of 30 periods** or hours a week.

Under the Choice based credit system, which is a student or learner centric system, the courses of study in the B.Tech Degree course shall be as under:

a) Professional Core (PC) Course: A course, which should compulsorily be studied by a candidate as a core requirement is termed as a Core course.
b) Basic Sciences and Engineering Science (BS and ES) Course: A course which informs the Professional core and should compulsorily be studied.
c) Elective Course: Generally a course which can be chosen from a pool of courses and are of two types:
    (i) Professional Elective (PE) which may be very specific or specialized or advanced or supportive to the discipline or subject of study or which provides an extended scope
    (ii) Open Elective (OE) which enables an exposure to some other discipline or subject or domain or nurtures the candidate‘s proficiency or skill

The Weightage in terms of Credits for each of the above in the prescribed curriculum of the institution shall be as follows:

S.no.	Credit Breakups	Credits	Percentage
1	Humanities and Social Sciences including Management courses	12	
2	Basic Science courses	26	
3	Engineering Science courses including workshop, drawing, basics of electrical/mechanical/computer etc.	20	
4	Professional core courses	52	
5	Professional Elective courses relevant to chosen	18	

	specialization/branch		
6	Open subjects – Electives from other technical and /or emerging subjects	18	
7	Project work, seminar and internship in industry or elsewhere	12	
8	Mandatory Courses	0	
		*158	

**Minor variation is allowed as per need of the respective disciplines.*

While calculating credits the following guidelines shall be adopted, namely: -

- 1 Hr. Lecture (L) per week 1 credit
- 1 Hr. Tutorial (T) per week 1 credit
- 1 Hr. Practical (P) per week 0.5
- 2 Hours Practical (Lab)/week 1 credit

Credit distribution in each semester (158 credits to 8 semesters)

Semester	**Credits**		
	Theory	Practical	Total
1st/2nd	15	5.5	20.5
2nd/1st	12	5.5	17.5
3rd	25	2	27
4th	18	3	21
5th	18	3	21
6th	15	3	18
7th	12	4	16
8th	9	8	17
Total	110	48	158

Course coding system

Every course coded as follows:

BSC : Basic Science Courses
ESC : Engineering Science Course
MC : Mandatory Courses
HSMC : Humanities and Social Sciences including Management
EE : Program core courses
PEC : Program Elective courses
OEC : Open Elective courses

Semester wise- course structure
First/Second Semester

S.No	Course Code	Subject	Period			Evaluation Scheme					Total Credits
						Sessional Exam			End Exams	Subject Total	
			L	T	P	CA	TA	Total			
1	BSC 101	Physics-I	3	1	0	20	20	40	60	100	4
2	BSC104	Mathematics –II	3	1	0	20	20	40	60	100	4
3	ESC 104	Workshop/manufacturing Practices	1	0	0	20	20	40	60	100	1
4	ESC101	Basic Electrical Engineering	3	1	0	20	20	40	60	100	4
5	AECC01	Environmental Studies									0
PRACTICALS											
1	BSC 101P	Physics-I Lab	0	0	3	-	-	40	60	100	1.5
2	ESC104 P	Workshop/manufacturing Practices Lab	0	0	4	-	-	40	60	100	2
3	ESC10 1P	Basic Electrical EngineeringEnglish Lab	0	0	4	-	-	40	60	100	1
Total											**17.5**

First/Second-Semester

S. No	Course Code	Subject	Period			Evaluation Scheme					Total Credits
						Sessional Exam			End Exa	Subject	
			L	T	P	C	T	Total			
1	BSC 103	Mathematics –I (Calculus, Ordinary Differential Equations& Complex Variables)	3	1	0	20	20	40	60	100	4
2	BSC104	Chemistry-I	3	1	0	20	20	40	60	100	4
3	ESC102	Workshop/Manufacturing Practices	1	0	0	20	20	40	60	100	1
4	ESC103	Engineering graphics	1	0	0	20	20	40	60	100	1
5	ESC104	Basic Electrical Engineering	2	0	0	20	20	40	60	100	2
		Slot for MC (Environmental Science)	2	0	0	20	20	40	60	100	0
PRACTICALS											
1	BSC104P	Chemistry-I Lab	0	0	3	-	-	40	60	100	1.5
2	ESC102P	Workshop/Manufacturing Practices	0	0	4	-	-	40	60	100	2
3	ESC103 P	Engineering graphics Lab	0	0	4	20	20	40	60	100	2
4	ESC104P	Basic Electrical Engineering Lab	0	0	2	-	-	40	60	100	1
Total											**20.5**

SEMESTER-I/II

DETAILED CURRICULUMCONTENTS

Course Code:BSC101 **Course Name:** Mathematics-I
Course Credit Hour: 4hr **Total Contact Hour:** 40hrs

Course Objective:

- The objective of this course is to familiarize the prospective engineers with techniques in calculus, multivariate analysis and linear algebra. It aims to equip the students with standard concepts and tools at an intermediate to advanced level that will serve them well towards tackling more advanced level of mathematics and applications that they would find useful in their disciplines.

Course Description:

- In this course we apply to differential and integral calculus to notions of curvature and to improper integrals. Apart from some other applications they will have a basic understanding of Beta and Gamma functions and discuss the fallouts of Rolle's Theorem that is fundamental to application of analysis to Engineering problems.
- We shall also learn the tool of power series and Fourier series for learning advanced Engineering Mathematics and deal with functions of several variables that are essential in most branches of engineering and the essential tool of matrices and linear algebra in a comprehensive manner

Course Contents:

Unit 1: Calculus: (6 lectures)
Evolutes and involutes; Evaluation of definite and improper integrals; Beta and Gamma functions and their properties; Applications of definite integrals to evaluate surface areas and volumes of revolutions.

Unit 2: Calculus: (6 lectures)
Rolle's Theorem, Mean value theorems, Taylor's and Maclaurin theorems with remainders; indeterminate forms and L'Hospital's rule; Maxima and minima.

