

INSTITUTE OF ENGINEERING AND TECHNOLOGY

DOCTOR HARISINGH GOUR VISHWAVIDYALAYA, SAGAR (M.P.)

470003

(A CENTRAL UNIVERSITY)

NAAC A+ Accreditation

(Approved by AICTE, New Delhi)



**Curriculum Framework & Syllabus
of**

UNDERGRADUATE PROGRAMME

B.Tech. in

COMPUTER SCIENCE AND ENGINEERING

I st Year

(Ist and IInd Semester)

**Courses effective from Academic Session 2024-2025
2024 batch onwards**

Based on

National Educational Policy (NEP) -2020

Date of BoS:

27/09/2024

PREAMBLE

The curriculum of B.Tech. Computer Science and Engineering program is prepared in accordance with the curriculum framework of AICTE. Further this Outcome Based Curriculum (OBC) is designed with Choice Based Credit and Semester System (CBCSS) In addition; the curriculum and syllabi are designed in a structured approach by deploying Feedback Mechanism on Curriculum from various stakeholders viz. Industry, Potential Employers, Alumni, Academia, Professional Bodies, Research Organizations and Parents to capture their voice of the respective stakeholders. The Curriculum design, delivery, and assessment, the three major pillars of academic system is completely aligned in line with Outcome Based Education (OBE) to assess and evaluate the learning outcomes to facilitate the learners to achieve their Professional and Career Accomplishments. The Vision To become the Centre of Excellence for technically competent and innovative computer engineers.

The Mission

- To provide quality education and spread professional & technical knowledge, leading to a career as computer professionals in different domains of industry, governance, and academia
- To provide state-of-the-art environment for learning and practices
- To impart hands on training in latest methodologies and technologies

For Semester I

S.No.	Nature of Courses	Credits
1.	Core Courses	11
2.	Skill Enhancement Courses	3
3.	Basic Science Course	8
Total		22 Credits

For Semester II

S.No.	Nature of Courses	Credits
1.	Core Courses	11
2.	Basic Science Course	8
3.	Laboratory Courses + Internship	04
Total		23 Credits

Scheme of Examination:**(a) Theory Block**

1. Mid exam (internal)	i Mid-I	: 20%
	ii Mid-II (IA) (Assignments, tutorials, regularity, quizzes, class test)	: 20%
2. End Exam (external)	i End-semester examination	: 60%
Total		: 100%

(b) Practical Block

1. Mid exam (internal)	i Mid-I	: 20%
	ii Mid-II (IA) (Lab work, field work/seminar, quizzes, assignments and regularity)	: 20%
2. End Exam (external)	i End-semester examination	: 60%
Total		: 100%

(c) Project Evaluation:

1. Mid exam (internal)	i Mid-I Presentation and evaluation of Synopsis	: 20%
	ii Mid-II (IA) Presentation and evaluation of Progress of work	: 20%
2. End Exam (external)	i End-semester examination	: 60%
	▪ Evaluation of Project	
	▪ Presentation	
	▪ Viva	
Total		: 100%

[A] Assessments:

Internal Assessment (IA):

Each theory course, practical and project must clearly mention the methodology of assessment i.e. assignment, presentation, group discussion etc depending on the number of students in the class and feasibility of adopting a particular methodology. The distribution of marks for internal assessments (IA) shall be as follows;

- | | | | |
|------|---|---|----------|
| (i) | Evaluation of the assignment,
presentation, group discussion etc | : | 10 Marks |
| (ii) | Attendance | : | 10 Marks |

The marks for attendance shall be awarded as follows:

- | | | | |
|-------|---------------------|---|----------|
| (i) | 75 % and Below | : | 00 Mark |
| (ii) | >75 % and upto 85 % | : | 04 Mark |
| (iii) | >85 % and upto 95 % | : | 08 Marks |
| (iv) | >95 % and above | : | 10 Marks |

Choice Based Grading System

Each course (Theory or Practical) is to be assigned 100 marks irrespective of the number of credits, and the mapping of marks to grades may be done as per the following table:

Range of Marks	Assigned Grade
91-100	A+
81-90	A
71-80	B+
61-70	B
51-60	C+
46-50	C
40-45	D
<40	F

The Semester Grade Point Average (SGPA) and Cumulative Grade Point Average (CGPA) shall be calculated as under.

$$SGPA = \frac{\sum_{i=1}^n C_i P_i}{\sum_{i=1}^n C_i}$$

Where C, is the number of Credits assigned for the i subject of a Semester, p_i the grade point earned in that 1th subject, where i = 1, 2 n. is the number of subjects in that semester for which SGPA is to be calculated.

here NC_j is the number of total Credits assigned for the Jth semester. SG_j is the SGPA earned in the Jth

$$CGPA = \frac{\sum_{j=1}^m SG_j NC_j}{\sum_{j=1}^m NC_j}$$

semester, where j = 1,2 ,m, is the number of semesters till which CGPA is being calculated.

Credits earned through MOOCS shall not be included in SGPA/CGPA calculations.

AWARD OF DIVISION

Division shall be awarded only after successful completion of the course, on the basis of integrated performance of the candidate in all the four years as per following details:

CGPA Score	Divisions
CGPA > 7.5	First Division with Distinction
7.5 > CGPA > 6.5	First Division
6.5 > CGPA > 5.0	Second Division

The conversion from grade to an equivalent percentage shall be according to the following formula:

Percentage marks scored = CGPA obtained X 10

- The introductory note must also mention that to be eligible to appear in End Semester Examination a student must appear in Mid Semester Examination and internal Assessment.*
- Attendance: 75 % attendance in a course is mandatory for a student to appear in end semester examination. Minimum passing marks for internal and external exams 40% individually.*

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(A CENTRAL UNIVERSITY)
New Scheme Based on AICTE Flexible Curriculum

B.Tech. Programme in
Computer Science and Engineering
Course structure

Semester- I

S.No	Category	Subject Code	Subject Name	hours			
				L	T	P	C
1	BSC	BTC BSC 101	Engineering Mathematics-I	3	1	0	4
2	BSC	BTC BSC 102	Engineering Chemistry	3	1	0	4
3	ESC	BTC ESC 103	Basic Electronics and Electrical Engineering	3	1	0	4
4	HSMC	BTC HSM 104	Technical English for communication	3	0	0	3
5	ESC	BTC ESC 105	Basic Mechanical Engineering	3	1	0	4
6	ESC	BTC ESC 106	Manufacturing Practices	0	0	2	1
7	INT	BTC INT 107	Internship-I at the Institute level/Swachh Bharat Summer Internship Unnat Bharat Abhiyan/Rural Outreach (Skill)	0	0	4	2
TOTAL				15	4	6	22

- MST – Engineering Mathematics
 - CHY – Engineering Chemistry
 - ECE – Electronics and Communication Engineering
 - MEC- Mechanical Engineering
 - HSMC – Humanities and Social including Management courses
 - INT - Internship
- BSC- Basic Science Courses
ESC – Engineering Science Courses
P - Practical

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Semester- II

S.No	Category	Subject Code	Subject Name	hours			
				L	T	P	C
1	BSC	BTC BSC 201	Engineering Mathematics-II	3	1	0	4
2	BSC	BTC BSC 202	Engineering Physics	3	1	0	4
3	ESC	BTC ESC 203	Object Oriented Programming & Methodology	3	1	0	4
4	ESC	BTC ESC 204	Engineering Graphics	3	0	0	3
5	ESC	BTC ESC 205	Basic Civil Engineering and Mechanics	3	1	0	4
6	LC	BTC LC 206	Object Oriented Programming & Methodology Lab	0	0	4	2
7	INT	BTC INT 207	Internship-II at the Institute level Swachh Bharat Summer Internship Unnat Bharat Abhiyan/Rural Outreach (Skill)	0	0	4	2
TOTAL				15	4	8	23

- MST – Engineering Mathematics
- PHY – Engineering Physics
- CSE – Computer Science Engineering
- MEC- Mechanical Engineering
- INT – Internship
- CEC – Civil Engineering

BSC- Basic Science Courses
 ESC – Engineering Science Courses
 P - Practical

First Semester (1st Semester)

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B.Tech. First Year (I semester)
Category- Basic Science Course BSC

Course Category	Course Code	Course Title	L	T	P	C	Sessional		ESE	Total
							Mid I	Mid II (IA)		
BSC	BTC BSC 101	Engineering Mathematics -I	3	1	0	4	20	20	60	100

Course Objectives:

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. More precisely, the objectives are:

- To introduce the idea of applying differential and integral calculus to notions of curvature and to improper integrals. Apart from some applications it gives a basic introduction on Beta and Gamma functions.
- To introduce the fallouts of Rolle's Theorem that is fundamental to application of analysis to Engineering problems.
- To deal with the nature of sequence and series that is essential in most branches of engineering.
- To familiarize the student with functions of several variables that is essential in most branches of engineering.
- To develop the essential tool of matrices and linear algebra in a comprehensive manner.

