Course Title:	**Communicative English**		
Course Code:	**BENGK106-206**	CIEM arks	50
Course Type(Theory/Practical/Integrated)	Theory	SEE Marks	50
		Total Marks	100
Teaching Hours/Week(L:T:P:S)	1:0:0:0	Exam Hours	01Theory
Total Hours of Pedagogy	15hours	Credits	01

Course objectives: The course Communicative English (BENGK106/206) will enable the students,

1. To know about Fundamentals of Communicative English and Communication Skills in general.
2. Totra into identify the nuances of phonetics, into nation and enhance pronunciation skills for better Communication skills.
3. To impart basic English grammar and essentials of important language skills.
4. ToenhancewithEnglishvocabularyandlanguageproficiencyforbettercommunicationskills.
5. To learn about Techniques of Information Transfer through presentation.

Teaching-Learning Process:

These are sample Strategies, which teacher can use to accelerate the attainment of the various course outcomes and make Teaching –Learning more effective:

Teachers shall adopt suitable pedagogy for effective teaching-learning process. The pedagogy shall involve the combination of different methodologies which suit modern technological tools and software's to meet the present requirements of the Global employment market.

(i) Direct instructional method (Low/Old Technology), (ii)Flipped classrooms (High/advanced Technological tools), (iii) Blended learning (Combination of both), (iv) Enquiry and evaluation based learning, (v)Personalized learning, (vi)Problems based learning through discussion, (vii)Following the method of expeditionary learning Tools and techniques, (viii)Use of audio visual methods through language Labs in teaching of LSRWskills.

A part from conventional lecture methods, various type so innovative teaching techniques through videos, animation films may be adapted so that the delivered lesson can progress the students In theoretical applied and practical skills in teaching of communicative skills in general.

Language Lab : To augment LSRW, grammar and Vocabulary skills (Listening, Speaking, Reading, Writing and Grammar,Vocabulary)throughtests,activities,exercisesetc.,comprehensiveweb-basedlearningandassessmentsystems can be referred as per the AICTE / VTU guidelines.

Module-1 (03hoursofpedagogy)

Introduction to Communicative English: Communicative English, Fundamentals of Communicative English, Process of Communication, Barriers to Effective Communicative English, Different styles and levels in Communicative English. Interpersonal and Intrapersonal Communication Skills.

Module-2 (03hoursofpedagogy)

Introduction to Phonetics: Phonetic Transcription, English Pronunciation, Pronunciation Guidelines to consonants and vowels, Sounds Mispronounced, Silent and Non silent Letters, Syllables and Structure. Word Accent, Stress Shift and Intonation, Spelling Rules and Words of ten Miss pelt. Common Errors in Pronunciation.

Module-3 (03hoursofpedagogy)

Basic English Communicative Grammar and Vocabulary PART-I: Grammar: Basic English Grammar and Parts of Speech, Articles and Preposition. Question Tags, One Word Substitutes, Strong and Weak forms of words, Introduction to Vocabulary, All Types of Vocabulary – Exercises on it.

Module-4 (03hoursofpedagogy)

Basic English Communicative Grammar and Vocabulary PART-II: Words formation -Prefixes and Suffixes, Contractions and Abbreviations. Word Pairs (Minimal Pairs)– Exercises, Tense and Types of tenses , The Sequence of Tenses (Rules in use of Tenses) and Exercises on it.

Module-5 (03hoursofpedagogy)

Communication Skills for Employment: Information Transfer: Oral Presentation and its Practice. Difference between Extempore/Public Speaking, Communication Guidelines. Mother Tongue Influence (MTI), Various Techniques for Neutralization of Mother Tongue Influence. Reading and Listening Comprehensions– Exercises.

Course outcome (Course Skill Set)

At the end of the course Communicative English(BENGK106/206) the student will be able to

CO1	UnderstandandapplytheFundamentalsofCommunicationSkillsintheircommunicationskills.
CO2	Identify the nuances of phonetics, into nation and enhance pronunciation skills.
CO3	ToimpartbasicEnglishgrammarandessentialsoflanguageskillsasperpresentrequirement.
CO4	UnderstandandusealltypesofEnglishvocabularyandlanguageproficiency.
CO5	Adopt the Techniques of Information Transfer through presentation.

Assessment Details (both CIE and SEE)

The weight age of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (**20 Marks** out of 50). The minimum passing mark for the SEE is 35% of the maximum marks (**18 Marks** out of 50). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 35% (18 Marks out of 50) in the semester-end examination (SEE), and a minimum of 40% (**40 Marks** out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

Continuous Internal Evaluation(CIE):

- Two Tests each of **25 Marks** and average of both the test will be taken. The test will be after the

completion of the syllabus of 50% and 100% respectively.

a) One Assignments and one quizzes/one seminars or b) one field survey and report presentation or c) one-course project with report totaling **25 Marks**.

Total Marks scored (Test + Assignments) will be for 25+25 = **50 Marks**

Semester End Examinations (SEE)

SEE paper shall be set for 50 questions**,** each of the **01 Mark**. The pattern of the question paper is MCQ (multiple choice questions). The time allotted for SEE is 01hour**.**The student must secure a minimum of 35% of the maximum marks for SEE.

Suggested Learning Resources:

Textbook:

1) **Communication Skills** by Sanjay Kumar & Pushp Lata, Oxford University PressIndiaPvtLtd-2019.
2) **A Textbook of English Language Communication Skills,** (ISBN-978-81-955465-2-7), Published by Infinite Learning Solutions, Bengaluru - 2022.

Reference Books:

1. **Technical Communication** by GajendraSingh ChauhanandEtal, (ISBN-978-93-5350-050-4), Cengage learning India Pvt Limited [Latest Revised Edition] - 2019.
2. **English for Engineers** by N.P. Sudharshana and C Savitha, Cam bridge UniversityPress–2018.
3. **English Language Communication Skills–Lab Manual cum Workbook,** Cengage learning India Pvt Limited [Latest Revised Edition] – (ISBN-978-93-86668-45-5), 2019.
4. **A Course in Technical English–D Praveen Sam, K N Shoba,** Cambridge UniversityPress–2020.

Practical English Usage by Michael Swan, Oxford University Press–2016.

Activity Based Learning (Suggested Activities in Class)/Practical Based learning

- ✓ Contents related activities (Activity-based discussions)
- ✓ ForactiveparticipationofstudentsinstructthestudentstoprepareFlowchartsandHandouts
- ✓ Organising Group wise discussions Connecting to placement activities
- ✓ Quizzes and Discussions, Seminars and assignments

Introduction to Electrical Engineering			
Course Code:	**BESCK104B**	CIE Marks	50
Course Type (Theory/Practical /Integrated)	Theory	SEE Marks	50
		Total Marks	100
Teaching Hours/Week (L:T:P: S)	3:0:0:0	Exam Hours	03
Total Hours of Pedagogy	40 hours	Credits	03

Course objectives

- To explain the laws used in the analysis of DC and AC circuits.
- To explain the behavior of circuit elements in single-phase circuits.
- To explain the construction and operation of transformers, DC generators and motors and induction motors.
- To introduce concepts of circuit protecting devices and earthing.
- To explain electric power generation, transmission and distribution, electricity billing, equipment and personal safety measures.

Teaching-Learning Process

These are sample Strategies, which teacher can use to accelerate the attainment of the various course outcomes and make Teaching –Learning more effective

1. Chalk and talk
2. Animated/NPTEL videos
3. Cut sections
4. PPTs

Module-1 (08 Hrs)

Introduction: Conventional and non-conventional energy resources; General structure of electrical power systems using single line diagram approach.

Power Generation: Hydel, Nuclear, Solar & wind power generation (Block Diagram approach).

DC Circuits:

Ohm's Law and its limitations. KCL & KVL, series, parallel, series-parallel circuits. Simple Numerical.

Module-2 (08 Hrs)

A.C. Fundamentals:

Equation of AC Voltage and current, waveform, time period, frequency, amplitude, phase, phase difference, average value, RMS value, form factor, peak factor. (only definitions)

Voltage and current relationship with phasor diagrams in R, L, and C circuits. Concept of Impedance.

Analysis of R-L, R-C, R-L-C Series circuits. Active power, reactive power and apparent power. Concept of power factor. (Simple Numerical).

Three Phase Circuits:

Generation of Three phase AC quantity, advantages and limitations; star and delta connection, relationship between line and phase quantities (excluding proof)

Module-3 (08 Hrs)

DC Machines:

DC Generator: Principle of operation, constructional details, induced emf expression, types of generators. Relation between induced emf and terminal voltage. Simple numerical.

DC Motor: Principle of operation, back emf and its significance. Torque equation, types of motors, characteristics and speed control (armature & field) of DC motors (series & shunt only). Applications of DC motors. Simple numerical.

Module-4 (08 Hrs)

Transformers: Necessity of transformer, principle of operation, Types and construction of single-phase transformers, EMF equation, losses, variation of losses with respect to load. Efficiency and simple numerical.

Three-phase induction Motors: Concept of rotating magnetic field, Principle of operation, constructional features of motor, types – squirrel cage and wound rotor. Slip and its significance simple numerical.

Module-5 (08 Hrs)

Domestic Wiring: Requirements, Types of wiring: casing, capping.Two way and three way control of load.

Electricity Bill: Power rating of household appliances including air conditioners, PCs, laptops, printers, etc. Definition of "unit" used for consumption of electrical energy, two-part electricity tariff, calculation of electricity bill for domestic consumers.

Equipment Safety measures: Working principle of Fuse and Miniature circuit breaker (MCB), merits and demerits.