Unit 3: Sequences and series: (10 lectures)
Convergence of sequence and series, tests for convergence; Power series, Taylor's series, for exponential, trigonometric and logarithm functions; Fourier series: Half range sine and cosine series, Parseval's theorem.

Unit 4: Multivariable Calculus (Differentiation): (8 lectures)
Limit, continuity and partial derivatives, directional derivatives, total derivative; Tangent plane and normal line; Maxima, minima and saddle points; Method of Lagrange multipliers; Gradient, curl and divergence.

Unit 5: Matrices (10 lectures)
Inverse and rank of a matrix, rank-nullity theorem; System of linear equations; Symmetric, skew-symmetric and orthogonal matrices; Determinants; Eigenvalues and eigenvectors; Diagonalization of matrices; Cayley-Hamilton Theorem, and Orthogonal transformation.

Course Learning Outcomes (CLOs):

- CLO-1: Apply to differential and integral calculus to notions of curvature and to improper integrals and its applications in engineering problems
- CLO-2: Fundamental to application of analysis to Engineering problems by mean value theorems.
- CLO-3: Apply thetool of power series and Fourier series for learning advanced Engineering Mathematics.
- CLO-4: Discuss problem and application of Multivariable Calculus.
- CLO-5: Apply tool of matrices and linear algebra in a comprehensive manner

Text books:

(i) Erwin kreyszig, Advanced Engineering Mathematics, John Wiley & Sons.
(ii) B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers.
(iii) G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, Edition, Pearson,

Reference books:

(i) Ramana B.V., Higher Engineering Mathematics, Tata McGraw Hill New Delhi,
(ii) D. Poole, Linear Algebra: A Modern Introduction, 2nd Edition, Brooks/Cole, 2005.

Online links for study & reference materials:

https://www.classcentral.com/course/swayam-engineering-mathematics-i-13000

Assessment method: (Continuous Internal Assessment = 40%, Final Examination = 60%)

Assignment -1	- 04%
Assignment -2	- 04%
Assessment-3(Mid-Exam)	- 20%
Assignment-3	- 04%
Assignment-4	- 04%
Assignment-5	- 04%
Total Internal Assessment	**- 40%**

Course Code: BSC102 **Course Name:** Chemistry-I
Course Credit Hour: 4hr **Total Contact Hour:** 45hr

Course Objective:

The objectives of the course are

1. To develop the interest among the students regarding chemistry and their applications in engineering. The student should understand the concepts of chemistry to lay the groundwork for subsequent studies in the fields such as chemical, mechanical, civil, environmental, electrical and electronics engineering etc.
2. To emphasize on learning microscopic chemistry in terms of atomic and molecular orbitals and intermolecular forces.
3. To understand principles of different spectroscopic techniques and its applications. Bulk properties and processes will be analyzed using thermodynamic considerations.
4. To outline periodic properties, stereochemistry, chemical reactions and synthesis.
5. To teach of experiments illustrating the principles of chemistry that have been learnt so far, as well as others relevant to the study of science and engineering.
6. To develop an intuitive understanding of chemistry by emphasizing the related branches of engineering.
7. To develop confidence among students about chemistry, how the knowledge of chemistry is applied in technological field.

Course Description:

- The course introduces fundamental concepts chemistry including Atomic and molecular structure,Spectroscopic techniques and applications, Intermolecular forces and potential energy surfaces , Use of free energy in chemical equilibrium, Periodic properties, Stereochemistry and Stereochemistry . This subject also laid down the groundwork for subsequent studies in the fields such as chemical, mechanical, civil, environmental, electrical and electronics engineering etc.

Course Contents:

Module 1: Atomic and molecular structure

Schrodinger equation. Particle in a box solutions and their applications for onjugated molecules and nanoparticles. Forms of the hydrogen atom wave functions and the plots of these functions to explore their spatial variations. Molecular orbitals of diatomic molecules and plots of the multi-centre orbitals. Equations for atomic and molecular orbitals. Energy level diagrams of diatomics. Pi-molecular orbitals of butadiene and benzene and aromaticity. Crystal field theory and the energy level diagrams for transition metal ions and their magnetic properties. Band structure of solids and the role of doping on band structures.

Module 2: Spectroscopic techniques and applications

Principles of spectroscopy and selection rules, Electronic spectroscopy, Fluorescence and its applications in medicine, Vibrational and rotational spectroscopy of diatomic molecules. Applications, Nuclear magnetic resonance and magnetic resonance imaging, surface characterization techniques, Diffraction and scattering.

Module 3: Intermolecular forces and potential energy surfaces

Ionic, dipolar and van Der Waals interactions. Equations of state of real gases and critical phenomena. Potential energy surfaces of H_3, H_2F and HCN and trajectories on these surfaces.

Module 4: Use of free energy in chemical equilibria

Thermodynamic functions: energy, entropy and free energy. Estimations of entropy and free energies. Free energy and emf. Cell potentials, the Nernst equation and applications. Acid base, oxidation reduction and solubility equilibria. Water chemistry. Corrosion. Use of free energy considerations in metallurgy through Ellingham diagrams.

Module 5: Periodic properties

Effective nuclear charge, penetration of orbitals, variations of s, p, d and f orbital energies of atoms in the periodic table, electronic configurations, atomic and ionic sizes, ionization energies, electron affinity and electronegativity, polarizability, oxidation states, coordination numbers and geometries, hard soft acids and bases, molecular geometries.

Module 6: Stereochemistry

Representations of 3 dimensional structures, structural isomers and stereoisomers, configurations and symmetry and chirality, enantiomers, diastereomers, optical activity, absolute configurations and conformational analysis. Isomerism in transitional metal compounds.

Module 7: Organic reactions and synthesis of a drug molecule

Introduction to reactions involving substitution, addition, elimination, oxidation, reduction, cyclization and ring openings. Synthesis of a commonly used drug molecule.