Unit Learning Outcomes

Upon successful completion of the course,

UO1:	In this unit students are able to understand various theorem, series of calculus including partial differentiation.
UO2:	In this unit students are able to understand definite integrals and multilevel integrals with its application
UO3:	In this unit students are able to understand various series and sequences with their proofs.
UO4:	In this unit students are able to understand vector space and various transforms.
UO5:	In this unit students are able to understand matrix and its applications

UNIT 1:

Calculus: Rolle's theorem, Mean Value theorems, Expansion of functions by Mc. Laurin's and

Taylor's for one variable; Taylor's theorem for function of two variables, Partial Differentiation, Eulers theorem on homogenous functions, Maxima & Minima (two and three variables)

UNIT 2:

Calculus: Definite Integral as a limit of a sum and Its application in summation of series; Beta and Gamma functions and their properties; Applications of definite integrals to evaluate surface areas and volumes of revolutions. Multiple Integral, Change the order of the integration,

UNIT 3:

Sequences and series: Convergence of sequence, Introduction of Arithmetic and Geometric Series, Convergence and divergence, Comparison Test(Without Proof), D' Alembert's Ratio Test(Without Proof), Cauchy RootTest(Without Proof), Alternating Series, Leibnitz Test(Without Proof), Absolute and Conditional Convergence,

UNIT 4:

Vector Spaces: Vector Space, Vector Sub Space, Linear Combination of Vectors, Linearly Dependent, Linearly Independent, Basis of a Vector Space, Linear Transformations.

UNIT 5:

Matrices: Rank of a Matrix, Solution of Simultaneous Linear Equations by Elementary Transformation, Consistency of Equation, Eigen Values and Eigen Vectors, Diagonalization of Matrices, Cayley-Hamilton theorem and its applications to find the inverse.

Text Books:

1. G.B. Thomas and R.L. Finney, Calculus and Analytic geometry (9th Edition), Pearson, Reprint, 2002.
2. Erwin kreyszig, Advanced Engineering Mathematics (9th Edition), John Wiley & Sons, 2006.
3. Veerarajan T., Engineering Mathematics for first year, Tata McGraw-Hill, New Delhi, 2008.
4. Stephen H. Friedberg, Arnold J. Insel, Lawrence E. Spence, Linear Algebra (4th Edition), Prentice- Hall of India Pvt. Ltd., New Delhi, 2004.

Reference Books:

1. N. P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications.
2. Gorakh Prasad. Differential Calculus (19th Edition). Pothishala Pvt. Ltd., 2016.
3. A.R.Vasishtha and A.K. Vasishtha, Matrices(4th Edition), Krishna Prakashan Media(P) Ltd.
4. Ramana B.V., Higher Engineering Mathematics, Tata McGraw Hill New Delhi, 11th Reprint, 2010.
5. A.R.Vasishtha and J.N. Sharma, Linear Algebra (8th Edition), Krishna Prakashan Media(P) Ltd.

E-material

<https://archive.nptel.ac.in/courses/111/105/111105121/>

Evaluation: Evaluation will be continuous and integral part of the class followed by final examination.

Essential- Students can use simple calculator (without memory) and log table in internal as well as end sem exam in this paper.

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B.Tech. First Year (I semester)
Category- Basic Science Course BSC

Course Category	Course Code	Course Title	L	T	P	C	Sessional		ESE	Total
							Mid I	Mid II (IA)		
BSC	BTC BSC 102	Engineering Chemistry	3	1	0	4	20	20	60	100

Course Objectives:

The objective of the Engineering Chemistry is to acquaint the students with the basic phenomenon/concepts of chemistry, the student face during course of their study in the industry and Engineering field. The student with the knowledge of the basic chemistry will understand and explain scientifically the various chemistry related problems in the industry/engineering field. The student will able to understand the new developments and break through efficiently in engineering and technology. The introduction of the latest (R&D oriented) topics will make the engineering student upgraded with the new technologies.

Unit Learning Outcomes

Upon successful completion of the course

UO1:	- Understand the hardness of water, types and its estimation with experimental methods. - Gain basic knowledge of water analysis and suitable water treatment method. - Analyze the common boiler problems and their remedies - Understand different Water softening techniques.
UO2:	- Gain the basic knowledge of common Fuels, Classification of Fuels and combustion process. - Collect the information of different refractory material and their applications. - Have the knowledge of Cement, its composition and applications.
UO3:	- Know about different types of lubricating materials. - Gain the basic knowledge of different lubrication mechanisms. - Analyze the effects of corrosion and protection methods will help the young minds to choose proper metal / alloys and also to create a design that has good corrosion control.
UO4:	- The study of polymer chemistry will give an idea of polymers to be used in engineering applications. - Understand the classification of polymers on the basis of different categories and analyze different categories of polymers. - Gain the knowledge of different mechanisms of polymerization. - Explain the applications of polymers in daily life as well as in engineering field.
UO5:	- Have the fundamental knowledge of different spectroscopic techniques and applications - Explain the concept of atomic and molecular spectroscopy - Understand the concept of Phase rule and its applications. - Analyze the one component system and binary system.

Unit 1: Water – Analysis, Treatments and Industrial Applications

Sources, Impurities, Hardness & its units, Determination of hardness by EDTA method, Alkalinity & Its determination and related numerical problems. Boiler troubles (Sludge & Scale, Priming & Foaming, Boiler Corrosion, Caustic Embrittlement), Softening methods (Lime-Soda, Zeolite and Ion Exchange Methods) and related numerical problems.

Unit- 2 Fuels and Combustion, Cement and Refractories

Classification of Fuels, Calorific Value, Analysis of coal, Carbonization, cracking, Knocking, Octane number, Cetane number, Combustion and related numerical, Composition and properties of Cement, Classification, Properties and uses of commercial refractories.

Unit- 3: Lubricants and Lubrication

Introduction, Mechanism of lubrication, Classification of lubricants, significance & determination of Viscosity and Viscosity Index, Flash & Fire Points, Cloud & Pour Points, Aniline Point, Acid Number, Saponification Number, Steam Emulsification Number and related numerical problems.

Unit- 4**Polymer & polymerization**

Introduction, types of polymerizations, Classification, mechanism of polymerization (Free radical & Ionic polymerization). Thermoplastic & Thermosetting polymers Elementary idea of Biodegradable polymers, preparation, properties & uses of the following polymers- PVC, PMMA, Teflon, Nylon 6, Nylon 6:6, Polyester phenol formaldehyde, Urea- Formaldehyde, Buna N, Buna S, Vulcanization of Rubber.

Unit-5**Phase equilibrium, Corrosion, Spectroscopic Techniques and Application**

Phase diagram of single component system (Water) Phase diagram of binary Eutectic System (Cu-Ag.) Corrosion: Types, Mechanisms & prevention. Principle, Instrumentation & Applications of Electronic spectroscopy, Vibrational & Rotational Spectroscopy of diatomic molecules.

List of experiments/demonstrations:

NOTE: At least 8 of the following core experiments must be performed during the session.

Water testing

- Determination of Total hardness by Complexometric titration method.
- Determination of mixed alkalinity (a) OH & CO₃ (b) CO₃ & HCO₃
- Chloride ion estimation by Argentometric method.

Fuels & Lubricant testing

- Flash & fire points determination by (a) Pensky Martin Apparatus (b) Abel's Apparatus (c) Cleveland's open cup Apparatus
- Calorific value by bomb calorimeter.
- Steam emulsification No & Aniline point determination.
- Cloud and Pour point determination of lubricating oil.
- Viscosity and Viscosity index determination by Redwood viscometer.
- Determination the moisture content of coal.