Personal safety measures: Electric Shock, Earthing and its types, Safety Precautions to avoid shock.

Course outcome (Course Skill Set)

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

CO1	Understand the concepts of various energy sources and Electric circuits.
CO2	Apply the basic Electrical laws to solve circuits.
CO3	Discuss the construction and operation of various Electrical Machines.
CO4	Identify suitable Electrical machine for practical implementation.
CO5	Explain the concepts of electric power transmission and distribution, electricity billing, circuit protective devices and personal safety measures.

Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (**20 Marks** out of 50). The minimum passing mark for the SEE is 35% of the maximum marks (**18 Marks** out of 50). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 35% (**18 Marks** out of 50) in the semester-end examination(SEE), and a minimum of 40% (**40 Marks** out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

Continuous Internal Evaluation(CIE):

- Three Tests each of **40 Marks** scale down to **25 Marks** and average of 3 test will be taken. The test will be after the completion of the syllabus of 35-40%, 65-70%, and 90-100% respectively.
  a) One Assignments and one quizzes/one seminars or b) one field survey and report presentation or c) one-course project with report totaling **25 Marks**.

Total Marks scored (Test + Assignments) will be for 25+25 = **50 Marks**

Semester End Examination (SEE):

Theory SEE will be conducted by Institution as per the scheduled timetable, with common question papers for the subject (**duration 03 hours)**

- The question paper shall be set for **100 Marks**. The medium of the question paper shall be English. The duration of SEE is 03 hours.
- The question paper will have 10 questions. Two questions per module. Each question is set for **20 Marks**. The students have to answer 5 full questions, selecting one full question from each module. The student has to answer for **100 Marks** and **marks scored out of 100 shall be proportionally reduced to 50 Marks**.

There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), **should have a mix of topics** under that module.

Suggested Learning Resources:

Books (Title of the Book/Name of the author/Name of the publisher/Edition and Year)

Text Books:

1. Basic Electrical Engineering by D C Kulshreshtha, Tata McGraw Hill, First Edition 2019.
2. A text book of Electrical Technology by B.L. Theraja, S Chand and Company, reprint edition 2014.

Reference Books:

1. Basic Electrical Engineering, D. P. Kothari and I. J. Nagrath, Tata McGraw Hill 4th edition, 2019.
2. Principles of Electrical Engineering & Electronics by V. K. Mehta, Rohit Mehta, S. Chand and Company Publications, 2nd edition, 2015.
3. Fundamentals of Electrical Engineering by Rajendra Prasad, PHI, 3rd edition, 2014.

Web links and Video Lectures (e-Resources):

- www.nptel.ac.in

Activity Based Learning (Suggested Activities in Class)/ Practical Based learning

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COs and POs Mapping (Individual teacher has to fill up)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	1	0	1	1	1	1	0	0	0	1
CO2	3	3	2	1	1	1	0	0	0	0	0	1
CO3	3	2	1	1	1	1	1	1	0	0	0	1
CO4	3	2	2	1	0	1	1	1	0	0	0	1
CO5	3	1	2	0	1	2	1	1	0	0	1	1

Level 3- Highly Mapped, Level 2-Moderately Mapped, Level 1-Low Mapped, Level 0- Not Mapped

Course Title:	Introduction to Internet of Things (IOT)		
Course Code:	BETCK105H/205H	CIE Marks	50
Course Type (Theory/Practical /Integrated)	Theory	SEE Marks	50
		Total Marks	100
Teaching Hours/Week (L:T:P: S)	03:00:00:00	Exam Hours	03
Total Hours of Pedagogy	40 hours	Credits	03
Teaching Department	ECE	QP setting	ECE

Course objectives

- Understand about the fundamentals of Internet of Things and its building blocks along with their characteristics.
- Understand the recent application domains of IoT in everyday life.
- Gain insights about the current trends of Associated IOT technologies and IOT Analytics.

Teaching-Learning Process

These are sample Strategies, which teacher can use to accelerate the attainment of the various course outcomes and make Teaching –Learning more effective

1. Chalk and Talk
2. Power point presentation
3. Video Lecturing
4. E-sources
5. Self-learning

Module-1 (07 hours of pedagogy)

Basics of Networking: Introduction, Network Types, Layered network models

Emergence of IoT: Introduction, Evolution of IoT, Enabling IoT and the Complex Interdependence of Technologies, IoT Networking Components

Textbook 1: Chapter 1- 1.1 to 1.3 Chapter 4 – 4.1 to 4.4

Module-2 (07 hours of pedagogy)

IoT Sensing and Actuation: Introduction, Sensors, Sensor Characteristics, Sensorial Deviations, Sensing Types, Sensing Considerations, Actuators, Actuator Types, Actuator Characteristics.

Textbook 1: Chapter 5 – 5.1 to 5.9

Module-3 (07 hours of pedagogy)

IoT Processing Topologies and Types: Data Format, Importance of Processing in IoT, Processing Topologies, IoT Device Design and Selection Considerations, Processing Offloading.

Textbook 1: Chapter 6 – 6.1 to 6.5

Module-4 (07 hours of pedagogy)

ASSOCIATED IOT TECHNOLOGIES

Cloud Computing: Introduction, Virtualization, Cloud Models, Service-Level Agreement in Cloud Computing, Cloud Implementation, Sensor-Cloud: Sensors-as-a-Service.

IOT CASE STUDIES

Agricultural IoT – Introduction and Case Studies

Textbook 1: Chapter 10– 10.1 to 10.6; Chapter 12- 12.1-12.2

Module-5 (07 hours of pedagogy)

IOT CASE STUDIES AND FUTURE TRENDS

Vehicular IoT – Introduction

Healthcare IoT – Introduction, Case Studies

IoT Analytics – Introduction

Textbook 1: Chapter 13– 13.1; Chapter 14- 14.1-14.2; Chapter 17- 17.1

Course outcome (Course Skill Set)

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

CO1	Describe the evolution of IoT, IoT networking components, and addressing strategies in IoT.
CO2	Classify various sensing devices and actuator types.
CO3	Demonstrate the processing in IoT.
CO4	Explain Associated IOT Technologies
CO5	Illustrate architecture of IOT Applications

Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (**20 Marks** out of 50). The minimum passing mark for the SEE is 35% of the maximum marks (**18 Marks** out of 50). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 35% (**18 Marks** out of 50) in the semester-end examination(SEE), and a minimum of 40% (**40 Marks** out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

Continuous Internal Evaluation(CIE):

- Three Tests each of **40 Marks** scale down to **25 Marks** and average of 3 test will be taken. The test will be after the completion of the syllabus of 35-40%, 65-70%, and 90-100% respectively.

  a) One Assignments and one quizzes/one seminars or b) one field survey and report presentation or c) one-course project with report totaling **25 Marks**.

Total Marks scored (Test + Assignments) will be for 25+25 = **50 Marks**

Semester End Examination (SEE):

Theory SEE will be conducted by Institute as per the scheduled timetable, with common question papers for the subject (**duration 03 hours)**

- The question paper shall be set for **100 Marks**. The medium of the question paper shall be English. The duration of SEE is 03 hours.
- The question paper will have 10 questions. Two questions per module. Each question is set for **20 Marks**. The students have to answer 5 full questions, selecting one full question from each module. The student has to answer for **100 Marks** and **marks scored out of 100 shall be proportionally reduced to 50 Marks**.

There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), **should have a mix of topics** under that module.

Suggested Learning Resources:

Books (Title of the Book/Name of the author/Name of the publisher/Edition and Year)

1. Sudip Misra, Anandarup Mukherjee, Arijit Roy, "Introduction to IoT", Cambridge University Press 2021.
2. S. Misra, C. Roy, and A. Mukherjee, 2020. Introduction to Industrial Internet of Things and Industry 4.0. CRC Press.
3. Vijay Madisetti and Arshdeep Bahga, "Internet of Things (A Hands-on-Approach)",1st Edition, VPT, 2014.
4. Francis daCosta, "Rethinking the Internet of Things: A Scalable Approach to Connecting Everything", 1st Edition, Apress Publications, 2013

Reference Books (Title of the Book/Name of the author/Name of the publisher/Edition and Year)

Web links and Video Lectures (e-Resources):

Practical Based learning (Any 5 experiments x 2 hours = 10 practical hours)

COs and POs Mapping (Individual teacher has to fill up)

COs	POs											
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
CO1	**2**										1	1
CO2	**2**	**2**	**3**	2							1	1
CO3	**2**	**2**	3	2							1	1
CO4	**2**	**2**	3								1	**1**
CO5			3								1	**1**

Level 3- Highly Mapped, Level 2-Moderately Mapped, Level 1-Low Mapped, Level 0- Not Mapped

Course Title:	Introduction to Cyber Security		
Course Code:	BETCK105I/205I	CIE Marks	50
Course Type (Theory/Practical /Integrated)	Theory	SEE Marks	50
		Total Marks	100
Teaching Hours/Week(L:T:P:S)	03:00:00:00	Exam Hours	03
Total Hours of Pedagogy	40hours	Credits	03
Teaching Department	ECE	QP setting	ECE

Course objectives

- UnderstandaboutthefundamentalsofInternetofThingsanditsbuildingblocksalongwiththeir characteristics.
- Understand their cent application domains of IoT in everyday life.
- GaininsightsaboutthecurrenttrendsofAssociatedIOTtechnologiesandIOTAnalytics.