Course Learning Outcomes (CLOs):

The course will enable the student to:

- **CLO-1**: Students will learn to apply concepts from physics and methods from mathematics to derive and understand the properties of chemical systems that arise from quantum mechanical models for the structure of atoms and molecules.
- **CLO-2**: Student will achieve advanced knowledge about the interactions of electromagnetic radiation and matter and their applications in spectroscopy.
- **CLO-3**: Student can explain how intermolecular forces determine physical properties of molecules; especially boiling point, melting point and viscosity.
- **CLO-4**: Student can answer why chemical reactions occur? the driving force(s) that are responsible for physical and chemical changes.
- **CLO-5**: Student can apply the knowledge of periodic properties such as ionization potential, electro negativity, oxidation states and electro negativity while planning use of any material for industrial purpose.
- **CLO-6**: Distinguish between different kinds of isomers, cis/trans or E/Z, superimposable, chiral/achiral, define enantiomers, levorotatory or dextrorotatory, racemic mixture, Distinguish between enantiomers and diastereomers, Understand the relationship between biological properties of pairs of enantiomers or diastereomer.
  - Draw the E or Z isomer of a given alkene
- **CLO-7**: Student can list major chemical reactions that are used in the synthesis of molecules.

Text books:

- B.H. Mahan,"Universitychemistry", Addison-WesleyPublishingCompany.
- M. J. Sienkoand R. A. Plane, "Chemistry: Principles and Applications", McGraw- -ill International.
- C. N. Banwell, "Fundamentals of Molecular Spectroscopy", McGraw Hill Education.

Reference books:

- B. L. Tembe, Kamaluddin and M. S. Krishnan, “Engineering Chemistry”(NPTEL).
- K. P. C. Volhardt and N. E. Schore, “ OrganicChemistry: Structure and Function” Freeman.

Online links for study & reference materials:

https://nptel.ac.in/courses/104/103/104103071/

Assessment method: (Continuous Internal Assessment = 40%, Final Examination = 60%)

Assignment-1	- 05%
Assignment-2	- 05%
Assessment-3(Midexam)	- 20%
Assignment-4	- 05%
Assignment-5/Quiz	- 05%
Total Internal Assessment	**- 40%**

Course Code: HSMC101 **Course Name:** English
Course Credit Hour: 2 Hr **Total Contact Hours:** 20hr

Course Objective:

- The student will acquire basic proficiency in English including reading and listening comprehension, writing and speaking skills.

Course Description:

- This course introduces the fundamental of communication skills, writing skills presentation skills and interview skills. Topic includes introduction to Grammar, speaking skills, Writing Skills, Presentation skills, Interview skills.

Course Contents:

Unit 1:VocabularyBuilding (4 lectures)

The concept of WordFormation, Root words from foreign languages and their use inEnglish Acquaintance with prefixes and suffixes from foreign languages in English to form derivatives. Synonyms, antonyms, and standardabbreviations.

Unit 2: Basic WritingSkills (4lectures)

SentenceStructures, use of phrases and clauses insentences Importance of properpunctuation Creatingcoherence Organizing principles of paragraphs indocuments Techniques for writingprecisely

Unit 3:Identifying Common Errors inWriting (4 lectures)

Subject-verbagreement, Noun-pronounagreement, Misplacedmodifiers, Articles, Prepositions RedundanciesClichés

Unit 4:Nature and Style of sensibleWriting (4 lectures)

Describing, Defining, Classifying, providing examples orevidence, writing introduction andconclusion WritingPractices Comprehension PrécisWritingEssayWriting

Unit 5: OralCommunication **(4 lectures)**

(This unit involves interactive interaction)

- ListeningComprehension
- Pronunciation, Intonation, Stress andRhythm
- Common Everyday Situations: Conversations andDialogues
- Communication atWorkplace
- Interviews
- FormalPresentation.

Course Learning Outcomes (CLOs):

- CLO-1: Develop the vocabulary building and basic grammar concepts.
- CLO-2: Inculcate speaking skills and listening skills.
- CLO-3: Develop the writing skills.
- CLO-4: Understand technical writing skills.
- CLO-5: Demonstrate all skills in presentation and interviews.

Text books:

- Raman, Singh – Business communication – Oxford Press
- Spoken English for India, R.K. Bansal & J.B. Harrison, Orient Longman, Delhi.
- Objective English, Tata Mc. Graw Hill Publishing Company Ltd., New Delhi.
- Practical English Usage. Michael Swan. OUP.1995.
- Communication Skills. Sanjay Kumar and PushpLata. Oxford University Press.2011.

Reference books:

- English Phonetics & Phonology, P. Roach, Cambridge University Press, London
- Common Errors in English, Abul Hashem, Ramesh Publishing House, new Delhi.
- Study Writing. Liz Hamp-Lyons and Ben Heasly. Cambridge University Press.2006.
- Exercises in Spoken English. Parts. I-III. CIEFL, Hyderabad. OxfordUniversity Press

Online links for study & reference materials:

- https://nptel.ac.in/courses/109/106/109106094/

Assessment method: (Continuous Internal Assessment = 40%, Final Examination = 60%)

Assignment -1	- 05%
Assignment -2	- 05%
Assessment-3(Mid-Exam)	- 20%
Assignment-3/Quiz-1	- 05%
Assignment-4	- 05%
Total Internal Assessment	**- 40%**

Course Code: ECS101 **Course Name:** Programming for Problem Solving
Course Credit Hour: 4hr **Total Contact Hour:** 42hr

Course Objective:

- The course aims to provide exposure to problem –solving through programming. It aims to train the student to the basic concept of the C –programming language. This course involves a lab component which is designed to give the student hands –on experience with the concept.

Course Description:

- This course introduces the fundamental concepts of computer and programming and provides comprehensive introduction to programming in C. Topic includes introduction to programming, Arrays, Basic Algorithms, Functions, Recursion, Structure and Pointers.

Course Contents:

Unit 1: Introduction to Programming

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

Unit 2: Arithmetic expressions and precedence

Conditional Branching and Loops, Writing and evaluation of conditionals and consequent branching, Iteration and loops.