Alloy Analysis

- Determination of percentage of Fe in an iron alloy by redox titration using N-Phenyl anthranilic acid as internal indicator.
- Determination of Cu and or Cr in alloy by Iodometric Titration.
- Determination of % purity of Ferrous Ammonium Sulphate & Copper Sulphate.

Essential Readings (Text Books)

- Engineering Chemistry – B.K. Sharma, Krishna Prakashan Media (P) Ltd., Meerut.
- Basics of Engineering Chemistry – S.S. Dara & A.K. Singh, S. Chand & Company Ltd., Delhi.
- A. Gowarikar, Text Book of Polymer Science, 2002
- Applied Chemistry – Theory and Practice, O.P. Viramani, A.K. Narula, New Age International Pvt. Ltd. Publishers, New Delhi.
- Text Book of Engineering Chemistry, Murthy, Agarwal & Naidu, BSP, 2003.
- A Text Book of Engineering Chemistry - Shashi Chawla
- Fundamental of Molecular Spectroscopy C.N. Banwell, McGraw Hill Education
- A 1. Vogel, A text book of Qualitative Inorganic Analysis, ELBS, London, 2004

Suggested Readings (Reference Books)

- B. K. Sharma, Engineering chemistry, Krishna Prakasam Media (P) Ltd., 2003
- Engineering Chemistry by Shikha Agarwal; Cambridge University Press, 2015 edition.
- Kuriacose & Rajaram, Vols. 1 & 2, Chemistry in Engineering and Technology, 2004
- Engineering Chemistry II, S. Sumathi and P.S. Raghavan, Dhanam Publications, 2008.
- Puri, Sharma and Pathania, Principles of Physical Chemistry, Vishal Publishing, Jalandhar, 2004.

E-material

<https://nptel.ac.in/courses/116102010>

<https://collegeacademy.in/Years/FirstYear.html>

<https://www.rgpvnotes.in/btech/grading-system-old/notes/2018/12/engineering-chemistry-bt-101>

Course outcomes

The final outcome of the subject will enable the student to understanding the basic concepts of Engineering Chemistry. They will understand the importance of engineering chemistry for industrial and domestic use and basic knowledge of material selection and the techniques for material analysis and also gain the knowledge of green chemical technology and its applications

Evaluation: Evaluation will be continuous and integral part of the class followed by final examination.

Essential- Students can use scientific calculator (without memory) in internal as well as end sem exam in this paper.

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B.Tech. First Year (I semester)
Category- Engineering Science Course ESC

Course Category	Course Code	Course Title	L	T	P	C	Sessional		ESE	Total
							Mid I	Mid II (IA)		
ESC	BTC ESC 103	Basic Electronics and Electrical Engineering	3	1	0	4	20	20	60	100

Course Objectives:

Electronics and Communications Engineering (ECE) involves researching, designing, developing, and testing electronic equipment used in various systems. Electronics and Communications engineers also conceptualize and oversee the manufacturing of communications and broadcast systems. This stream of engineering deals with analog transmission, basic electronics, microprocessors, solid-state devices, digital and analog communication, analog integrated circuits, microwave engineering, satellite communication, antennae, and wave progression. It also deals with the manufacturing of electronic devices, circuits, and communications equipment.

Unit Learning Outcomes

Upon successful completion of the course,

UO1:	- Analyze and solve DC circuits using Ohms law, Kirchhoff's law and voltage and current division methods. - Calculate power, energy, and efficiency in DC circuits. - Design and analyze simple resistive networks and voltage dividers. - Understand the basic theorems and conversion techniques.
UO2:	- Analyze and solve AC circuits using phasor notation, impedance, and complex numbers. Apply concepts of series and parallel AC circuits, including resonance and impedance matching. - Calculate power, power factor, and reactive power in AC circuits. - Understand the behavior of capacitors and inductors in AC circuits.
UO3:	- Describe the working principles and applications of electric machines (motors and generators). - Understand the basic concepts of power generation, transmission, and distribution. - Analyze single-phase and three-phase AC power systems. - Calculate power factor correction and perform power system analysis.
UO4:	- Explain the working principles of diodes, transistors, and operational amplifiers. - Analyze diode circuits, including rectifiers, clippers, and voltage multipliers. - Understand the biasing and operation of different transistor configurations (common emitter, common base, common collector). - Design and analyze basic amplifier circuits using transistors. - Understand binary number systems, logic gates, and Boolean algebra. - Analyze and design combinational and sequential logic circuits. - Explain the concept of memory elements, such as flip-flops and registers.
UO5:	- Understand the basic principles and characteristics of operational amplifiers (op-amps). - Identify the different types of op-amps and their packages. - Analyze and design inverting and non-inverting amplifier circuits using op-amps.

- | |
|---|
| <ul style="list-style-type: none"> ▪ Understand the concept of virtual ground and its application in op-amp circuits. ▪ Design and analyze voltage follower, summing amplifier, difference amplifier, and integrator circuits. ▪ Explain the concept of frequency response and bandwidth in op-amp circuits. |
|---|

Unit- 1

D.C. Circuits: Voltage and current sources, dependent and independent sources, Units and dimensions, Source Conversion, Ohm's Law, Kirchhoff's Law, Superposition theorem, Thevenin's theorem and their application for analysis of series and parallel resistive circuits excited by independent voltage sources, Power & Energy in such circuits. Mesh & nodal analysis, Star Delta transformation & circuits.

Unit- 2

1- phase AC Circuits: Generation of sinusoidal AC voltage, definition of average value, R.M.S. value, form factor and peak factor of AC quantity, Concept of phasor, Concept of Power factor, Concept of impedance and admittance, Active, reactive and apparent power, analysis of R-L, R-C, R-L-C series & parallel circuit

3-phase AC Circuits: Necessity and advantages of three phase systems, Meaning of Phase sequence, balanced and unbalanced supply and loads. Relationship between line and phase values for balanced star and delta connections. Power in balanced & unbalanced three-phase system and their measurements.

Unit- 3

Magnetic Circuits: Basic definitions, magnetization characteristics of Ferro magnetic materials, self-inductance and mutual inductance, energy in linear magnetic systems, coils connected in series, AC excitation in magnetic circuits, magnetic field produced by current carrying conductor, Force on a current carrying conductor. Induced voltage, laws of electromagnetic Induction, direction of induced E.M.F.

Machines: Construction, Classification & Working Principle of DC machine, induction machine and synchronous machine. Working principle of 3-Phase induction motor, Concept of slip in 3-Phase induction motor. Applications of DC machine, induction machine and synchronous machine.

Unit- 4

Transistors: Introduction to Semiconductors, Diodes, V-I characteristics.

BJT- Construction, biasing and operation in active region, JFET- Construction and biasing, JFET Characteristics, MOSFET: Depletion and Enhancement type MOSFET, **Basic Electronics:** Number systems & Their conversion used in digital electronics, De morgan's theorem, Logic Gates, half and full adder circuits, R-S flip flop, J-K flip flop.

Unit-5:

Operational Amplifiers: Differential Amplifier: DC and AC analysis, CMRR Inverting and Non-inverting, Block Diagram of operational amplifier, Operational amplifiers with negative feedback: Voltage Series and Voltage shunt. Basic comparator, fixed voltage regulator and Adjustable regulator.

List of experiments/demonstrations:

- Verification of truth table for various gates,
- Verification of truth table for RS, JK, Master Slave Flip-Flops.
- Realizations of Various gates, Flip-Flops etc.
- Verification of De morgan's theorems.
- Realization of Half Adder and Full Adder
- Study of V-I Characteristics of Diodes.
- Applications of Diodes and their verification.
- Transistor applications as amplifier and switch.
- Basic Characteristics of JFET
- Basic Characteristics of MOSFET
- Measuring the steady-state and transient time-response of R-L, R-C, and R-L-C circuits to a step change in voltage (transient may be observed on a storage oscilloscope). Sinusoidal steady state response of R-L, and R-C circuits – impedance calculation and verification. Observation of phase differences between current and voltage. Resonance in R-L-C circuits.
- Verification of Thevenin and superposition theorem.
- Basic safety precautions. Introduction and use of measuring instruments – voltmeter, ammeter, multi-meter, oscilloscope. Real-life resistors, capacitors and inductors.