Teaching-Learning Process

These are sample Strategies, which teacher can use to accelerate the attainment of the various course outcomes and make Teaching –Learning more effective

1. Chalk and Talk
2. Power point presentation
3. Video Lecturing
4. E-sources
5. Self-learning

Module-1(07 hours of pedagogy)

Introduction to Cybercrime:

Cybercrime: DefinitionandOriginsoftheWord,CybercrimeandInformationSecurity,WhoareCybercriminals?ClassificationsofCybercrimes,An Indian Perspective, Hacking and Indian Laws., Global PerspectivesTextbook:1Chapter1(1.1to1.5,1.7-1.9)

Module-2(07 hours of pedagogy)

Cyber Offenses: How Criminals Plan Them: Introduction, How criminals plan the attacks, Social Engineering, Cyber Stalking, Cyber cafe & cybercrimes.

Botnets: Thefuelforcybercrime,AttackVector.Textbook:1Chapter2(2.1to2.7)

Module-3 (07 hours of pedagogy)

Tools and Methods used in Cybercrime: Introduction, Proxy Servers, Anonymizers, Phishing, Password Cracking, Key Loggers and S pyways, Virus and Worms, Trozen Horses and Back doors, Steganography, Do S and DDOS Attacks, Attackson Wireless networks. Textbook:1Chapter4(4.1to4.9,4.12)

Module-4 (07 hours of pedagogy)

Phishing and Identity The ft : Introduction, methods of phishing, phishing, phishing techniques, spear phishing, types of phishing's, cams, phishing toolkits and spy phishing, counter measures, Identity TheftTextbook:1Chapter5(5.1.to5.3)

Module-5(07 hours of pedagogy)

Understanding Computer Forensics: Introduction, Historical Background of Cyber forensics, Digital Forensics Science, Need for Computer Forensics, Cyber Forensics and Digital Evidence, Digital Forensic Lifecycle, Chain of Custody Concepts, network forensics. Textbook:1Chapter7(7.1.to7.5,7.7to7.9)

Course outcome (Course Skill Set)

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

CO1	Describe the evolution of IoT, IoT networking components ,and addressing I o T.
CO2	Classify various sensing devices and actuator types.
CO3	Demonstrate the processing in IoT.
CO4	Explain Associated IOT Technologies
CO5	Illustrate architecture of IOT Applications

Assessment Details (both CIE and SEE)

The weight age of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50% The minimum passing mark for the CIE is 40% of the maximum marks (**20 Marks** out of 50). The minimum passing mark for these is 35% of the maximum marks (**18 Marks** out of 50). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/course if the students e cures not less than 35% (**18 Marks** out of 50) in the semester-end examination(SEE), and a minimum of 40% (**40 Marks** out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

Continuous Internal Evaluation(CIE):

- Three Tests each of **40 Marks** scale down to **25 Marks** and average of 3test will be taken. The test will be after the completion of the syllabus of 35 -40% ,65-70%, and 90-100%respectively.

a) One Assignments and one quizzes/one seminars or b) one field survey and report presentation or c) one-course project with report totaling **25 Marks**. Total Marks scored (Test+ Assignments) will be for 25+25 = **50 Marks**

Semester End Examination (SEE):

Theory SEE will be conducted by Institute as per the scheduled timetable, with common question papers for the subject (**duration 03 hours)**

- The question papers hall be set for **100 Marks**. The medium of the question papers hall be English. The duration of SEE is 03 hours.
- The question paper will have 10 questions. Two questions per module. Each question is set for **20 Marks**. The students have to answer 5 full questions, selecting one full question from each module. The student has to answer for **100 Marks** and **marks scored out of 100 shall be proportionally reduced to 50 Marks**.

There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), **should have a mix of topics** under that module.

Suggested Learning Resources:

Books(TitleoftheBook/Nameoftheauthor/Nameofthepublisher/EditionandYear)

1. Sunit Belapure and Nina Godbole, "Cyber Security: Understanding Cyber Crimes, Computer Forensics And Legal Perspectives", Wiley India Pvt Ltd, ISBN: 978-81- 265-21791, 2011, First Edition (Reprinted 2018)

Web links and Video Lectures (e-Resources):

- https://www.youtube.com/watch?v=yC_hFm0BX28&list=PLxApjaSnQGi6Jm7LLSxvmNQjS_rt9swsu
- https://www.youtube.com/watch?v=nzZkKoREEGo&list=PL9ooVrP1hQOGPQVeapGsJCktzIO4DtI4_
- https://www.youtube.com/watch?v=6wi5DI6du-4&list=PL_uaeekrhGzJlB8XQBxU3z__hDwT95xlk
- https://www.youtube.com/watch?v=KqSqyKwVuA8

Activity Based Learning (Suggested Activities in Class)/ Practical Based learning

- Illustration of standard case study of cyber crime
- Setup a cyber-court at Institute level

Course Title:	**Indian Constitution**		
Course Code:	**BICOK107/207**	CIE Marks	50
Course Type (Theory/Practical /Integrated)	Theory	SEE Marks	50
		Total Marks	100
Teaching Hours/Week (L:T:P: S)	1:0:0:0	Exam Hours	01 Theory
Total Hours of Pedagogy	15 hours	Credits	01

Course objectives:

The course **INDIAN CONSTITUTION (BICOK107/207)** will enable the students,

1. To know about the basic structure of Indian Constitution.
2. To know the Fundamental Rights (FR's), DPSP's and Fundamental Duties (FD's) of our constitution.
3. To know about our Union Government, political structure & codes, procedures.
4. To know the State Executive & Elections system of India.
5. To learn the Amendments and Emergency Provisions, other important provisions given by the constitution.

Teaching-Learning Process

These are sample Strategies, which teacher can use to accelerate the attainment of the various course outcomes and make Teaching –Learning more effective: Teachers shall adopt suitable pedagogy for effective teaching - learning process. The pedagogy shall involve the combination of different methodologies which suit modern technological tools.

(i) Direct instructional method (Low/Old Technology), (ii) Flipped classrooms (High/advanced Technological tools), (iii) Blended learning (Combination of both), (iv) Enquiry and evaluation based learning, (v) Personalizedlearning, (vi) Problems based learning through discussion.

(ii) Apart from conventional lecture methods, various types of innovative teaching techniques through videos, animation films may be adapted so that the delivered lesson can progress the students In theoretical applied and practical skills.

Module-1 (03 hours of pedagogy)

Indian Constitution: Necessity of the Constitution, Societies before and after the Constitution adoption. Introduction to theIndian constitution, Making of the Constitution, Role of the Constituent Assembly.

Module-2 (03 hours of pedagogy)

Salient features of India Constitution. Preamble of Indian Constitution & Key concepts of the Preamble. Fundamental Rights (FR's) and its Restriction and limitations in different Complex Situations. building.

Module-3 (03 hours of pedagogy)

Directive Principles of State Policy (DPSP's) and its present relevance in Indian society. Fundamental Duties and its Scope and significance in Nation, Union Executive : Parliamentary System, Union Executive – President, PrimeMinister, Union Cabinet.

Module-4 (03 hours of pedagogy)

Parliament - LS and RS, Parliamentary Committees, Important Parliamentary Terminologies. Judicial System of India, Supreme Court of India and other Courts, Judicial Reviews and Judicial Activism.

Module-5 (03 hours of pedagogy)

State Executive and Governer, CM, State Cabinet, Legislature - VS & VP, Election Commission, Elections & Electoral Process. Amendment to Constitution, and Important Constitutional Amendments till today. Emergency Provisions.

Course outcome (Course Skill Set)
At the end of the course BICOK107/207 the student will be able to:

CO1	Analyse the basic structure of Indian Constitution.
CO2	Remember their Fundamental Rights, DPSP's and Fundamental Duties (FD's) of our constitution.
CO3	know about our Union Government, political structure & codes, procedures.
CO4	Understand our State Executive & Elections system of India.
CO5	Remember the Amendments and Emergency Provisions, other important provisions given by the constitution.

Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (**20 Marks** out of 50). The minimum passing mark for the SEE is 35% of the maximum marks (**18 Marks** out of 50). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 35% (**18 Marks** out of 50) in the semester-end examination(SEE), and a minimum of 40% (**40 Marks** out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

Continuous Internal Evaluation(CIE):

- Two Tests each of **25 Marks** and average of both the test will be taken. The test will be after the completion of the syllabus of 50% and 100% respectively.

a) One Assignments and one quizzes/one seminars or b) one field survey and report presentation or c) one-course project with report totaling **25 Marks**.

Total Marks scored (Test + Assignments) will be for 25+25 = **50 Marks**

Semester End Examinations (SEE)

SEE paper shall be set for 50 questions, each of the **01 Mark**. The pattern of the question paper is MCQ (multiple choice questions). The time allotted for SEE is 01hour.The student must secure a minimum of 35% of the maximum marks for SEE.

Suggested Learning Resources:

Textbook:

1. "Constitution of India" (for Competitive Exams) - Published by Naidhruva Edutech Learning Solutions, Bengaluru. – 2022.
2. "Introduction to the Constitution of India", (Students Edition.) by Durga Das Basu (DD Basu): Prentice –Hall, 2008.

Reference Books:

1. "Constitution of India, Professional Ethics and Human Rights" by Shubham Singles, Charles E. Haries, and et al: published by Cengage Learning India, Latest Edition – 2019.
2. "The Constitution of India" by Merunandan K B: published by Merugu Publication, Second Edition, Bengaluru.
3. "Samvidhana Odu" - for Students & Youths by Justice HN Nagamohan Dhas, Sahayana, kerekon. M. Govindarajan, S.Natarajan, V.S.Senthilkumar, "Engneering Ethics", Prentice – Hall, 2004.