Unit 3: Arrays

Arrays (1-D, 2-D), Character arrays and Strings.

Unit 4: Basic Algorithms

Searching, Basic Sorting Algorithms (Bubble, Insertion and Selection), Finding roots of Equations, notion of order of complexity through example programs (no formal definition Required)

Unit 5: Function

Functions (including using built in libraries), Parameter passing in functions, call by value,
Passing arrays to functions: idea of call by reference.

Unit 6: Recursion

Recursion, as a different way of solving problems. Example programs, such as Finding Factorial, Fibonacci series, Ackerman function etc. Quick sort or Merge sort.

Unit 7: Structure

Structures, Defining structures and Array of Structures.

Unit 8: Pointers

Idea of pointers, Defining pointers, Use of Pointers in self-referential structures, notion of linked list (no implementation)

Unit 9: File handling (only if time is available, otherwise should be done as part of the lab)

Course Learning Outcomes (CLOs):

On completion of the course students will be able to:

- **CLO-1**: Formulate simple algorithms for arithmetic and logical problems.
- **CLO-2:** Test and execute the programs and correct syntax and logical errors.
- **CLO-3:** Implement conditional branching, iteration and recursion.
- **CLO-4:** Use arrays, pointers and structures to formulate algorithms and programs.
- **CLO-5:** Apply programming to solve matrix addition and multiplication problems and searching and sorting problems.

Text books:

(iv) Byron Gottfried, Schaum's Outline of Programming with C, Third Edition, McGraw-Hill.

(v) E.Balaguruswamy, Programming in ANSI, Tata McGraw- Hill.

(vi) YashavantKanetkar, Let Us C, BPB Publications.

Reference books:

- Brian W. Kernighhan and Dennis Ritchie, The C Programming Language, Prentice Hall of India

Online links for study & reference materials:

https://nptel.ac.in/courses/106/104/106104128/

Assessment method: (Continuous Internal Assessment = 40%, Final Examination = 60%)

Assignment -1	- 05%
Assignment -2	- 05%
Assessment-3(Mid-Exam)	- 20%
Assignment-3/Quiz-1	- 05%
Assignment-4	- 05%
Total Internal Assessment	**- 40%**

LAB EXPERIMENTS
FIRST SEMESTER

Lab Code: ESC101P **Lab Name:** Programming for Problem Solving
Course Credit Hour: 2hr **Total Contact Hour:** 04

List of Experiments:

Problems based on if-then-else structure:

1. If the three sides of the triangle are entered through the keyboard, write a program to check whether the triangle is isosceles or equilateral.
2. In a company an employee is paid under: If his basic salary is less then Rs.1500, then HRA=10% of basic salary and DA=90% of basic salary .If his salary is either equal to or above Rs 1500, then HRA=Rs 500 and DA= 98% of basic salary. If the employee's salary is input through the keyboard write a program to find his gross salary.
3. The current year and year in which the employee joined the organization are entered through the keyboard. If the no of years for which the employee has served the organization is greater than 3 then a bonus of Rs.2500/- is given to the employee. If the years of service are not greater than three, then the program should do nothing. Write a program to perform the said task.
4. Write a program to check whether a triangle is valid or not when the three angles of the triangle are entered through the keyboard. A triangle is valid if the sum of all the three angles is equal to 180 degree.
5. If cost price and selling price of item is input through the keyboard, write a program to determine whether the seller gas made profit or incurred loss. Also determine how much profit he made or loss he incurred.
6. In a company worker efficiency is determined on the basis of the time required for a worker to complete a particular job. If the time taken by the worker is between 2-3 hours, then the worker is said to be highly efficient. If the time required by the worker is between 3-4 hours, then the worker is ordered to improve speed. If the time taken is between 4-5 hours, the worker is given training to improve his speed, and if the time taken by the worker is more than 5 hours, then the worker has to leave the company. If time taken by the worker is input through the keyboard, write a program to find the efficiency of the worker.

Problems based on while loop and for loop:

1. Write a program to print the cube of any number provided by the user.
2. Make a program to calculate the simple interest for 3 sets of p, n, r using while and for loop.
3. Write a program to print the sum of all the digits from 1 to 10 using while loop.
4. Write a program to print the digit from 1 to100 using while and for loop.
5. Using for loop print the following pattern

   R=1 c=1 sum=2
   R=1 c=2 sum=3
   R=2 c=1 sum =3
   R=2 c=2 sum=4
6. Write a program to print the following pattern
7. Write a program to print the square and cube of any number.
8.

*****	*	1
*****	**	12
*****	***	123
*****	****	1234
	*****	12345

Problems based on 1-D Array, Array Manipulation, 2-D Array and String Operations:

1. Write a program to perform following operations on String(s) using a well-defined library function:
    - Find the length of the string.
    - Concatenate two strings
    - Compare two given strings
    - Copy the content of string to another string
2. Write a program to find average marks obtained by a class of 30 students in a test.
3. Write a program to find the maximum marks obtained by a student in 5 subjects.
4. Write a program to pick up the largest number from any 5 row by 5 column matrix.
5. Twenty five numbers are entered from the keyboard into an array. Write a program to find out how many of them are positive, how many of them are negative and how many of them are zeros.
6. Write a program to store n elements in an array and print all elements.
7. Write a program to compute the sum of all elements in an array.
8. Write a program to print the elements of an array in reverse order.

Problems based on Structures:

1. Write a program to enter name, price and page number of three books using structure.
2. Write a program to enter roll number and average marks of 3 students using structure.
3. Create a structure to specify data of customer in a bank. The data to be stored is: Account number, Name, Balance in Account. Assume maximum of 200 customers in the bank. Write a program to print name and account number of each customer with balance below Rs. 100.
4. A record contains name of cricketer, his age, number of test matches that he has played and the average runs that he has scored. Create an array of structures to hold records of 20 such cricketers.
5. There is a structure called employee that holds information like employee code, name, and year of joining. Write a program to create an array of structures and enter some data into it. Then ask the user to enter current year. Display the names of those employees whose tenure is more than 3 years according to given year.