Essential Readings (Text Books)

1. Sahdev Chaturvedi, Electrical and Electronics Engineering, Dhanpat Rai & Co., latest edition
2. Electronic Devices and Circuit Theory" by Robert L. Boylestad and Louis Nashelsky
3. Sanjay Sharma, Electronics Devices and Circuits, S. K. Kataria and Sons Publisher
4. "Microelectronic Circuits" by Adel S. Sedra and Kenneth C. Smith, Oxford University Press

Suggested Readings (Reference Books)

1. D.P. Kothari & I.J. Nagrath, Basic Electrical Engineering, Tata McGraw Hill, latest edition.
2. Ramakant A. Gayakwad, Op-Amps and Linear Integrated Circuits | Fourth Edition | Pearson
3. V.K. Mehta, Principles of Electronics, S. Chand Publication.
4. S.N. Singh, Basic Electrical Engineering, P.H.I., 2013
5. B.L. Theraja and A.K. Theraja, Text book of Electrical Technology- S. Chand Publication.
6. G.K. Mithal, Network Analysis, Khanna Publishers

E-material

<https://archive.nptel.ac.in/courses/108/108/108108076/>

<https://www.ncertbooks.guru/basic-electrical-and-electronics-engineering/amp/>

<https://easyengineering.net/be3251-basic-electrical-and-electronics-engineering-notes/>

Course outcomes:

The final outcome of the subject will result into an enhancement in understanding the basic concepts of Core Electrical Engineering subjects. The topics covered under this subject will help to enhance the basic understanding of Electrical machines and power systems and basic electronics. **Evaluation:** Evaluation will be continuous and integral part of the class followed by final examination.

Essential- Students can use scientific calculator (without memory) in internal as well as end sem exam in this paper

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Category- Humanities and Social Sciences including Management
 courses **HSMC**

Course Category	Course Code	Course Title	L	T	P	C	Sessional		ESE	Total
							Mid I	Mid II (IA)		
HSM	BTC HSM 104	Technical English for communication	3	0	0	3	20	20	60	100

Course Objectives:

The objective of this course is to enable the students to recognize the relationship of effective communication skills to succeed in academic, work and social environments and to develop both written and oral communication skills to comprehend and produce clear, complete and accurate messages. This course also intends to impart business correspondence and improve English phonetics enabling the students to speak and write English correctly and with confidence.

Unit Learning Outcomes

Upon successful completion of the course,

UO1:	▪ Learning about the usage of important concepts of communication in order to develop proficient exchange of information
UO2:	▪ Developing morphological approach to understand the vocabulary and enhance comprehensive ability.
UO3:	▪ Learning the formal report making skills.
UO4:	▪ Develop professional communicative soft skills required for presentation and communicating in a professional work space
UO5:	▪ Learning to excel business communication through written formats of documents.

Unit-1

Communication Skills (i) Meaning & Process (ii) Significance of Effective communication. (iii) Presentation Strategies: Techniques of Oral Presentations, Defining the Purpose, Analyzing the Audience, Medium and Levels of Communication) and Grapevine Communication, Verbal and Nonverbal Communication; Barriers to Communication.

Unit-2

Introduction to Language & Linguistics: Reading and Comprehension, Essay Writing and Precis, Application of Linguistic Ability and Phonetics, English IPA (Types of speech sounds),

Monophthongs, Diphthongs and Consonants.

Unit-3

Academic Writing and Technical Report Writing: (i) Introduction to Technical and Academic Writing (ii) Features & Principles of Technical Report (iii) Structure & Format of Technical Report (iv) Samples & Models for practice, Features of writing a good Report2

Unit-4

Speaking: Making Speeches, Power Point Presentation, Group Discussion, Meeting, Interview, Debate

Unit-5

Business Correspondence: (i) Business letters (ii) Structure & Layout of Business letters – Standard Fully Block Style (iii) Types of Letters: Job Application and other Business letters (letters of enquiry, Quotations etc) (iv) E-Mail writing, v) Technical Descriptions of Simple Engineering Objects; Formal (Application, CV).

Text Books:

1. 'Technical Communication: Principles and practice' , Meenakshi Raman and Sangeeta Sharma (Oxford)
2. 'Effective Business Communication', Krizan and merrier (Cengage learning)
3. 'Communication Skill, Sanjay Kumar and pushlata, OUP 2011
4. "Practical English Usage Michael Swan OUP, 1995.
5. "Exercises in spoken English Parts I-III EFLU, Hyderabad, Oxford University Press

Reference Books:

1. Lesikar, Petlit, and Flatley, Lesikar's Basic Business Communication, New Delhi: Tata McGrawHill, 1999.
2. Bhatia, R.C., Business Communication, New Delhi: Ane Books Pvt. Ltd., 2012.
3. Magan, Sangeeta, Business Communication, New Delhi: Biztantra Publications, 2010

Course outcomes:

- The student will acquire basic proficiency in English including reading and listening comprehension, writing and speaking skills.
- It will help the students:
- To develop the communication skills and soft skills of the students.
- To enhance the ability of the students to participate in group discussions and personal interviews.

Evaluation: Evaluation will be continuous and integral part of the class followed by final examination.

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New Scheme Based on AICTE Flexible Curriculum

B.Tech. First Year (I semester)
Category- Engineering Science Courses ESC

Course Category	Course Code	Course Title	L	T	P	C	Sessional		ESE	Total
							Mid I	Mid II (IA)		
ESC	BTC ESC 105	Basic Mechanical Engineering	3	1	0	4	20	20	60	100

Course Objectives:

Basic Mechanical Engineering (MEC) involves an ability to design and conduct experiments, an ability to function on multi-disciplinary teams as well as to analyze and interpret data, a knowledge of science and engineering designing, developing, and material testing mechanical equipment used in various systems. This stream of engineering deals with analog mechanical properties of the materials, classification of the engineering materials, thermodynamic laws, best fuel and lubrication selection, gas laws, generate steam as per required application and select boilers as per required working condition, Internal combustion engine working principle in practical application.

Unit Learning Outcomes

Upon successful completion of the course,

UO1:	Understand the basics of Engineering Materials (its applications) and Stress-Strain To impart a fundamental knowledge of Ferrous & Non-Ferrous Metal. Selection and application of different Metals & Alloys Differentiate properties of engineering materials and its industrial applications.
UO2:	Understand basics of measurements and manufacturing Learn about the mechanism of different machines and its applications. Understand the behavior production processes and their use.
UO3:	Identify the applications of fluid concepts. To learn fluid properties, types of fluid and to apply this knowledge for understand of static fluid behavior. Differentiate between various turbines and its principle. Understand mechanics of various pumps and its characteristics
UO4:	Basic understanding thermodynamics and its application To know and learn thermodynamic properties and laws in practical engineering application.
UO5:	Basic understanding of engines and latest automobile technologies. To select Internal Combustion engine (petrol and Diesel engine) as per function and power requirement.

Unit 1

Materials: Introduction, Classification of Engineering Material, Composition of Cast iron and Carbon steels, Iron Carbon diagram. Alloy, their applications.

Mechanical properties: like strength, hardness, toughness, ductility, brittleness, etc. of materials, Stress- Strain diagram of ductile and brittle materials, Hooks law and modulus of elasticity.

Unit 2

Measurement: General measurement, Types of measurements, Accuracy & Precision, Factors affecting the accuracy of measuring system, Errors- Types of Errors, Vernier caliper.

Production Engineering: Elementary theoretical aspects of production processes like Fitting, carpentry, welding etc. Introduction to Lathe and their various operations.

Unit 3

Fluids: Introduction, Fluid properties pressure, Types of pressure, Density, and Viscosity etc. Newton's law of viscosity, Types of fluids, Types of fluid flow, Pascal's law, Hydrostatic law, Bernoulli's equation for incompressible fluids. **Introduction to Turbine and Pump.**

Unit 4

Thermodynamics: Introduction to Thermodynamics, Thermodynamic System, Properties, State, Equilibrium, Process, Gas laws, Ideal Gas, Thermodynamic processes at constant pressure, volume, Temperature, Zeroth, First and second law of thermodynamics, Basics of Heat engine, Refrigerator & Heat pump, **Definition of Entropy.**

Unit 5

Air standard cycles & Engines: Introduction and Assumptions for Air standard cycles, Cycles like - Carnot, Otto, Diesel, P-V & T-S diagrams and its efficiency, Mean Effective Pressure. Introduction and Working principal of two stroke & four stroke Petrol & Diesel engines and their comparisons.