Activity Based Learning (Suggested Activities in Class)/ Practical Based learning

- ✓ Contents related activities (Activity-based discussions)
- ✓ For active participation of students instruct the students to prepare Flowcharts and Handouts
- ✓ Organising Group wise discussions Connecting to placement activities
- ✓ Quizzes and Discussions Seminars and assignments

INNOVATION AND DESIGN THINKING			
Course Code	**BIDTK158/258**	CIE Marks	50
Teaching Hours/Week(L:T:P:S)	1:0:0	SEE Marks	50
Total Hours of Pedagogy	15	Total Marks	100
Credits	01	Exam Hours	01

Course Category: Foundation

Preamble: This course provides an introduction to the basic concepts and techniques of engineering and reverses engineering, the process of design, analytical thinking and ideas, basics and development of engineering drawing, application of engineering drawing with computer aide.

Course objectives:

CLO 1: To explain the concept of design thinking for product and service development

CLO 2. To explain the fundamental concept of innovation and design thinking

CLO 3. To discuss the methods of implementing design thinking in the real world.

Teaching-Learning Process (General Instructions)

These are sample Strategies; which teachers can use to accelerate the attainment of the various course outcomes.

1. Lecturer method (L) does not mean only the traditional lecture method, but a different type of teaching method may be adopted to develop the outcomes.

2. Show Video/animation films to explain concepts.

3. Encourage collaborative (Group Learning) Learning in the class.

4. Ask at least three HOTS (Higher-order Thinking) questions in the class, which promotes critical thinking.

5. Adopt Problem Based Learning (PBL), which fosters students' Analytical skills, develops thinking skills such as the ability to evaluate, generalize, and analyse information rather than simply recall it.

6. Topics will be introduced in multiple representations.

7. Show the different ways to solve the same problem and encourage the students to come up with their own creative ways to solve them.

8. Discuss how every concept can be applied to the real world - and when that's possible, it helps improve the students' understanding.

Module-1	
PROCESS OF DESIGN **Understanding Design thinking** Shared model in team-based design – Theory and practice in Design thinking – Explore presentation signers across globe – MVP or Prototyping	
Teaching-Learning Process	Introduction about the design thinking: Chalk and Talk method Theory and practice through presentation MVP and Prototyping through live examples and videos.
Module-2	
Tools for Design Thinking Real-Time design interaction capture and analysis – Enabling efficient collaboration in digital space – Empathy for design – Collaboration in distributed Design	
Teaching-Learning Process	Case studies on design thinking for real-time interaction and analysis Simulation exercises for collaborated enabled design thinking Live examples on the success of collaborated design thinking.
Module-3	
Design Thinking in IT Design Thinking to Business Process modelling – Agile in Virtual collaboration environment – Scenario based Prototyping	
Teaching-Learning Process	Case studies on design thinking and business acceptance of the design Simulation on the role of virtual eco-system for collaborated prototyping.
Module-4	
DT For strategic innovations Growth – Story telling representation – Strategic Foresight - Change – Sense Making – Maintenance Relevance – Value redefinition - Extreme Competition – experience design - Standardization – Humanization - Creative Culture – Rapid prototyping, Strategy and Organization – Business Model design.	
Teaching-Learning Process	Business model examples of successful designs Presentation by the students on the success of design Live project on design thinking in a group of 4 students
Module-5	
Design thinking workshop Design Thinking Work shop Empathize, Design, Ideate, Prototype and Test	
Teaching-Learning Process	8 hours design thinking workshop from the expect and then presentation by the students on the learning from the workshop

Course Outcomes:

Upon the successful completion of the course, students will be able to:

CO Nos.	Course Outcomes	Knowledge Level (Based on revised Bloom's Taxonomy)
CO1	Appreciate various design process procedure	K2
CO2	Generate and develop design ideas through different technique	K2
CO3	Identify the significance of reverse Engineering to Understand products	K2

Assessment Details (both CIE and SEE)

The weight age of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (**20 Marks** out of 50). The minimum passing mark for the SEE is 35% of the maximum marks (**18 Marks** out of 50). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 35% (**18 Marks** out of 50) in the semester-end examination (SEE), and a minimum of 40% (**40 Marks** out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

Continuous Internal Evaluation(CIE):

- Two Tests each of **25 Marks** and average of both the test will be taken. The test will be after the completion of the syllabus of 50% and 100% respectively.

a) One Assignments and one quizzes/one seminars or b) one field survey and report presentation or c) one-course project with report totaling **25 Marks**.

Total Marks scored (Test + Assignments) will be for **25+25 = 50 Marks**

Semester End Examinations (SEE)

SEE paper shall be set for 50 questions, each of the **01 Mark**. The pattern of the question paper is MCQ (multiple choice questions). The time allotted for SEE is 01hour.The student must secure a minimum of 35% of the maximum marks for SEE.

Suggested Learning Resources:

Text Books :

1. John.R.Karsnitz, Stephen O'Brien and John P. Hutchinson, "Engineering Design", Cengage learning (International edition) Second Edition, 2013.

2. Roger Martin, "The Design of Business: Why Design Thinking is the Next Competitive Advantage", Harvard Business Press , 2009.

3. HassoPlattner, ChristophMeinel and Larry Leifer (eds), "Design Thinking: Understand – Improve – Apply", Springer, 2011

4. IdrisMootee, "Design Thinking for Strategic Innovation: What They Can't Teach You at Business or Design School", John Wiley & Sons 2013.

References:

5. YousefHaik and Tamer M.Shahin, "Engineering Design Process", Cengage Learning, Second Edition, 2011.

6. Book - Solving Problems with Design Thinking - Ten Stories of What Works (Columbia Business School Publishing) Hardcover – 20 Sep 2013 by Jeanne Liedtka(Author), Andrew King (Author), Kevin Bennett (Author).

Web links and Video Lectures (e-Resources):

1. www.tutor2u.net/business/presentations/. /**productlifecycle**/default.html

2. https://docs.oracle.com/cd/E11108_02/otn/pdf/. /E11087_01.pdf

3. www.bizfilings.com › Home › Marketing › Product Developmen

4. https://www.mindtools.com/brainstm.html

5. https://www.quicksprout.com/. /how-to-**reverse-engineer**-your-competit

6. www.vertabelo.com/blog/documentation/**reverse-engineering**

https://support.microsoft.com/en-us/kb/273814

7. https://support.google.com/docs/answer/179740?hl=en

8. https://www.youtube.com/watch?v=2mjSDIBaUlM

thevirtualinstructor.com/foreshortening.html

https://dschool.stanford.edu/.../designresources/.../ModeGuideBOOTCAMP2010L.pdf

https://dschool.stanford.edu/use-our-methods/ 6. https://www.interactiondesign.

org/literature/article/5-stages-in-the-design-thinking-process 7.

http://www.creativityatwork.com/design-thinking-strategy-for-innovation/ 49 8.

https://www.nngroup.com/articles/design-thinking/ 9.

https://designthinkingforeducators.com/design-thinking/ 10.

www.designthinkingformobility.org/wp-content/.../10/NapkinPitch_Worksheet.pdf

Activity Based Learning (Suggested Activities in Class)/ Practical Based learning

http://dschool.stanford.edu/dgift/

Course Title:	**Mathematics-I for Computer Science and Engineering stream**		
Course Code:	**BMATS101**	CIE Marks	50
Course Type (Theory/Practical/Integrated)	Integrated	SEE Marks	50
		Total Marks	100
Teaching Hours/Week (L:T:P: S)	2:2:2:0	Exam Hours	03
Total Hours of Pedagogy	40 hours Theory + 10 to12 Lab slots	Credits	04

Course objectives: The goal of the course **Mathematics-I for Computer Science and Engineering stream** (B**MATS101**) is to

- **Familiarize** the importance of calculus associated with one variable and multivariable for computer science and engineering.
- **Analyze** Computer science and engineering problems by applying Ordinary Differential Equations.
- **Apply** the knowledge of modular arithmetic to computer algorithms.
- **Develop** the knowledge of Linear Algebra to solve the system of equations.

Teaching-Learning Process

These are sample Strategies, which teacher can use to accelerate the attainment of the various course outcomes and make Teaching –Learning more effective

1. Flipped Class
2. Chalk and Talk
3. Blended Mode of Teaching and Learning
4. Simulations, Interactive Simulations and Animations
5. NPTEL and Other Videos for theory topics
6. Smart Class Room
7. Lab Experiment Videos

Module-1: Calculus (8 hours)

Introduction to polar coordinates and curvature relating to EC & EE Engineering applications.Polar coordinates, Polar curves, angle between the radius vector and the tangent, angle between two curves. Pedal equations. Curvature and Radius of curvature - Cartesian, Parametric, Polar and Pedal forms. Problems.

Self-study: Center and circle of curvature, evolutes and involutes.

Applications: Communication signals, Manufacturing of microphones, and Image processing.

(RBT Levels: L1, L2 and L3)

Module-2: Series Expansion and Multivariable Calculus (8 hours)

Introduction of series expansion and partial differentiation in EC & EE Engineering applications.

Taylor's and Maclaurin's series expansion for one variable (Statement only) – problems. Indeterminate forms - L'Hospital's rule - Problems.

Partial differentiation, total derivative - differentiation of composite functions. Jacobian and problems. Maxima and minima for a function of two variables. Problems.

Self-study: Euler's Theorem and problems. Method of Lagrange's undetermined multipliers with single constraint.

Applications: Series expansion in communication signals, Errors and approximations, and vector calculus.

(RBT Levels: L1, L2 and L3)

Module-3: Ordinary Differential Equations (ODEs) of First Order (8 hours)

Introduction to first-order ordinary differential equations pertaining to the applications for EC & EE engineering.