Problems based on Function, Pointer, Call by Value and Call by Reference

1. Write function which receives a float and an integer from main (), find the product of these two and returns the product which is printed through main ().
2. Write a function that receives marks received by a student in 3 subjects and returns the average and percentage of these marks. Call this function from main and print the result in main.
3. Find the smallest number in an array.
4. Any year is entered through the keyboard. Write a function to determine whether the year is a leap year or not.
5. Write a function that receives 5 integers and returns the sum, average of these numbers. Call this function from main () and print the result in main ().
6. Write a program to add two numbers using pointers**.**
7. Write a program to store n elements in an array and print all elements using pointer.
8. Write a program to read array elements and print array addresses using pointer.
9. Write a program to compute the sum of all elements in an array using pointer.
10. Write a program to print the elements of an array in reverse order using pointer.

Problems based on Recursion, recursive functions, file handling operations and numerical method problems:

1. Write a program to writes records to a file using structure.
2. Write a program for reading a string from the file and display them on screen.
3. Write a program to copy the content of one file to another file.
4. Write a program to display contents of a file on screen.

5. Write a program to count Chars, space, tabs and new lines in a file.
6. Write a program to calculate factorial of any inputted number with recursion and without recursion.
7. Write a program to calculate Fibonacci Series using recursive call.
8. Write a program to calculate Ackerman Function for any two non-negative integers using recursion.

Lab Code: BSC104P **Lab Name:** Chemistry Lab
Course Credit Hour: 1.5 **Total Contact Hours:** 03

List of Experiments:

- DeterminationofAlkalinityingivenwatersample.
- Determination of Total hardness, Permanent hardness and TemporaryHardnessofgivenWaterSamplebyusingEDTAasstandardsolution.
- DeterminationofavailablechlorineinBleachingpowder.
- DeterminationofchlorideContentsingivenWatersamplebyusingMohr'sMethod.
- DeterminationofIronContentinthegivenOrebyusing externalIndicator.
- pHmetrictitration.
- ViscosityofanadditionpolymerlikePolyesterbyViscometer.
- Determination of heat of neutralization of Hydrochloric acid and Sodiumhydroxide.
- DeterminationofamountofdissolveOxygeninwater.
- Separationofmetalionsbypaperchromatography.

SEMESTER-I/II

DETAILED CURRICULUM CONTENTS

Course Code: BSC101 **Course Name:** Physics
Course Credit Hour: 4hr Total Contact Hour: 42hr

Course Objective: At the completion of this course, a student will be able to

1. Know about the development of modern Physics and the theoretical formulation of quantum mechanics.
2. Know the applications of quantum mechanics in solving physical problems.

Course Description: This course willanalyze the applications of mathematics to the problems in physics & develop suitable mathematical method for such application & for formulation of physical theories.

Course Contents:

Unit I: Wave nature of particles and the Schrodinger equation(8 Lectures)
Introduction to Quantum mechanics
Wave nature of particles
Time independent and time dependent Schrodinger equation for wave function
Born interpretation
Probability current
Expectation values
Free particle wavefunction and wave packets
Uncertainty principle

Unit II: Mathematical Preliminaries for Quantum Mechanics (4 Lectures)
Complex numbers Linear vector spaces Inner product Operators Eigen value problems Hermitian operators Hermite polynomials Legendre`s equation Spherical harmonics

Unit III: Applying the Schrodinger equation (15 Lectures)
Solution of stationary state Schrodinger equation for one dimensional problem Particle in a box Particle in attractive delta function potential Square well potential Linear harmonic oscillator
Numerical solution of stationary state Schrodinger equation for one dimensional problem for different potentials Scattering from a potential barrier and tunneling Examples like alpha decay, field ionisation and scanning tunnelling microscope Three dimensional problems: particle in three-dimensional box and related examples Angular momentum operator Rigid rotor Hydrogen atom ground state, orbitals, interaction with magnetic field spin Numerical solution stationary state Schrodinger equation for spherically symmetric potentials

Unit IV: Introduction to Molecular Bonding (4 Lectures)
Particle in double delta function potential Molecules (Hydrogen molecule, valence bond and molecular orbitals picture) Singlet/triplet states Chemical bonding Hybridization

Unit V: Introduction to Solids (7 Lectures)
Free electron theory of metals Fermi level, density of states Application of white dwarfs and neutron stars Bloch theorem for particles in a periodic potential Kronig-Penney model and origin of energy bands Numerical solution for energy in one dimensional periodic lattice by mixing plane waves

Course Learning Outcomes (CLOs):

After successful completion of this paper, the student will be well-versed in

- **CLO1.** Concepts of basis and operators
- **CLO2.** Both Schrodinger and Heisenberg formulations of time development and their applications
- **CLO3.** Solution of stationary state Schrodinger equation for one dimensional problem
- **CLO4.** Concepts of Molecules (Hydrogen molecule, valence bond and molecular orbitals picture)
- **CLO5.**Kronig-Penney model and origin of energy bands

Text Books

- Eisberg and Resnik, Introduction to Quantum Physics

Reference Books

- D. J. Grriffiths, Quantum Mechanics
- Richard Robinett, Quantum Mechanics
- Daniel McQuarrie, Quantum Chemistry

Online links for study & reference materials:

https://nptel.ac.in/courses/122/106/122106034/

Assessment method: (Continuous Internal Assessment = 40%, Final Examination = 60%)

Assignment -1	- 05%
Assignment -2	- 05%
Assessment-3(Mid-Exam)	- 20%
Assignment-3/Quiz-1	- 05%
Assignment-4	- 05%
Total Internal Assessment	- 40%

Course Code:BSC104 **Course Name:** Mathematics II
Course Credit Hour: 4hr **Total Contact Hour:** 40hrs

Course Objective:

- The objective of this course is to familiarize the prospective engineers with techniques in multivariate integration, ordinary and partial differential equations and complex variables. It aims to equip the students to deal with advanced level of mathematics and applications that would be essential for their disciplines.