List of experiments/demonstrations:

- Study of Universal Testing machines.
- Study of measurement and types.
- Study of Lathe Machine.
- Verification of Bernoulli's Theorem.
- Study of different Air Standard Cycles.
- Study of different IC Engines.

Essential Readings (Text Books)

1. Jain Vineet, "Basics of Mechanical Engineering", 2nd Edition, Dhanpat Rai Publications, 2016
2. Kumar Parvin, "Basic Mechanical Engineering", 1st Edition, Pearson Education India, 2013
3. Elements of Mechanical Engineering by R. K. Rajput, Laxmi Publications (P) Ltd., New Delhi
4. Engineering Thermodynamics by P. K. Nag, Tata McGraw-Hill Publishing Company Ltd., New Delhi.
5. Workshop Technology by S. K. Garg, Laxmi Publications (P) Ltd., New Delhi.
6. Elements of Mechanical Engineering by K.P. Roy and Prof. S.K. Hajra Chaudhary, MediaPromoters, and publishers Pvt. Ltd. Bombay
7. Elements of Mechanical Engineering by Sadhu Singh S. Chand Publication.

Suggested Readings (Reference Books)

1. Rizza Robert, "Introduction to Mechanical Engineering", Person, 2001
2. Workshop Technology by Hajara & Chaudhary.
3. Kothandaraman & Rudra Moorthy, Fluid Mechanics & Machinery, New Age.
4. Ganesan, Internal Combustion Engines, TMH.
5. Agrawal CM, Basic Mechanical Engineering, Wiley Publication.
6. Fundamental of Mechanical Engineering by G.S. Sawhney, PHI Publication

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- https://www.technicalsymposium.com/alllecturenotes_mech.html#.XPYtgtR95nI
- https://onlinecourses.nptel.ac.in/noc24_me104/preview
- <https://nptel.ac.in/courses/112107216/6>
- <https://archive.nptel.ac.in/courses/112/106/112106310/>
- <https://nptel.ac.in/courses/112104118>
- <https://archive.nptel.ac.in/courses/112/105/112105269/>

Course outcomes:

The final outcome of the subject will result into an enhancement in understanding the basic concepts of Core Mechanical Engineering subjects. The topics covered under this subject will help to enhance the basic understanding of Mechanical machines, material selection and basic mechanical material, thermal and fluid properties.

Evaluation: Evaluation will be continuous and integral part of the class followed by final examination.

Essential: In both the internal exam and the end-of-semester exam, students can use **the scientific calculator** (without memory).

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New Scheme Based on AICTE Flexible Curriculum

B.Tech. First Year (I semester)

Category- Laboratory Courses LC

Course Category	Course Code	Course Title	L	T	P	C	Sessional		ESE	Total
							Mid I	Mid II (IA)		
LC	BTC LC 106	Manufacturing Practices	0	0	2	1	20	20	60	100

Course Objectives:

Manufacturing is fundamental to the development of any engineering product. The course on Engineering Workshop Practice is intended to expose engineering students to different types of manufacturing/fabrication processes, dealing with different materials such as metals, ceramics, plastics, wood, glass etc. While the actual practice of fabrication techniques is given more weightage, some lectures and video clips available on different methods of manufacturing are also included.

Unit Learning Outcomes

Upon successful completion of the course,

Course Outcomes	▪ At the end of this course, students will demonstrate the ability to Understanding different manufacturing techniques and their relative advantages/ disadvantages with respect to different applications. ▪ Selection of a suitable technique for meeting a specific fabrication need. ▪ Acquire a minimum practical skill with respect to the different manufacturing methods and develop the confidence to design & fabricate small components for their project work and to participate in various national and international technical competitions. ▪ Introduction to different manufacturing methods in different fields of engineering. ▪ Practical exposure to different fabrication techniques. ▪ Creation of simple components using different materials. ▪ Exposure to some of the advanced and latest manufacturing techniques being employed in the industry.
Laboratory Outcomes	▪ Upon completion of this laboratory course, students will be able to fabricate components with their own hands. ▪ They will also get practical knowledge of the dimensional accuracies and dimensional tolerances possible with different manufacturing processes. ▪ By assembling different components, they will be able to produce small devices of their interest.

Course Contents:**Lectures & videos:**

1. Manufacturing Methods-casting, forming, machining, joining, advanced manufacturing methods
2. Fitting operations & power tools
3. Electrical & Electronics
4. Carpentry
5. Plastic moulding, glass cutting
6. Metal casting
7. Welding (arc welding & gas welding),

List of experiments/demonstrations:**Workshop Practice:**

1. Machine shop
2. Fitting shop
3. Carpentry
4. Welding shop
5. Smithy

Essential Readings (Text Books)

1. Anderson and Tetro; Shop Theory; Mc Graw Hills
2. Kaushish JP; Manufacturing Processes; PHI Learning.
3. Kalpakjian Producing Engineering PEARSON Education
4. Chapman; Workshop Technology
5. Philip F Ostwald; Manufacturing Process & systems: John Wiley
6. Raghuvanshi; Workshop Technology; Dhanpat Rai.

Suggested Readings (Reference Books)

1. Bawa HS; Workshop Practice, TMH
2. Rao PN; Manufacturing Technology- Vol.1& 2, TMH
3. John KC; Mechanical workshop practice; PHI
4. Hazara Choudhary; Workshop Practices-Vol.I& II.
- 5 Jain. R.K. Production Technology

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- [Fundamentals of manufacturing processes - Course \(nptel.ac.in\)](https://nptel.ac.in/courses/2019Fall/112101001/)
- [NPTEL :: Mechanical Engineering - NOC: Fundamentals of manufacturing processes](https://nptel.ac.in/courses/2019Fall/112101001/)

Course outcomes:

The final outcome of the subject will result into an enhancement in understanding the basic concepts of manufacturing of the products. The topics covered under this subject will help to enhance the basic concepts of workshop processes, understand various formation equipment and how it is applied on various engineering application, learn about the mechanism of different machines and its applications, understand the behavior of foundry, carpentry tools and their use.

Evaluation: Evaluation will be continuous and integral part of the class followed by final examination.

Essential: In both the internal exam and the end-of-semester exam, students can use the **scientific calculator (without memory)**

Second Semester (2nd Semester)

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New Scheme Based on AICTE Flexible Curriculum

B.Tech. First Year (II semester)
Category- Basic Science Course BSC

Course Category	Course Code	Course Title	L	T	P	C	Sessional		ESE	Total
							Mid I	Mid II (IA)		
BSC	BTC BSC 201	Engineering Mathematics - II	3	1	0	4	20	20	60	100

Course Objectives:

OBJECTIVES: The objective of this course is to familiarize the prospective engineers with techniques in Ordinary and partial differential equations, complex variables and vector calculus. It aims to equip the students to deal with advanced level of mathematics and applications that would be essential for their disciplines. More precisely, the objectives are:

1. To introduce effective mathematical tools for the solutions of ordinary and partial differential equations that model physical processes.
2. To introduce the tools of differentiation and integration of functions of complex variable that are used in various techniques dealing engineering problems.
3. To acquaint the student with mathematical tools available in vector calculus needed various field of science and engineering.

Unit Learning Outcomes

Upon successful completion of the course,

UO1:	Students should able to understand first order differential equation and its application
UO2:	Students should able to understand second order differential equation with variable coefficients
UO3:	Students should able to understand linear and non linear partial differential equations.
UO4:	Students should able to understand Analytic Functions, Harmonic Conjugate, Cauchy-Riemann Equations, Residue Theorem and its application.
UO5:	Students should able to understand Vectors, Gradient, Divergence and Curl, Line Integral, Surface Integral and Volume Integral and its theorem

UNIT 1:

Ordinary Differential Equations I: Differential Equations of First Order and First Degree (Leibnitz linear, Bernoulli's, Exact), Differential Equations of First Order and Higher Degree, Higher order differential equations with constants coefficients, Homogeneous Linear Differential equations,

UNIT 2:

Ordinary Differential Equations II: Second order linear differential equations with variable coefficients, Method of variation of parameters, Power series solutions; Legendre polynomials, Bessel functions of the first kind and their properties.