Linear and Bernoulli's differential equations. Exact and reducible to exact differential equations-Integrating factors, Orthogonal trajectories, L-R and C-R circuits, Problems.

Non-linear differential equations: Introduction to general and singular solutions, Solvable for p only, Clairaut's equations, reducible to Clairaut's equations.Problems.

Self-Study: Applications of ODEs, Solvable for x and y.

Applications of ordinary differential equations: Rate of Growth or Decay, Conduction of heat.

(RBT Levels: L1, L2 and L3)

Module-4: Modular Arithmetic (8 hours)

Introduction of modular arithmetic and its applications in Computer Science and Engineering.

Introduction to Congruences, Linear Congruences, The Remainder theorem, Solving Polynomials, Linear Diophantine Equation, System of Linear Congruences, Euler's Theorem, Wilson Theorem and Fermat's little theorem. Applications of Congruences-RSA algorithm.

Self-Study: Divisibility, GCD, Properties of Prime Numbers, Fundamental theorem of Arithmetic.

Applications: Cryptography, encoding and decoding, RSA applications in public key encryption.

(RBT Levels: L1, L2 and L3)

Module-5: Linear Algebra (8 hours)

Introduction of linear algebra related to EC & EE engineering applications.

Elementary row transformation of matrix, Rank of a matrix. Consistency and Solution of system of linear equations - Gauss-elimination method, Gauss-Jordan method and approximate solution by Gauss-Seidel method. Eigenvalues and Eigenvectors, Rayleigh's power method to find the dominant Eigenvalue and Eigenvector.

Self-Study: Solution of system of equations by Gauss-Jacobi iterative method. Inverse of a square matrix by Cayley- Hamilton theorem.

Applications of Linear Algebra: Network Analysis, Markov Analysis, Critical point of a network system. Optimum solution.

(RBT Levels: L1, L2 and L3)

List of Laboratory experiments (2 hours/week per batch/ batch strength 15) 10 lab sessions + 1 repetition class + 1 Lab Assessment

1	2D plots for Cartesian and polar curves
2	Finding angle between polar curves, curvature and radius of curvature of a given curve
3	Finding partial derivatives and Jacobian
4	Applications to Maxima and Minima of two variables
5	Solution of first-order ordinary differential equation and plotting the solution curves
6	Program to compute area, volume and centre of gravity
7	Evaluation of improper integrals
8	Numerical solution of system of linear equations, test for consistency and graphical representation
9	Solution of system of linear equations using Gauss-Seidel iteration
10	Compute eigenvalues and eigenvectors and find the largest and smallest eigenvalue by Rayleigh power method.

Course outcome (Course Skill Set)

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

CO1	Apply the knowledge of calculus to solve problems related to polar curves andlearn the notion of partial differentiation to compute rate of change of multivariate functions
CO2	Analyze the solution of linear and nonlinear ordinary differential equations
CO3	Get acquainted and to apply modular arithmetic to computer algorithms
CO4	Make use of matrix theory for solving the system of linear equations and compute eigenvalues and eigenvectors
CO5	Familiarize with modern mathematical tools namely MATHEMATICA/MATLAB/ PYTHON/ SCILAB

Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (**20 Marks** out of 50). The minimum passing mark for the SEE is 35% of the maximum marks (**18 Marks** out of 50). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 35% (**18 Marks** out of 50) in the semester-end examination(SEE), and a minimum of 40% (**40 Marks** out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together

Continuous Internal Evaluation(CIE):

The CIE marks for the theory component of the IC shall be **25 Marks** and for the laboratory component **25 Marks**.

CIE for the theory component of the IC

- Three Tests each of **40 Marks** scale down to **15 Marks** and average of 3 test will be taken. The test will be after the completion of the syllabus of 35-40%, 65-70%, and 90-100% respectively.

  a) One Assignments and one quizzes/one seminars or b) one field survey and report presentation or c) one-course project with report totaling **10 Marks**.

Total Marks scored (test + assignments) will be for 15+10 = **25 Marks**

CIE for the practical component of the IC

- On completion of every experiment/program in the laboratory, the students shall be evaluated and marks shall be awarded on the same day. The **15 Marks** are for conducting the experiment and preparation of the laboratory record, the other **10 Marks** shall be for the test conducted at the end of the semester.
- The CIE marks awarded in the case of the Practical component shall be based on the continuous evaluation of the laboratory report. Marks of all "experiments' write- ups + conduction + lab record" = 10+10+10 = **30 Marks** respectively. the total marks for all the experiments are added and scaled down to **15 Marks**.
- The laboratory test **(duration 02 hours)** at the end of the 15^{th} week of the semester /after completion of all the experiments (whichever is early) shall be conducted for **50 Marks** and scaled down to **10 Marks.**
- Total Marks scored for the laboratory component of IC/IPCC (Lab Conduction + Lab Test) will be for 15+10 = **25 Marks**
- The minimum marks to be secured in CIE to appear for SEE shall be **10 Marks** (40% of maximum marks) in the theory component and **10 Marks** (40% of maximum marks) in the practical component. The laboratory component of the IC/IPCC shall be for CIE only. However, in SEE, the questions from the laboratory component shall be included**.** The theory component of the IC shall be for both CIE and SEE.

Semester End Examination(SEE):

Theory SEE will be conducted by Institution as per the scheduled timetable, with common question papers for the subject (**duration 03 hours)**

- The question paper shall be set for **100 Marks**. The medium of the question paper shall be English. The duration of SEE is 03 hours.
- The question paper will have 10 questions. Two questions per module. Each question is set for **20 Marks**. The students have to answer 5 full questions, selecting one full question from each module. The student has to answer for **100 Marks** and **marks scored out of 100 shall be proportionally reduced to 50 Marks**.

There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), **should have a mix of topics** under that module.

Suggested Learning Resources:

Books (Title of the Book/Name of the author/Name of the publisher/Edition and Year) Text Books

1. **B. S. Grewal**: "Higher Engineering Mathematics", Khanna Publishers, 44thEd., 2021.
2. **E. Kreyszig**: "Advanced Engineering Mathematics", John Wiley & Sons, 10thEd., 2018.

Reference Books

1. **V. Ramana:** "Higher Engineering Mathematics" McGraw-Hill Education, 11th Ed., 2017
2. **Srimanta Pal & Subodh C.Bhunia**: "Engineering Mathematics" Oxford University Press,
3. **N.P Bali and Manish Goyal**: "A Textbook of Engineering Mathematics" Laxmi Publications, 10th Ed., 2022.
4. **C. Ray Wylie, Louis C. Barrett:** "Advanced Engineering Mathematics" McGraw – Hill Book Co., New York, 6th Ed., 2017.
5. **Gupta C.B, Sing S.R and Mukesh Kumar:** "Engineering Mathematic for Semester I and II", Mc-Graw Hill Education(India) Pvt. Ltd 2015
6. **. K. Dass and Er. Rajnish Verma:** "Higher Engineering Mathematics" S. Chand Publication, 3rd Ed., 2014.
7. **James Stewart: "**Calculus" Cengage Publications, 7thEd., 2019.
8. **David C Lay:** "Linear Algebra and its Applications", Pearson Publishers, 4th Ed., 2018.
9. **Gareth Williams:** "Linear Algebra with Applications", Jones Bartlett Publishers Inc., 6th Ed., 2017.

Gilbert Strang: "Linear Algebra and its Applications", Cengage Publications, 4th Ed. 2022.

Web links and Video Lectures (e-Resources):

- http://nptel.ac.in/courses.php?disciplineID=111
- http://www.class-central.com/subject/math(MOOCs)
- http://academicearth.org/
- VTU e-Shikshana Program

VTU EDUSAT Program

Activity Based Learning (Suggested Activities in Class)/ Practical Based learning

- Quizzes
- Assignments
- Seminar

COs and POs Mapping (Individual teacher has to fill up)

COs	POs											
	1	**2**	**3**	**4**	**5**	**6**	**7**	8	9	10	11	12
CO1	**3**	**3**		**2**	**3**				**2**	**2**		**2**
CO2	**3**	**3**		**2**	**3**				**2**	**2**		**2**
CO3	**3**	**3**		**2**	**3**				**2**	**2**		**2**
CO4	**3**	**3**		**2**	**3**				**2**	**2**		**2**
CO5	**3**	**3**		**2**	**3**				**2**	**2**		**2**

Level 3- Highly Mapped,, Level 2-Moderately Mapped,, Level 1-Low Mapped

Wayanamac Education Trust ®

DON BOSCO INSTITUTE OF TECHNOLOGY

An Autonomous Institution under VTU - Belagavi,

Approved by AICTE – New Delhi, Recognized by Govt. of Karnataka

Kumbalagodu, Mysore Road, Bengaluru – 560074

Course Title:	**Mathematics-II for Computer Science and Engineering stream**		
Course Code:	**BMATS201**	CIE Marks	50
Course Type (Theory/Practical/Integrated)	Integrated	SEE Marks	50
		Total Marks	100
Teaching Hours/Week (L:T:P: S)	2:2:2:0	Exam Hours	03
Total Hours of Pedagogy	40 hours Theory + 10 to 12 Lab slots	Credits	04

Course objectives: The goal of the course **Mathematics-II for Computer Science and Engineering stream**(**BMATS201**) is to

- **Familiarize** the importance of Integral calculus and Vector calculus.
- **Learn** vector spaces and linear transformations**.**
- **Develop** the knowledge of numerical methods and apply them to solve transcendental and differential equations.

Teaching-Learning Process Pedagogy (General Instructions):

These are sample Strategies, which teachers can use to accelerate the attainment of the various course outcomes.