Course Description:

- Applying the mathematical tools for need in evaluating multiple integrals and their usage, solutions of differential equations that model physical processes and the tools of differentiation and integration of functions of a complex variable that are used in various techniques dealing engineering problems.

Course Contents:

Unit 1: Multivariable Calculus (Integration): (10 lectures)
Multiple Integration: Double integrals (Cartesian), change of order of integration in double integrals, Change of variables (Cartesian to polar), Applications: areas and volumes, Center of mass and Gravity (constant and variable densities); Triple integrals (Cartesian), orthogonal curvilinear coordinates, Simple applications involving cubes, sphere and rectangular parallelepipeds; Scalar line integrals, vector line integrals, scalar surface integrals, vector surface integrals, Theorems of Green, Gauss and Stokes.

Unit 2: First order ordinary differential equations: (6 lectures)
Exact, linear and Bernoulli's equations, Euler's equations, Equations not of first degree: equations solvable for p, equations solvable for y, equations solvable for x and Clairaut's type.

Unit 3: Ordinary differential equations of higher orders: (8 lectures)
Second order linear differential equations with variable coefficients, method of variation of parameters, Cauchy-Euler equation; Power series solutions; Legendre polynomials, Bessel functions of the first kind and their properties.

Unit 4: Complex Variable – Differentiation: (8 lectures)
Differentiation, Cauchy-Riemann equations, analytic functions, harmonic functions, finding harmonic conjugate; elementary analytic functions (exponential, trigonometric, logarithm)

Unit 5: Complex Variable – Integration: (8 lectures)
Contour integrals, Cauchy-Goursat theorem (without proof), Cauchy Integral formula (without proof), Liouville's theorem and Maximum-Modulus theorem (without proof); Taylor's series, zeros of analytic functions, singularities, Laurent's series; Residues, Cauchy Residue theorem (without proof), Evaluation of definite integral involving sine and cosine, Evaluation of certain improper integrals using the Bromwich contour.

Course Learning Outcomes (CLOs):

- CLO-1: Evaluation of areas and volumes, Center of mass and Gravity.
- CLO-2: Solution of first order ordinary differential equations by various methods.
- CLO-3: Solution of ordinary differential equations of higher orders.
- CLO-4: Differentiation of Vector calculus.

- CLO-5: Integration of Vector Calculus.

Text books:

- Erwin kreyszig, Advanced Engineering Mathematics, John Wiley & Sons.
- B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers.
- G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, Edition, Pearson,

Reference books:

- Ramana B.V., Higher Engineering Mathematics, Tata McGraw Hill New Delhi,
- D. Poole, Linear Algebra: A Modern Introduction, 2nd Edition, Brooks/Cole, 2005.
- W. E. Boyce and R. C. DiPrima, Elementary Differential Equations and Boundary Value Problems, Wiley India

Online links for study & reference materials:

https://nptel.ac.in/courses/122/107/122107036/

Assessment method: (Continuous Internal Assessment = 40%, Final Examination = 60%)

Assignment -1	- 04%
Assignment -2	- 04%
Assessment-3(Mid-Exam)	- 20%
Assignment-3	- 04%
Assignment-4	- 04%
Assignment-5	- 04%
Total Internal Assessment	**- 40%**

Course Code: ESC104 **Course Name:** Workshop/Manufacturing Practices
Course Credit: 5.5 **Total Contact Hours:** 40hr

Course Objective:

- To familiarize with the basic manufacturing processes and to study the various tools and equipment.
- They will get hands-on training is given in different sections. Essentially student should know the labour involved, machinery or equipment necessary.
- To analyze time required to fabricate and also should be able to estimate the cost of the product or job work.

Course Description:

- Ability to prepare simple objects using machines and machine tools to make students aware of fundamental operations of manufacturing an engineering component, enhance visualization and motivate them to innovate.

Course Contents:

Module 1

Machine Shop: To make a machined-component using lathe with mild steel round bar or hexagonal bar comprising of common turning operations with reference to drawing given in the manual. Any one of the following jobs Jobs: Hex Bolt, Axle for cycle wheel, Jig Bush, a typical turning specimen.

Module II

Sheet metal Shop: To make a sheet metal component with galvanized iron sheet as per the drawing provided in the manual having spot welding joint. Any one of the following jobs Jobs: Square tray, Scoop, Funnel.

Fitting Shop To make a joint using fitting tools with mild steel flats, round bars or square bars as per the drawing provided in the manual.

Module III

Carpentry Shop: To make a wooden joint with soft wood as per the drawing provided in the manual. Any one of the following jobs Jobs: T-Lap joint, Dove tail joint, Mortise & Tendon joint, Bridle joint.

Module IV

Welding Shop- Arc Welding To prepare a welding joint with mild steel flat using Manual Metal Arc welding machine according to the drawing provided in the manual.

Any one of the following jobs Jobs: Lap joint, Butt joint, Fillet/Corner joint.

Gas & Spot Welding To observe the demonstration of making a Lap joint/Butt joint with mild steel sheet using oxyacetylene flame as per the drawing provided in the manual. To perform the spot welding operation on G.I. Sheet.

Module V

Foundry Shop Introduction to foundry process like melting of metals, mould making, casting process and use of patterns to prepare of a component and significance of foundry. Demo of mould preparation.

Course Learning Outcomes (CLOs):

Upon completion of this course, students will be able to achieve the following:

- Have Capability to identify hand tools and instruments for machining and other workshop practices.
- The students will gain knowledge of the different manufacturing processes which are commonly employed in the industry, to fabricate components using different materials.

Text books:

- A course in Workshop Technology Vol I and Vol II by Prof. B.S. RaghuwanshiDhanpat Rai & Co.(P) Ltd.
- Elements of Workshop Technology Vol I and Vol II by S.K. Hajara Choudhury, A.K. Hajara Choudhury &Nirjhar Roy; Media Promoters & Publishers Pvt. Ltd, Mumbai.