UNIT 3:

Partial Differential Equations: Formulation of Partial Differential Equations, Linear and Non-Linear Partial Differential Equations, Homogeneous Linear Partial Differential Equations with Constants Coefficients.

UNIT 4:

Functions of Complex Variable: Functions of Complex Variables: Analytic Functions, Harmonic Conjugate, Cauchy-Riemann Equations (without proof), Line Integral, Cauchy-Goursat theorem (without proof), Cauchy Integral formula (without proof), Singular Points, Poles & Residues, Residue Theorem, Application of Residues theorem for Evaluation of Real Integral (Unit Circle).

UNIT 5:

Vector Calculus: Differentiation of Vectors, Scalar and vector point function, Gradient, Geometrical meaning of gradient, Directional Derivative, Divergence and Curl, Gauss Divergence theorem (without proof), Stokes theorem (without proof) and Green's theorem (without proof)

Text Books:

1. S. L. Ross, Differential Equations (3rd Edition), Wiley India, 1984
2. M.D. Raisinghania, Ordinary and Partial Differential Equations (20th Edition), S Chand Publishers, India.
3. James Ward Brown and Ruel V. Churchill, Complex Variables and Applications (8th Edition), McGraw – Hill International Edition, 2009.

Reference Books:

1. W. E. Boyce and R. C. DiPrima, Elementary Differential Equations and Boundary Value Problems (9th Edition), Wiley India, 2009.
2. E. A. Coddington, An Introduction to Ordinary Differential Equations, Prentice Hall India, 1995.
3. Erwin Kreyszig, Advanced Engineering Mathematics, (9th Edition), John Wiley & Sons, 2006.

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<https://archive.nptel.ac.in/courses/111/105/111105134/>

Evaluation: Evaluation will be continuous and integral part of the class followed by final examination.

Essential- Students can use simple calculator (without memory) in internal as well as end sem exam in this paper.

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B.Tech. First Year (II semester)
Category- Basic Science Courses BSC

Course Category	Course Code	Course Title	L	T	P	C	Sessional		ESE	Total
							Mid I	Mid II (IA)		
BSC	BTC BSC 202	Engineering Physics	3	1	0	4	20	20	60	100

Course Objectives:

The fundamental and necessary knowledge of physics that is provided by applied physics is crucial for a student of engineering. Students will also comprehend the fundamental idea underlying the different phenomena they will come across in the course. The students would be able to build foundation to various applied fields in science and technology especially in the field of engineering.

Unit Learning Outcomes

Upon successful completion of the course,

UO1:	The students will acquire knowledge of basic concepts of quantum mechanics along with the importance of quantum mechanics over the classical mechanics. The students will learn to solve various one-dimensional quantum mechanical problems by using time independent Schrodinger wave equation.
UO2:	Students will understand various optical phenomena of daily life that can be explained by wave nature of light. Along with they will also comprehend with various principles, working and applications of these phenomena. They will use the principles of wave motion and superposition to explain the physics of interference and diffraction.
UO3:	The students will acquire knowledge of free electron theory of metals and band theory of semiconductors. They will also understand the properties of semiconductor materials and devices made-up using semiconductor like P-N junction diode, Zener diode, Solar cell.
UO4:	Students will introduce with definition, types, properties and applications of laser. In additions, they will get idea about working principle and basics of optical fiber which is used in telecommunication.
UO5:	Students will learn, calculation of electric field and electric potential in different conditions, and generation of electric and magnetic field using Maxwell's equation. Additionally, the students will acquire the knowledge of basic mathematical methods to solve the various problems in physics.

UNIT 1

Wave nature of Particles and the Schrodinger Equation

Introduction to Quantum mechanics, Wave nature of Particles, operators, Time-dependent and time-

independent Schrodinger equation for wavefunction, Application: Particle in a one-dimensional Box, Born interpretation, Free-particle wavefunction and wave-packets, v_g and v_p relation Uncertainty principle.

UNIT 2:

Wave Optics

Huygens' principle, superposition of waves and interference of light by wave front splitting and amplitude splitting; Young's double slit experiment, Newton's rings, Michelson interferometer, Mach- Zehnder interferometer.

Farunhofer diffraction from a single slit and a circular aperture, the Rayleigh criterion for limit of resolution and its application to vision; Diffraction gratings and their resolving power.

UNIT 3:

Introduction to Solids

Free electron theory of metals, Fermi level of Intrinsic and extrinsic semiconductor, density of states, Bloch's theorem for particles in a periodic potential, Kronig-Penney model(no derivation) and origin of energy bands. V-I characteristics of PN junction, Zener diode, Solar Cell, Hall Effect.

UNIT 4:

Lasers

Einstein's theory of matter radiation interaction and A and B coefficients; amplification of light by population inversion, different types of lasers: gas lasers (He-Ne, CO₂), solid-state lasers (Ruby, Neodymium), Properties of laser beams: mono-chromaticity, coherence, directionality and brightness, laser speckles, applications of lasers in science, engineering and medicine. Introduction to Optical fiber, acceptance angle and cone, Numerical aperture, V number, attenuation.

UNIT 5:

Electrostatics in Vacuum

Calculation of electric field and electrostatic potential for a charge distribution; Electric displacement, Basic Introduction to Dielectrics, Gradient, Divergence and Curl, Stokes theorem, Gauss Theorem, Continuity equation for current densities; Maxwell's equation in vacuum and non-conducting medium; Poynting vector.

List of suggestive core Experiments:

Students are expected to perform minimum 10 experiments from the list suggested below by preferably selecting experiments from each unit of syllabus.

1. To determine the characteristics of Zener Diode.
2. To determine the characteristics of PN diode.
3. To determine the Resolving Power of a Plane Diffraction Grating.
4. To determine the Resolving power of telescope.
5. To determine diameter/thickness of a thin wire by Diffraction method.
6. Study of diffraction at straight edge.
7. Determination of Dielectric constant of Kerosene by resonance method.
8. To determine the dispersive power of prism.
9. Young's double slit experiment.

10. To determine the frequency of AC main supply.
11. To determine the wavelength of sodium light with the help of Newton's ring.
12. Hall's effect experiment
13. To study the effect of temperature on reverse saturation current in P-N junction diode and to determine the energy band gap.
14. To determine the numerical aperture of an optical fiber.
15. To determine wavelength of given laser by plane diffraction grating.

Text Books:

1. Applied Physics by: Arthur Beiser
2. Engineering Physics by: Avadhanulu, Kshirsagar
3. Engineering Physics by: Gaur R. K. and Gupta S. L.
4. Engineering Physics by: P. Mani
5. Applied Physics for Engineers by: Rajendran V. and Marikani A.

Reference Books:

1. Quantum Mechanics Concepts and Applications by: Nouredine Zettili
2. Quantum Mechanics by: G. Arul Das
3. Advance Quantum Mechanics by: Satya Prakash
4. Optics by: Ajoy Ghatak
5. A Text Book of Optics by: N. Subrahmanyam and Brij Lal
6. Solid State Physics by: S.O. Pillai
7. Introduction to Solid State Physics by: Charles Kittel
8. Solid State Physics by: Adrianus J. Dekker
9. Laser: Fundamentals and Applications by: Ajoy Ghatak and K. Tyagarajan
10. Optical Fiber and Laser "Principles and Applications" by: Anuradha De
11. Introduction to Electrodynamics by: David J. Griffiths
12. Electrodynamics by: Gupta, Kumar and Singh

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- <https://archive.nptel.ac.in/courses/122/107/122107035/>
- <https://archive.nptel.ac.in/courses/122/104/122104016/>

Course outcomes:

The final outcome of the subject will result into an enhancement in understanding the basic applied physics. The topics covered under this subject will help to enhance the basic understanding nature of light, LASER, various materials, optics and principals behind various phenomenon's.

Evaluation: Evaluation will be continuous and integral part of the class followed by final examination.

Essential- Students can use simple calculator (non programmable) in internal as well as end sem exam in this paper.