1. In addition to the traditional lecture method, different types of innovative teaching methods may be adopted so that the delivered lessons shall develop students' theoretical and applied mathematical skills.
2. State the need for Mathematics with Engineering Studies and Provide real-life examples.
3. Support and guide the students for self–study.
4. You will also be responsible for assigning homework, grading assignments and quizzes, and documenting students' progress.
5. Encourage the students to group learning to improve their creative and analytical skills.
6. Show short related video lectures in the following ways:
   - As an introduction to new topics (pre-lecture activity).
   - As a revision of topics (post-lecture activity).
   - As additional examples (post-lecture activity).
   - As an additional material of challenging topics (pre-and post-lecture activity).
   - As a model solution of some exercises (post-lecture activity).

Module-1Integral Calculus (8 hours)

Introduction to Integral Calculus in Computer Science &Engineering.

Multiple Integrals: Evaluation of double and triple integrals, evaluation of double integrals by change

of order of integration, changing into polar coordinates. Applications to find Area and Volume by double integral. Problems.

Beta and Gamma functions: Definitions, properties, relation between Beta and Gamma functions. Problems.

Self-Study: Center of gravity, Duplication formula.
Applications: Antenna and wave propagation, Calculation of optimum value in various geometries. Analysis of probabilistic models.

(RBT Levels: L1, L2 and L3)

Module-2 Vector Calculus(8 hours)

Introduction to Vector Calculus in Computer Science & Engineering.
Scalar and vector fields. Gradient, directional derivative, curl and divergence - physical interpretation, solenoidal and irrational vector fields. Problems.

Curvilinear coordinates: Scale factors, base vectors, Cylindrical polar coordinates, Spherical polar coordinates, transformation between Cartesian and curvilinear systems, orthogonality. Problems.

Self-Study: Vector integration and Vector line integral.
Applications: Conservation of laws, Electrostatics, Analysis of streamlines.

Module-3Vector Space and Linear Transformations(8 hours)

Importance of Vector Space and Linear Transformations in the field of Computer Science & Engineering.

Vector spaces: Definition and examples, subspace, linear span, Linearly independent and dependent sets, Basis and dimension. Problems.

Linear transformations: Definition and examples, Algebra of transformations, Matrix of a linear transformation. Change of coordinates, Rank and nullity of a linear operator, rank-nullity theorem. Inner product spaces and orthogonality. Problems.

Self-study: Angles and Projections. Rotation, Reflection, Contraction and Expansion. **Applications:** Image processing, AI & ML, Graphs and networks, Computer graphics. **(RBT Levels: L1, L2 and L3)**

Module-4Numerical Methods -1(8 hours)

Importance of numerical methods for discrete data in the field of computer science & engineering.
Solution of algebraic and transcendental equations - Regula-Falsi and Newton-Raphson methods (only formulae). Problems. Finite differences, Interpolation using Newton's forward and backward difference formulae, Newton's divided difference formula and Lagrange's interpolation formula (All formulae without proof). Problems.

Numerical integration: Trapezoidal, Simpson's $(1/3)^{rd}$ and $(3/8)^{th}$ rules(without proof). Problems.

S**elf-Study:** Bisection method, Lagrange's inverse Interpolation.

Applications: Estimating the approximate roots, extremum values, Area, volume, and surface area. Errors in finite precision.
(RBT Levels: L1, L2 and L3)

Module-5Numerical Methods -2(8 hours)

Introduction to various numerical techniques for handling Computer Science & Engineering applications.

Numerical Solution of Ordinary Differential Equations (ODE's): Numerical solution of ordinary differential equations of first order and first degree - Taylor's series method, Modified Euler's method, Runge-Kutta method of fourth order and Milne's predictor-corrector formula (No derivations of formulae). Problems.

Self-Study: Adam-Bashforth method.
Applications: Estimating the approximate solutions of ODE.
(RBT Levels: L1, L2 and L3).

List of Laboratory experiments (2 hours/week per batch/ batch strength 15)
10 lab sessions + 1 repetition class + 1 Lab Assessment

1	Program to compute area, surface area, volume and centre of gravity
2	Evaluation of improper integrals
3	Finding gradient, divergent, curl and their geometrical interpretation
4	Computation of basis and dimension for a vector space and Graphical representation of linear transformation
5	Computing the inner product and orthogonality
6	Solution of algebraic and transcendental equations by Ramanujan's, Regula-Falsi and Newton-Raphson method
7	Interpolation/Extrapolation using Newton's forward and backward difference formula
8	Computation of area under the curve using Trapezoidal, Simpson's $(1/3)^{rd}$ and $(3/8)^{th}$ rule
9	Solution of ODE of first order and first degree by Taylor's series and Modified Euler's method
10	Solution of ODE of first order and first degree by Runge-Kutta 4^{th} order and Milne's predictor-corrector method

Suggested software's: Mathematica/MatLab/Python/Scilab

Course outcome (Course Skill Set)
At the end of the course the student will be able to:

CO1	Apply the concept of change of order of integration and variables to evaluate multiple integrals and their usage in computing area and volume.
CO2	Understand the applications of vector calculus refer to solenoidal, and irrotational vectors.Orthogonal curvilinear coordinates.
CO3	Demonstrate the idea of Linear dependence and independence of sets in the vector space, and linear transformation
CO4	Apply the knowledge of numerical methods in analysing the discrete data and solving the physical and engineering problems.
CO5	Get familiarize with modern mathematical tools namely MATHEMATICA/ MATLAB /PYTHON/ SCILAB

Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (**20 Marks** out of 50). The minimum passing mark for the SEE is 35% of the maximum marks (**18 Marks** out of 50). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 35% (**18 Marks** out of 50) in the semester-end examination(SEE), and a minimum of 40% (**40 Marks** out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together

Continuous Internal Evaluation(CIE):

The CIE marks for the theory component of the IC shall be **25 Marks** and for the laboratory component **25 Marks**.

CIE for the theory component of the IC

- Three Tests each of **40 Marks** scale down to **15 Marks** and average of 3 test will be taken. The test will be after the completion of the syllabus of 35-40%, 65-70%, and 90-100% respectively.
  a) One Assignments and one quizzes/one seminars or b) one field survey and report presentation or c) one-course project with report totaling **10 Marks**.

Total Marks scored (test + assignments) will be for 15+10 = **25 Marks**

CIE for the practical component of the IC

- On completion of every experiment/program in the laboratory, the students shall be evaluated and marks shall be awarded on the same day. The **15 Marks** are for conducting the experiment and preparation of the laboratory record, the other **10 Marks** shall be for the test conducted at the end of the semester.
- The CIE marks awarded in the case of the Practical component shall be based on the continuous evaluation of the laboratory report. Marks of all "experiments' write- ups + conduction + lab record" = 10+10+10 = **30 Marks** respectively. the total marks for all the experiments are added and scaled down to **15 Marks**.
- The laboratory test **(duration 02 hours)** at the end of the 15th week of the semester /after completion of all the experiments (whichever is early) shall be conducted for **50 Marks** and scaled down to **10 Marks.**
- Total Marks scored for the laboratory component of IC/IPCC (Lab Conduction + Lab Test) will be for 15+10 = **25 Marks**
- The minimum marks to be secured in CIE to appear for SEE shall be **10 Marks** (40% of maximum marks) in the theory component and **10 Marks** (40% of maximum marks) in the practical component. The laboratory component of the IC/IPCC shall be for CIE only. However, in SEE, the

questions from the laboratory component shall be included**.** The theory component of the IC shall be for both CIE and SEE.

Semester End Examination(SEE):

Theory SEE will be conducted by Institution as per the scheduled timetable, with common question papers for the subject (**duration 03 hours)**

- The question paper shall be set for **100 Marks**. The medium of the question paper shall be English. The duration of SEE is 03 hours.
- The question paper will have 10 questions. Two questions per module. Each question is set for **20 Marks**. The students have to answer 5 full questions, selecting one full question from each module. The student has to answer for **100 Marks** and **marks scored out of 100 shall be proportionally reduced to 50 Marks**.

There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), **should have a mix of topics** under that module.

Suggested Learning Resources:

Books (Title of the Book/Name of the author/Name of the publisher/Edition and Year)

Text Books

1. **B. S. Grewal**: "Higher Engineering Mathematics", Khanna Publishers, 44thEd., 2021.
2. **E. Kreyszig**: "Advanced Engineering Mathematics", John Wiley & Sons, 10thEd., 2018.

Reference Books

1. **V. Ramana:** "Higher Engineering Mathematics" McGraw-Hill Education, 11th Ed., 2017
2. **Srimanta Pal & Subodh C.Bhunia**: "Engineering Mathematics" Oxford University Press, 3rd Ed., 2016.
3. **N.P Bali and Manish Goyal**: "A Textbook of Engineering Mathematics" Laxmi Publications, 10th Ed., 2022.
4. **C. Ray Wylie, Louis C. Barrett:** "Advanced Engineering Mathematics" McGraw – Hill Book Co., New York, 6th Ed., 2017.
5. **Gupta C.B, Sing S.R and Mukesh Kumar:** "Engineering Mathematic for Semester I and II", Mc-Graw Hill Education(India) Pvt. Ltd 2015.
6. **H. K. Dass and Er. Rajnish Verma:** "Higher Engineering Mathematics" S. Chand Publication, 3rd Ed., 2014.
7. **James Stewart: "**Calculus" Cengage Publications, 7thEd., 2019.
8. **David C Lay:** "Linear Algebra and its Applications", Pearson Publishers, 4th Ed., 2018.
9. **Gareth Williams:** "Linear Algebra with applications", Jones Bartlett Publishers Inc., 6th Ed., 2017.