Reference books:

- Workshop Technology Part 1, Part2 & Part3 by W.A.J. Chapman; CBS Publishers & Distributors, New Delhi

- Kalpak Jian S. And Steven S. Schmid, "Manufacturing Engineering and Technology", 4th edition, Pearson Education India Edition, 2002.
- Gowri P. Hariharan and A. Suresh Babu, "Manufacturing Technology – I" Pearson Education, 2008.
- Roy A. Lindberg, "Processes and Materials of Manufacture", 4th edition, Prentice Hall India, 1998.
- Rao P.N., "Manufacturing Technology", Vol. I and Vol. II, Tata McGrawHill House, 2017.

Online links for study & reference materials:
http://ecoursesonline.iasri.res.in/course/view.php?id=86

Assessment method: (Continuous Internal Assessment = 40% , Final Examination = 60%)

Assessment -1	- 05%
Assessment-2	- 05%
Assessment-3(Midexam)	- 20%
Assessment-3	- 05%
Assessment-4	- 05%
Total Internal Assessment	**- 40%**

Course Code: ESC101 **Course Name:** Basic Electrical Engineering
Course Credit: 5hr **Total Contact Hour:** 42hr

Course Objective:

- To introduce concept of D.C. circuits and A.C. circuits.
- To make the students understand and working of machines, transformer and components used for low voltage installation.

Course Description:

- This course introduces the fundamental concepts of circuits, machines and low voltage installation.

Course Contents:

Unit 1: DC Circuits

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

Unit 2: AC Circuits

Representation of sinusoidal waveforms, peak and rms values, phasor representation, real power, reactive power, apparent power, power factor. Analysis of single-phase ac circuits consisting of R, L, C, RL, RC, RLC combinations (series and parallel), resonance. Three- phase balanced circuits, voltage and current relations in star and delta connections.

Unit 3: Transformers

Magnetic materials, BH characteristics, ideal and practical transformer, equivalent circuit, losses in transformers, regulation and efficiency. Auto-transformer and three-phase transformer connections.

Unit 4: Electrical Machines

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

Unit 5: Power Converters

DC-DC buck and boost converters, duty ratio control. Single-phase and three-phase voltage source inverters; sinusoidal modulation.

Unit 6: Electrical Installations (6 hours)

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

Course Learning Outcomes (CLOs):

At the end of this course, students will demonstrate the ability

- CLO-1: Analyze basic electric and magneticcircuits.
- CLO- 2: working principles of electrical machines and power converters.
- CLO-3 :Understand the basic concept of components of low-voltage electrical Installations.

Text books:

- D. P. Kothari and I. J. Nagrath, " BasicElectrical Engineering", Tata McGraw Hill.
- D. C. Kulshreshtha, "BasicElectrical Engineering", McGraw Hill.

Reference books:

- L. S. Bobrow, " Fundamentals of Electrical Engineering", Oxford University Press.
- E. Hughes, "Electrical and Electronics Technology", Pearson.
- V. D. Toro, "Electrical Engineering Fundamentals", Prentice Hall India.

Online links for study & reference materials:

https://nptel.ac.in/courses/108/108/108108076/

Assessment method: (Continuous Internal Assessment = 40%, Final Examination = 60%)

Assignment -1	- 05%
Assignment -2	- 05%
Assessment-3(Mid-Exam)	- 20%
Assignment-3/Quiz-1	- 05%
Assignment-4	- 05%
Total Internal Assessment	**- 40%**

Course Code: AECC01 **Course Name:** Environmental Science
Course Credit Hour: 2hr **Total Contact Hour:** 25

Course Objective:

- The Compulsory course on Environmental Science at Undergraduate level (AECCI) aims to train students to cater to the need for ecological citizenship through developing a strong foundation on the critical linkages between ecology-society-economy.

Course Description:

- Graduates will evolve into ecologically informed and socially responsible citizens who are empowered to protect the natural resources while ensuring sustainable lifestyle and developmental model.

Course Contents:

Unit 1: Introduction to Environmental Studies

- Multidisciplinary nature of environmental studies
- Scope and importance; Concept of sustainability and sustainable development

Unit 2:Ecosystem

- Definition and concept of Ecosystem
  Structure of ecosystem (biotic and abiotic components); Functions of Ecosystem
  Physical (energy flow), Biological (food chains, food web, ecological succession) and
  Biogeochemical (nutrient cycling) processes. Concepts of productivity, ecological
  pyramids and homeostasis
- Types of Ecosystem – Tundra, Forest, Grassland, Desert, Aquatic (ponds, streams, lakes, rivers, oceans, estuaries) – their importance and threats on them with relevant examples from India Ecosystem services (Provisioning, Regulating, Cultural and Supporting). Basics of Ecosystem restoration

Unit 3:Natural Resources

- Land resources and landuse change Land degradation, soil erosion and desertification
- Forest resources and causes of deforestation; impacts of mining and dam building on environment, forests, biodiversity and tribal populations
- Water resource: Use and over exploitation of surface and ground water, floods, drought conflicts over water (international & inter-state)
- Energy resources: Renewable and non-renewable energy sources, use of alternate energy sources, growing energy needs
- Case studies: National Solar Mission, Cauvery river water conflict etc

Unit 4:Biodiversity and Conservation

- Definition of Biodiversity; Levels of biological diversity: genetic, species and ecosystem diversity; Biogeographic zones of India
- India as a mega-biodiversity nation; Endemic and endangered species of India; IUCN Red list; biodiversity hotspots
- Value of biodiversity: Ecological, economic, social, ethical, aesthetic and informational value of biodiversity with examples; sacred groves and their importance with example
- Current mass extinction crisis; Threats to biodiversity: Habitat loss, poaching of wildlife, man-wildlife conflicts, biological invasion with emphasis to Indian biodiversity

- Biodiversity conservation strategies: in-situ and ex-situ methods of conservation; Biosphere reserves; Keystone and Flagship species; Species reintroduction and translocation