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B.Tech. First Year (II semester)
Category- Engineering Science Courses ESC

Course Category	Course Code	Course Title	L	T	P	C	Sessional		ESE	Total
							Mid I	Mid II (IA)		
ESC	BTC ESC 203	Object Oriented Programming & Methodology	3	1	0	4	20	20	60	100

Course Objectives

1. The objective of this course is to understand the advantage of object oriented programming over procedure oriented programming.
2. To help students to understand the key features of Object Oriented Programming and Methodology like objects, methods, instance, message passing, encapsulation, polymorphism, data hiding, abstract data and inheritance.
3. To develop understanding of pointers and memory management.
4. To be able to develop understanding of file input/output and templates

Unit- 1

Computer: Basic components of a computer system, generation of computer, Organization i.e. CPU, register, Bus architecture, System & Application Software. Computer Application in e- Business, Bio-Informatics, health Care, Remote Sensing & GIS, Meteorology and Climatology, Computer Gaming, Multimedia and Animation etc.

Algorithms and Programming: Introduction to Algorithms, Complexities and Flowchart, pseudocode.

Unit- 2

Introduction: Object oriented programming, Application, characteristics, difference between object oriented and procedure programming, Data Type, Type Conversion, Control Statement, Loops, Arrays and string arrays fundamentals, Function, Returning values from functions, Reference arguments, Overloaded function, Inline function, Default arguments, Returning by reference..

Unit 3

Object and Classes: Implementation of class and object in C++, access modifiers, object as data type, constructor, destructor, Object as function arguments, default copy constructor, parameterized constructor, returning object from function, Structures and classes, Classes objects and memory, static class data, Arrays of object, Arrays as class Member Data, The standard C++ String class, Run time and Compile time polymorphis

Unit- 4

Operator overloading and Inheritance: Overloading unary operators, Overloading binary operators, , Concept of inheritance, Derived class and base class, access modifiers, types of inheritance, Derived class constructors, member function, public and private inheritance.

Pointer and Virtual Function: Addresses and pointers, the address-of operator & pointer and arrays, Pointer and Function pointer, Memory management: New and Delete, pointers to objects

Unit- 5

Streams and Files: Streams classes, Stream Errors, Disk File I/O with streams, file pointers, error handling in file I/O with member function, overloading the extraction and insertion operators, memory as a stream object, command line arguments, printer output, Function templates, Class templates Exceptions, Containers, exception handling.

Reference Books:

E. Balaguruswami, "Object Oriented Programming in C++", TMH.

Robert Lafore, "Object Oriented Programming in C++", Pearson.

M.T. Somashekare, D.S. Guru, " Object-Oriented Programming with C++", PHI.

Herbert Schildt, "The Complete Reference C++", Tata McGraw Hill publication.

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B.Tech. First Year (II semester)
Category- Engineering Science Courses ESC

Course Category	Course Code	Course Title	L	T	P	C	Sessional		ESE	Total
							Mid I	Mid II (IA)		
ESC	BTC ESC 204	Engineering Graphics	3	0	0	3	20	20	60	100

Course Objectives:

All phases of manufacturing or construction require the conversion of new ideas and design concepts into the basic line language of graphics. Therefore, there are many areas (civil, mechanical, electrical, architectural, and industrial) in which the skills of the CAD technicians play major roles in the design and development of new products or construction. Students prepare for actual work situations through practical training in a new state-of-the-art computer designed CAD laboratory using engineering software. This course is designed to address:

- To prepare a design system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability
- To prepare you to communicate effectively
- To prepare you to use the techniques, skills, and modern engineering tools necessary in Electronic and Communication Engineering for engineering practice.

Unit Learning Outcomes

Upon successful completion of the course,

UO1:	• Introduction to engineering design and its place in society • Exposure to engineering communication • Use standard font and lines in engineering drawings. • Understand the universally accepted conventions, symbols and the methods of engineering drawing such as line, lettering, dimensioning, scales etc.
UO2:	• Draw orthographic views of basic planar and solid objects • Draw dimensioned orthographic of engineering objects.
UO3:	• Develop basic 3-D surfaces. • Draw the sections of simple solid objects cut by a plane • Develop and interpret the projection of planes, regular & sectioned solids, solids, surfaces.
UO4:	• Draw isometric views of basic solid objects. • Draw dimensioned isometric projections of engineering objects.

UO5:	- To understand and visualize geometric objects more clearly by using AutoCAD. - Exposure to computer-aided geometric design
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UNIT1

Introduction to Engineering Drawing Principles of Engineering Graphics and their significance, usage of Drawing instruments, lettering, Conic sections including the Rectangular Hyperbola (General method only); Cycloid, Epicycloid, Hypocycloid, and Involute; Scales –Plain, Diagonal and Vernier Scales.

UNIT2:

Orthographic Projections, Principles of Orthographic Projections- Conventions- Projections of Points and lines inclined to both planes; Projections of planes inclined Planes-Auxiliary Planes; **Projections of Regular Solids** covering, those inclined to both the Planes- Auxiliary Views; Draws implean notation, dimensioning, and scale. Floor plans that include: windows, doors, and fixtures such as WC, bath, sink, shower, etc.

UNIT3:

Sections and Sectional Views of Right Angular Solids covering, Prism, Cylinder, Pyramid, Cone– Auxiliary Views; Development of surfaces of Right Regular Solids- Prism, Pyramid, Cylinder and Cone; Draw the sectional orthographic views of geometrical solids, objects from industry and dwellings (foundation to slab only)

UNIT4:

Isometric Projections covering, Principles of Isometric projection–Isometric Scale, Isometric Views, Conventions; Isometric Views of lines, Planes, Simple and compound Solids; Conversion of Isometric Views to Orthographic Views and Vice-versa, Conventions; **Overview of Computer Graphics** covering, listing the computer technologies that impact on graphical communication, Demonstrating knowledge of the theory of CAD software [such as: The Menu System, Toolbars(Standard, Object Properties, Draw, Modify and Dimension), Drawing Area (Background, Crosshairs, Coordinate System), Dialog boxes and windows, Shortcut menus (Button Bars),The Command Line (where applicable),The Status Bar, Different methods of zoom as used in CAD, Select and erase objects.; Isometric Views of lines, Planes, Simple and compound Solids]

UNIT5:

Customization & CAD Drawing consisting of setup of the drawing page and the printer, including scale settings, setting up of units and drawing limits; ISO and ANSI standards for coordinate dimensioning and tolerancing; Orthographic constraints, Snap to objects manually and automatically; Producing drawings by using various coordinate input entry methods to draw straight lines, Applying various ways of drawing circles.

List of experiments/demonstrations: • Drawing of lines, lettering and dimensioning types of lines, types, types of lettering, types of dimensioning. • Drawing of scales. Plain scale, diagonal scale, comparative scale, and Vernier scale. • Drawing of projections; Orthographic projections, methods of projections. Drawing of screw threads; Types of threads and terminologies used in lit. • Screw fastening: Types of nuts, types of bolts, stud, locking arrangements for nuts and Foundation bolt. Drawing of rivets and riveted joints forms of rivet heads, types of riveted; joints, failure of riveted joints. Drawing of welded joints: Forms of welds, location, and dimensions of welds. Drawing of keys, cotter joint, pin joints types of keys, types of cotter joints, pin joints. • Drawing of shaft couplings: Rigid couplings, loose couplings, flexible couplings universal coupling. Drawing of shaft bearings. Journal bearings, pivot bearings, collar bearings.
Essential Readings (Text Books) 1. Bhatt N.D., Panchal V.M.& Ingle P.R., (2014), Engineering Drawing, Charter Publishing House. 2. Shah, M.B. & Rana B.C. (2008), Engineering Drawing and Computer Graphics, Pearson Education. 3. Agrawal B. & Agrawal C.M.(2012), Engineering Graphics, TMH Publication..
Suggested Readings (Reference Books) 1. P S Gill, Engineering Drawing, Kataria and Sons, New Delhi. 2. Harvinder Singh, Engineering Drawing & Computer Graphics, Dhanpat Rai, New Delhi. 3. R. K. Dhawan, Engineering Drawing , S. Chand & Co, New Delhi.
E-material • NPTEL :: Mechanical Engineering - Engineering Drawing
Course outcomes: The final outcome of the subject will result into an enhancement in understanding the basic concepts of core engineering subjects. The topics covered under this subject will help to enhance the basic understanding of drawing of machine components, engineering graphics standards, the visual aspects of engineering design, solid modelling, and engineering communication. Evaluation: Evaluation will be continuous and integral part of the class followed by final examination.
Essential: In both the internal exam and the end-of-semester exam, students can use the scientific calculator(without memory), Drawing sheet, Drawing board, Mini drafter, Roller scale, T square, Compass, Divider, Set squares, Protractor, French curves, Pencils, Eraser.