Gilbert Strang: "Linear Algebra and its Applications", Cengage Publications, 4th Ed., 2022.

Web links and Video Lectures (e-Resources):

- http://nptel.ac.in/courses.php?disciplineID=111
- http://www.class-central.com/subject/math(MOOCs)

- http://academicearth.org/
- VTU e-Shikshana Program
- VTU EDUSAT Program

Activity-Based Learning (Suggested Activities in Class)/ Practical-Based Learning

- Quizzes
- Assignments

  Seminar

COs and POs Mapping (Individual teacher has to fill up)

COs	POs											
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
CO1	3	3		2	2				2	2		2
CO2	3	3		2	2				2	2		2
CO3	3	3		2	2				2	2		2
CO4	3	3		2	2				2	2		2
CO5	3	3		2	2				2	2		2

Level 3- Highly Mapped, Level 2-Moderately Mapped, Level 1-Low Mapped, Level 0- Not Mapped

Course Title:	**Applied Physics for CSE Stream**		
Course Code:	**BPHYS102/202**	CIE Marks	50
Course Type (Theory/Practical/Integrated)	Integrated	SEE Marks	50
		Total Marks	100
Teaching Hours/Week (L:T:P: S)	2:2:2:0	Exam Hours	03
Total Hours of Pedagogy	40 hours Theory + 10-12 Lab slots	Credits	04

Course objectives

- To study the essentials of photonics and its application in computer science.
- To study the principles of quantum mechanics and its application in quantum computing.
- To study the electrical properties of materials
- To study the essentials of physics for computational aspects like design and data analysis.

Teaching-Learning Process

These are sample Strategies, which teacher can use to accelerate the attainment of the various course outcomes and make Teaching –Learning more effective

1. Flipped Class
2. Chalk and Talk
3. Blended Mode of Teaching and Learning
4. Simulations, Interactive Simulations and Animations
5. NPTEL and Other Videos for theory topics
6. Smart Class Room
7. Lab Experiment Videos

Module-1 (8 Hours)

Laser and Optical Fibers:

LASER: Characteristic properties of a LASER beam, Interaction of Radiation with Matter, Einstein's A and B Coefficients and Expression for Energy Density (Derivation), Laser Action, Population Inversion, Metastable State, Requisites of a laser system, Semiconductor Diode Laser, Applications: Bar code scanner, Laser Printer, Laser Cooling(Qualitative), Numerical Problems.

Optical Fiber: Principle and Structure, Propagation of Light, Acceptance angle and Numerical Aperture (NA), Derivation of Expression for NA, Modes of Propagation, RI Profile, Classification of Optical Fibers, Attenuation and Fiber Losses, Applications: Fiber Optic networking, Fiber Optic Communication. Numerical Problems

Pre requisite: Properties of light

Self-learning: Total Internal Reflection

Module-2 (8 Hours)

Quantum Mechanics:

de Broglie Hypothesis and Matter Waves, de Broglie wavelength and derivation of expression by analogy, Phase Velocity and Group Velocity, Heisenberg's Uncertainty Principle and its application (Nonexistence of electron inside the nucleus - Non Relativistic), Principle of Complementarity, Wave Function, Time independent Schrödinger wave equation (Derivation), Physical Significance of a wave function and Born Interpretation, Expectation value, Eigen functions and Eigen Values, Particle inside one dimensional infinite potential well, Quantization of Energy States, Waveforms and Probabilities. Numerical Problems.

Pre requisite:Wave–Particle dualism
Self-learning: de Broglie Hypothesis

Module-3 (8 Hours)

Quantum Computing:

Principles of Quantum Information & Quantum Computing:

Introduction to Quantum Computing, Moore's law & its end, Differences between Classical & Quantum computing. Concept of qubit and its properties. Representation of qubit by Bloch sphere. Single and Two qubits. Extension to N qubits.

Dirac representation and matrix operations:

Matrix representation of 0 and 1 States, Identity Operator I, Applying I to$|0\rangle$and $|1\rangle$ states, Pauli Matrices and its operations on $|0\rangle$and $|1\rangle$states, Explanation of i) Conjugate of a matrix and ii) Transpose of a matrix. Unitary matrix U, Examples: Row and Column Matrices and their multiplication (Inner Product), Probability, and Quantum Superposition, normalization rule. Orthogonality, Orthonormality. Numerical Problems

Quantum Gates:

Single Qubit Gates: Quantum Not Gate, Pauli – X, Y and Z Gates, Hadamard Gate, Phase Gate (or S Gate), T Gate **Multiple Qubit Gates:**Controlled gate, CNOT Gate, (Discussion for 4 different input states). Representation of Swap gate, Controlled -Z gate, Toffoli gate.

Pre requisites: Matrices
Self-learning: Moore's law

Module-4 (8 Hours)

Electrical Properties of Materials and Applications

Electrical Conductivity in metals

Resistivity and Mobility, Concept of Phonon, Matheissen's rule, Failures of Classical Free Electron Theory, Assumptions of Quantum Free Electron Theory, Fermi Energy, Density of States, Fermi Factor, Variation of Fermi Factor With Temperature and Energy. Numerical Problems.

Superconductivity

Introduction to Super Conductors, Temperature dependence of resistivity, Meissner's Effect, Critical

Field, Temperature dependence of Critical field, Types of Super Conductors, BCS theory (Qualitative), Quantum Tunnelling, High Temperature superconductivity, Josephson Junctions (Qualitative), DC and RF SQUIDs (Qualitative), Applications in Quantum Computing: Charge, Phase and Flux qubits, Numerical Problems.

Pre requisites: Basics of Electrical conductivity
Self-learning: Resistivity and Mobility

Module-5 (8 hours)

Applications of Physics in computing:
Physics of Animation:
Taxonomy of physics based animation methods, Frames, Frames per Second, Size and Scale, Weight and Strength, Motion and Timing in Animations, Constant Force and Acceleration, The Odd rule, Odd-rule Scenarios, Motion Graphs, Examples of Character Animation: Jumping, Parts of Jump, Jump Magnification, Stop Time, Walking: Strides and Steps, Walk Timing. Numerical Problems

Statistical Physics for Computing: Descriptive statistics and inferential statistics, Poisson distribution and modeling the probability of proton decay, Normal Distributions (Bell Curves), Monte Carlo Method: Determination of Value of π. Numerical Problems.

Pre requisites: Motion in one dimension, Probability
Self-learning: Frames, Frames per Second

Course outcome (Course Skill Set)
At the end of the course the student will be able to:

CO1	Describe the principles of LASERS and Optical fibers and their relevant applications.
CO2	Discuss the basic principles of the Quantum Mechanics and its application in Quantum Computing.
CO3	Summarize the essential properties of superconductors and its applications in qubits.
CO4	Illustrate the application of physics in design and data analysis.
CO5	Practice working in groups to conduct experiments in physics and perform precise and honest measurements.

Assessment Details (both CIE and SEE)
The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (**20 Marks** out of 50). The minimum passing mark for the SEE is 35% of the maximum marks (**18 Marks** out of 50). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 35% (**18 Marks** out of 50) in the semester-end examination(SEE), and a minimum of 40% (**40 Marks** out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together

Continuous Internal Evaluation(CIE):

The CIE marks for the theory component of the IC shall be **25 Marks** and for the laboratory component **25 Marks**.

CIE for the theory component of the IC

- Three Tests each of **40 Marks** scale down to **15 Marks** and average of 3 test will be taken. The test will be after the completion of the syllabus of 35-40%, 65-70%, and 90-100% respectively.

  a) One Assignments and one quizzes/one seminars or b) one field survey and report presentation or c) one-course project with report totaling **10 Marks**.

Total Marks scored (test + assignments) will be for 15+10 = **25 Marks**

CIE for the practical component of the IC

- On completion of every experiment/program in the laboratory, the students shall be evaluated and marks shall be awarded on the same day. The **15 Marks** are for conducting the experiment and preparation of the laboratory record, the other **10 Marks** shall be for the test conducted at the end of the semester.
- The CIE marks awarded in the case of the Practical component shall be based on the continuous evaluation of the laboratory report. Marks of all "experiments' write- ups + conduction + lab record" = 10+10+10 = **30 Marks** respectively. the total marks for all the experiments are added and scaled down to **15 Marks**.
- The laboratory test **(duration 02 hours)** at the end of the 15th week of the semester /after completion of all the experiments (whichever is early) shall be conducted for **50 Marks** and scaled down to **10 Marks.**
- Total Marks scored for the laboratory component of IC/IPCC (Lab Conduction + Lab Test) will be for 15+10 = **25 Marks**
- The minimum marks to be secured in CIE to appear for SEE shall be **10 Marks** (40% of maximum marks) in the theory component and **10 Marks** (40% of maximum marks) in the practical component. The laboratory component of the IC/IPCC shall be for CIE only. However, in SEE, the questions from the laboratory component shall be included**.** The theory component of the IC shall be for both CIE and SEE.

Semester End Examination(SEE):

Theory SEE will be conducted by Institution as per the scheduled timetable, with common question papers for the subject (**duration 03 hours)**

- The question paper shall be set for **100 Marks**. The medium of the question paper shall be English. The duration of SEE is 03 hours.
- The question paper will have 10 questions. Two questions per module. Each question is set for **20 Marks**. The students have to answer 5 full questions, selecting one full question from each

module. The student has to answer for **100 Marks** and **marks scored out of 100 shall be proportionally reduced to 50 marks**.

There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub- questions), **should have a mix of topics** under that module.