Unit 5:Environmental pollution

- Environmental pollution (Air, water, soil, thermal and noise): causes, effects and controls; Air and water quality standards
- Nuclear hazards and human health risks
- Solid waste management: Control measures of urban and industrial waste
- Pollution case studies: Ganga Action plan (GAP), Delhi air pollution and public health issues etc

Unit 6:Global Environmental Issues and Policies

- Climate change, Global warming, Ozone layer depletion, Acid rain and impacts on human communities and agriculture
- International agreements: Earth Summit, UNFCCC, Montreal and Kyoto protocols and Convention on Biological Diversity (CBD)
- Sustainable Development Goals and India's National Action Plan on Climate Change Environment legislation in India: Wildlife Protection Act, 1972; Water (Prevention and Control of Pollution) Act, 1974; Forest (Conservation) Act 1980, Air (Prevention & Control of Pollution) Act, 1981; Environment Protection Act, 1986; Scheduled Tribes and other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006

Unit 7:Human Communities and the Environment

- Human population growth: Impacts on environment, human health and welfare
- Resettlement and rehabilitation of project affected persons; case studies
- Disaster management: floods, earthquake, cyclones and landslides
- Environmental movements: Chipko movement, Silent valley movement, Bishnois of Rajasthan, Narmada BachaoAndolanetc
- Environment justice: National Green Tribunal and its importance
- Environmental ethics: Role of Indian and other religions and cultures in environmental conservation
- Environmental communication and public awareness, case studies (e.g., CNG vehicles in Delhi, Swachh Bharat Abhiyan)

Field work/ Practicals

- Field visit to any of the ecosystems found in Delhi like Delhi Ridge/ Sanjay lake/ Yamuna river and its floodplains etc. or any nearby lake or pond, explaining the theoretical aspects taught in the classroom
- Visit to any biodiversity park/ reserve forests/ protected area/ zoo/ nursery/ natural history museum in and around Delhi, explaining the theoretical aspects taught in the classroom
- Visit to a local polluted site (Urban/Rural/Industrial/Agricultural), Wastewater treatment plants
- Study of common plants, insects, birds and basic principles of identification
- Organize a seminar/ conference/ workshop/ panel discussion on relevant topics for enhancing awareness, capacity building and critical reasoning among students

Course Learning Outcomes (CLOs):

The course will empower the undergraduate students by helping them to:

- CLO-1 Gain in-depth knowledge on natural processes that sustain life, and govern economy.
- CLO-2: Predict the consequences of human actions on the web of life, global economyand quality of human life.
- CLO-3: Develop critical thinking for shaping strategies (scientific, social, economic and legal) for environmental protection and conservation of biodiversity, social equity and sustainable development.
- CLO-4: Acquire values and attitudes towards understanding complex environmental-economic social challenges, and participating actively in solving current environmental problems and preventing the future ones..
- CLO-5: Adopt sustainability as a practice in life, society and industry.

Text books:

- William P. Cunningham, Mary Ann Cunningham, Barbara Woodworth Saigo, Environmental Science: A global concern, McGrawHill 2003 ¬
- William Cunningham, Mary Cunningham, Principles of Environmental Science: Seventh Edition, Mc Graw Hill 2014 UGC DOCUMENT ON LOCF ENVIRONMENTAL SCIENCE 24
- Rogers PP, Jalal, KF, Boyd JA, An introduction to sustainable development, Earthscan

Reference books:

- Roosa SA, Sustainable Development Handbook, CRC Press 2008 ¬
- Atkinson G., Dietz S., Neumayer E., Agarwala M, Handbook of Sustainable Development, Edward Elger, 2014 ¬
- Robbins P., Hintz J., Moore S.A., Environment and Society: A critical introduction, Wiley Blackwel 2014

Online links for study & reference materials:

https://www.hzu.edu.in/bed/E%20V%20S.pdf

Assessment method: (Continuous Internal Assessment = 40%, Final Examination = 60%)

Assignment -1	- 05%
Assignment -2	- 05%
Assessment-3(Mid-Exam)	- 20%
Assignment-3/Quiz-1	- 05%
Assignment-4	- 05%
Total Internal Assessment	**- 40%**

LAB EXPERIMENTS
SECOND SEMESTER

Lab Code: BSC101P
Course Credit Hour: 1.5hr

Lab Name: Physics Lab
Total Contact Hour: 03

List of Experiments:

- Four Probe Setup
- Stefan`s Law
- Diode Valve Characteristics
- Frequency of A.C Mains
- Band Gap in a Semi-Conductor Diode
- P-N Junction Diode Characteristics
- Zener Diode Characteristics
- Transistor Common-Base Configuration
- Transistor Common-Emitter Configuration

Lab Code: ESC104P **Lab Name:** Workshop/Manufacturing Practice
Course Credit Hour: 2hr **Total Contact Hour:** 04

List of Experiments:

- Manufacturing Methods- casting, forming, machining, joining, advanced manufacturing Methods
- CNC machining, Additive manufacturing
- Fitting operations & power tools
- Electrical &Electronics
- Carpentry
- Plastic molding, glass cutting
- Metal casting
- Welding (arc welding & gas welding), brazing

Lab Code: ESC101P **Lab Name:** Electrical Engineering Lab
Course Credit Hour: 1hr **Total Contact Hour:** 02

List of Experiments:

- Basic safety precautions. Introduction and use of measuring instruments – pole meter, ammeter, multi-meter, oscilloscope. Real-life resistors, capacitors and inductors.
- To verify KCL and KVL in D.C. circuit
- To verify Superposition theorem
- To Verify The venin's Theorem
- To find resonance in series R-L-C circuit.
- Transformers: Loading of a transformer: measurement of primary and secondary voltages and currents, and power.
- Demonstration of cut-out sections of machines: dc machine (commutator-brush arrangement).
- Torque Speed Characteristic of separately excited dc motor.
- Three-phase induction motors. Direction reversal by change of phase-sequence of connections.
- Demonstration of Components of LT switchgear.