INSTITUTE OF ENGINEERING AND TECHNOLOGY
DOCTOR HARISINGH GOUR VISHWAVIDYALAYA, SAGAR (M.P.) 470003
(A CENTRAL UNIVERSITY)
New Scheme Based on AICTE Flexible Curriculum

B.Tech. First Year (II semester)
Category- Engineering Science Courses ESC

Course Category	Course Code	Course Title	L	T	P	C	Sessional		ESE	Total
							Mid I	Mid II (IA)		
ESC	BTC ESC 205	Basic Civil Engineering & Mechanics	3	1	0	4	20	20	60	100

Course Objectives:

The course involves surveying activities of taking various measurements on ground that promote habit of working in groups, neatness and care in documentation and also involves introduction of engineering materials and elements of building materials.

The objective of this course is to introduce students to the basic concepts of engineering mechanics. We will start by reviewing the general method of mechanics and principles of analysis. Then, we will define the basic quantities (force and moment) and relations, which are necessary for describing and analyzing, in a systematic mathematical way, the equilibrium of particles and rigid bodies. Along the way, students will also learn how to treat distributed loads and how to find the centroid/center of gravity and moments of inertia of bodies and areas. Eventually, we will put a strong emphasis on applying the concepts to solving the equilibrium of simple structures and analyzing internal forces in beams, when they are acted on by external loads.

Unit Learning Outcomes

Upon successful completion of the course,

UO1:	Understand the typical and potential applications of construction materials in civil engineering.
UO2:	Understand the basic principles of surveying and application of various surveying instruments for vertical (leveling), horizontal, linear and angular measurements to arrive at solutions to basic surveying problems.
UO3:	Understand the concept contouring and remote sensing and its application.
UO4:	Draw free-body diagrams, formulate and solve the equations of equilibrium.
UO5:	Construct shear force and bending moment diagrams for beams and determine the Centroid center of gravity, and moment of inertia.

Basic Civil Engineering

Unit-I

Building Materials: Introduction to Stones (Rocks), Bricks, Lime, Cement & types of cement, Timber, Mortar.

Concrete: Introduction, Tests on concrete, Properties of concrete, Nominal proportion of concrete, Preparation of concrete, Concrete curing.

Unit-II

Surveying: Introduction to surveying, Classification of Surveying, Basics of Chain, Compass, Plane Table Surveying. Level and Levelling, Levelling Instruments, Methods of Levelling (Direct Levelling), Theodolite, Use of Theodolite. **Global Positioning System.**

Unit-III

Contour & Remote Sensing: Contour, Characteristics of Contour, Mapping details and Contouring, Methods of Contouring. Survey stations, Introduction of remote sensing, Application of Remote Sensing, Geographical Information System (GIS).

Engineering Mechanics

Unit-IV

Basic Concept: Introduction to Engineering Mechanics, Basic Definition, Scalar and Vector Quantities, Fundamental Units and Derived Units, System of Units.

Force and Force system: Introduction, Laws of forces, Force system, Moment & Couple, Resultant and Resolution forces, Free Body Diagram.

Equilibrium: Definition, Principle of Equilibrium, Free body diagram, Lami's Theorem – statement and explanation, Applications.

Unit-V

Friction: Introduction, Principle of friction, Types of Friction, Angle of Friction, Coefficient of Friction, Basic problems on Equilibrium of a Body on a Rough Horizontal Plane, Equilibrium of a Body on a Rough Inclined Plane. **Introduction to Centroid, Centre of Gravity and Moment of Inertia.**

Beam: Introduction, Types of beams, Load and Types. Reactions, Supports, Equations of equilibrium, shear force and bending moment diagram, Basic problems on shear force and bending moment diagram.

List of suggestive core Experiments:

Students are expected to perform minimum ten experiments from the list suggested below by preferably selecting experiments from each unit of syllabus.

- To perform traverse surveying with prismatic compass, check for local attraction and determine corrected bearings and to balance the traverse by Bowditch's rule.
- To perform levelling exercise by height of instrument of Rise and fall method.
- 3. To measure horizontal and vertical angles in the field by using Theodolite.
- 4. To determine (a) normal consistency (b) Initial and Final Setting time of a cement Sample.
- 5. To determine the workability of fresh concrete of given proportions by slump test or compaction factor test.
- 6. To determine the Compressive Strength of brick.
- 7. To determine particle size distribution and fineness modulus of course and fine Aggregate.
- 8. To verify the law of Triangle of forces and Lami's theorem.
- 9. To verify the law of parallelogram of forces.
- 10. To verify law of polygon of forces
- 11. To find the support reactions of a given truss and verify analytically.
- 12. To determine support reaction and shear force at a given section of a simply Supported beam and verify in analytically using parallel beam apparatus.
- 13. To determine the moment of inertia of fly wheel by falling weight method.
- 14. To verify bending moment at a given section of a simply supported beam.

Text Books:

1. Rangwala .S.C, “Engineering Materials”, Charotor Publishing House, New Delhi, 2012
2. Duggal S.K. , Surveying Vol. 1, Tata McGraw- Hill Education New Delhi Edition 4th 2013.
3. Punmia, B.C., Surveying, Laxmi Publications, New Delhi, Edition 16th 2005.
4. Rajput .R.K., Engineering Mechanics, Dhanpat Rai and Sons New Delhi. Edition 3rd 2013.
5. Rammamurtham S., Applied Mechanics, Dhanpat Rai and Sons New Delhi, Edition 2016.
6. S.P, Timoshenko, Mechanics of structure, East West press Pvt.Ltd.
7. Basic Civil Engineering, S S Bhavikatti, Publisher. New Age International Pvt. Ltd., 2011

Reference Books:

1. S. Ramamurtham & R. Narayanan; Basic Civil Engineering, Dhanpat Rai Pub.
2. Basic Civil Engineering, S S Bhavikatti, Publisher. New Age International Pvt. Ltd., 2011
3. Prasad I.B., Applied Mechanics, Khanna Publication..
4. Shesha Prakash and Mogaveer; Elements of Civil Engg & Engg. Mechanics; PHI
5. Gurucharan Singh, “Building Construction and Materials”, Standard Book House, Delhi, 1988

E-material <https://www.digimat.in/nptel/courses/video/105102088/L01.html>

<https://archive.nptel.ac.in/courses/112/106/112106286/>

<https://archive.nptel.ac.in/courses/113/108/113108083/>

<https://archive.nptel.ac.in/courses/105/106/105106206/>

<https://archive.nptel.ac.in/courses/105/103/105103193/>

Course outcomes:

The final outcome of the subject will result into an enhancement in understanding the basic concepts of Core Civil Engineering subjects. The topics covered under this subject will help to enhance the basic understanding of Building materials, Surveying, Remote sensing & GIS and Engineering mechanics.

Evaluation: Evaluation will be continuous and integral part of the class followed by final examination.

Essential- Students can use scientific calculator (without memory) in internal as well as end sem exam in this paper

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Category- Laboratory Courses LC

Course Category	Course Code	Course Title	L	T	P	C	Sessional		ESE	Total
							Mid I	Mid II (IA)		
LC	BTC LC 206	Object Oriented Programming & Methodology Lab	-	-	4	2	20	20	60	100

List of experiments/demonstrations:

- Write a program to find out the largest number using function.
- Write a program to find the area of circle, rectangle and triangle using function overloading.
- Write a program to implement complex numbers using operator overloading and type conversion.
- Write a program using class and object to print bio-data of the students.
- Write a program which defines a class with constructor and destructor which will count number of object created and destroyed.
- Write a program to implement single and multiple inheritances taking student as the sample base class.
- Write a program to add two private data members using friend function.
- Write a program using dynamic memory allocation to perform 2x2 matrix addition and subtraction.
- Write a program to create a stack using virtual function.
- Write a program that store five student records in a file.
- Write a program to get IP address of the system.
- Write a program to shutdown the system on windows operating system.

Course outcomes:

The final outcome of the subject will result into an enhancement in understanding the basic concepts of **Object Oriented Programming & Methodology** . The topics covered under this practical will help to enhance the programming.

Evaluation: Evaluation will be continuous and integral part of the class followed by final examination.