Suggested Learning Resources:

Books (Title of the Book/Name of the author/Name of the publisher/Edition and Year)

1. Solid State Physics, S O Pillai, New Age International Private Limited, 8th Edition, 2018.
2. Engineering Physics by Gupta and Gour, Dhanpat Rai Publications, 2016 (Reprint).
3. A Textbook of Engineering Physics- M.N. Avadhanulu and P.G. Kshirsagar, 10th revised Ed, S. Chand. & Company Ltd, New Delhi.
4. Concepts of Modern Physics, Aurthur Beiser, McGrawhill, 6th Edition, 2009.
5. Lasers and Non Linear Optics, B B Loud, New age international, 2011 edition.
6. A Textbook of Engineering Physics by M.N. Avadhanulu, P G. Kshirsagar and T V S Arun Murthy, Eleventh edition, S Chand and Company Ltd. New Delhi-110055.
7. Quantum Computation and Quantum Information, Michael A. Nielsen & Isaac L. Chuang, Cambridge Universities Press, 2010 Edition.
8. Quantum Computing, Vishal Sahani, McGraw Hill Education, 2007 Edition.
9. Quantum Computing – A Beginner's Introduction, Parag K Lala, Indian Edition, Mc GrawHill, Reprint 2020.
10. Engineering Physics, S P Basavaraj, 2005 Edition, Subhash Stores.
11. Physics for Animators, Michele Bousquet with Alejandro Garcia, CRC Press, Taylor & Francis, 2016.
12. Quantum Computation and Logic: How Quantum Computers Have Inspired Logical Investigations,Maria Luisa Dalla Chiara, Roberto Giuntini, Roberto Leporini, Giuseppe Sergioli,TrendsinLogic, Volume 48, Springer.
13. Statistical Physics: Berkely Physics Course, Volume 5, F. Reif, McGraw Hill.
14. Introduction to Superconductivity, Michael Tinkham, McGraw Hill, INC, II Edition

Web links and Video Lectures (e-Resources):

LASER: https://www.youtube.com/watch?v=WgzynezPiyc

Superconductivity : https://www.youtube.com/watch?v=MT5Xl5ppn48

Optical Fiber : https://www.youtube.com/watch?v=N_kA8EpCUQo

Quantum Mechanics : https://www.youtube.com/watch?v=p7bzE1E5PMY&t=136s

Quantum Computing : https://www.youtube.com/watch?v=jHoEjvuPoB8

Quantum Computing :https://www.youtube.com/watch?v=ZuvCUU2jD30

Physics of Animation : https://www.youtube.com/watch?v=kj1kaA_8Fu4

Statistical Physics Simulation : https://phet.colorado.edu/sims/html/plinko-probability/latest/plinko-probability_en.html

NPTEL Supercoductivity:https://archive.nptel.ac.in/courses/115/103/115103108/

NPTEL Quantum Computing : https://archive.nptel.ac.in/courses/115/101/115101092

Virtual LAB :https://www.vlab.co.in/participating-institute-amrita-vishwa-vidyapeetham

Virtual LAB : https://vlab.amrita.edu/index.php?sub=1&brch=189&sim=343&cnt=1

Activity Based Learning (Suggested Activities in Class)/ Practical Based learning

http://nptel.ac.in

https://swayam.gov.in

https://virtuallabs.merlot.org/vl_physics.html https://phet.colorado.edu

https://www.myphysicslab.com

Laboratory Component:

Any Ten Experiments have to be completed from the list of experiments

Note: The experiments have to be classified into

a) Exercise
b) Demonstration
c) Structured Inquiry
d) Open Ended

Based on the convenience classify the following experiments into above categories. Select at least one simulation/spreadsheet activity.

List of Experiments

1. Determination of wavelength of LASER using Diffraction Grating.
2. Determination of acceptance angle and numerical aperture of the given Optical Fiber.
3. Determination of Magnetic Flux Density at any point along the axis of a circular coil.
4. Determination of resistivity of a semiconductor by Four Probe Method
5. Study the I-V Characteristics of the Given Bipolar Junction Transistor.
6. Determination of dielectric constant of the material of capacitor by Charging and Discharging method.
7. Study the Characteristics of a Photo-Diode and to determine the power responsivity / Verification of Inverse Square Law of Intensity of Light.
8. Study the frequency response of Series & Parallel LCR circuits.
9. Determination of Planck's Constant using LEDs.
10. Determination of Fermi Energy of Copper.
11. Identification of circuit elements in a Black Box and determination of values of the components.
12. Determination of Energy gap of the given Semiconductor.
13. Step Interactive Physical Simulations.
14. Study of motion using spread Sheets
15. Study of Application of Statistics using spread sheets
16. PHET Interactive Simulations(https://phet.colorado.edu/en/simulations/filter?subjects=physics&type=html,prototype)

COs and POs Mapping (Individual teacher has to fill up)

COs	**POs**											
	1	**2**	**3**	**4**	**5**	**6**	**7**	8	9	10	11	12
CO1	**3**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**
CO2	**3**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**
CO3	**3**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**
CO4	**3**	**2**	**1**	**-**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**2**
CO5	**3**	**2**	**1**	**-**	**2**	**-**	**-**	**3**	**3**	**-**	**-**	**2**

Level 3- Highly Mapped, Level 2-Moderately Mapped, Level 1-Low Mapped,

Note : The CO-PO mapping values are indicative. The course coordinator can alter the mapping using **Competency and Performance Indicators** mentioned in the **AICTE Exam reforms.**

CourseTitle	**Principles of Programming using C**	
Course Code	**BPOPS103/203**	CIE Marks 50
Course Type (Theory/Practical /Integrated)	Integrated	SEE Marks 50
		Total Marks 100
Teaching Hours/Week (L:T:P:S)	2:0:2	Exam Hours 3+2
Total Hours of Pedagogy	40 hours	Credits 03

Course Objectives:

CLO1. Elucidate the basic architecture and functionalities of a Computer.

CLO2. Apply programming constructs of C language to solve the real-world problems.

CLO3. Explore user-defined data structures like arrays, structures and pointers in implementing solutions to problems.

CLO4. Design and Develop Solutions to problems using structured programming constructs such as functions and procedures.

Teaching-Learning Process (General Instructions)

These are sample Strategies, which teachers can use to accelerate the attainment of the various course outcomes.

1. Lecturer method (L) need not to be only traditional lecture method, but alternative effective teaching methods could be adopted to attain the outcomes.
2. Use of Video/Animation to explain functioning of various concepts.
3. Encourage collaborative (Group Learning) Learning in the class.
4. Ask at least three HOT (Higher order Thinking) questions in the class, which promotes critical thinking.
5. Adopt Problem Based Learning(PBL), which fosters students Analytical skills, develop design thinking skills such as the ability to design, evaluate, generalize, and analyze information rather than simply recall it.
6. Introduce topics in main folder representations.
7. Show the different ways to solve the same problem and encourage the students outcome up with their own creative ways to solve them.
8. Discuss how every concept can be applied to the real world-and when that's possible it helps to improve the students' understanding.
9. Use https://pythontutor.com/visualize.html#mode=edit in order to visualize the operations of C Programs.

Module-1(6HoursofPedagogy)	
Introductionto C: Introduction to computers, input and output devices, designing efficient programs. Introduction to C, Structure of C program, Files used in a C program, Compilers, Compiling and executing C programs, variables, constants, Input/output statements in C, **Textbook:Chapter1.1-1.9,2.1-2.2,8.1-8.6,9.1-9.14**	
Teaching-Learning Process	Chalk and talk method/Power Point Presentation/ Web Content: https://tinyurl.com/4xmrexre
Module-2 (6 Hours of Pedagogy)	
Operators in C, Type conversion and typecasting. **Decision control and Looping statements:** Introduction to decision control, Conditional branching statements, iterative statements, nested loops, break and continue statements, goto statement. **Textbook: Chapter 9.15-9.16, 10.1-10.6**	
Teaching-LearningProcess	Chalk and talk method/Power Point Presentation/ Web Content: https://tinyurl.com/4xmrexre
Module-3 (8 Hours of Pedagogy)	
Functions: Introduction using functions, Function definition, function declaration, function call, return statement, passing parameters to functions, scope of variables, storage classes, recursive functions. Arrays: Declaration of arrays, accessing the elements of an array, storing values in arrays, Operations on arrays, Passing arrays to functions, two dimensional arrays, operations on two-dimensional arrays, two dimensional arrays to functions, multidimensional arrays, applications of arrays. **Textbook: Chapter 11.1-11.10**, **12.1-12.10,12.12**	
Teaching-Learning Process	Chalk and talk method/Power Point Presentation/WebContent
Module-4 (6 Hours of Pedagogy)	
Strings and Pointers: Introduction, string taxonomy, operations on strings, Miscellaneous string and character functions, arrays of strings. Pointers: Introduction to pointers, declaring pointer variables, Types of pointers, Passing arguments to functions using pointers. **Textbook: Chapter 13.1-13.6, 14-14.7**	
Teaching-LearningProcess	Chalk and talk method/Power Point Presentation/Web Content
Module-5 (6 Hours of Pedagogy)	
Structure, Union, and Enumerated Data Type: Introduction, structures and functions, Unions, unions, inside structures, Enumerated data type. **Files:** Introduction to files, using files in C, reading and writing data files. , Detecting end of file. **Textbook: Chapter 15.1 – 15.10, 16.1-16.5**	
Teaching-LearningProcess	Chalk and talk method/Power Point Presentation/Web Content

Course Outcomes (Course Skill Set)

At the end of the course the student will be able to: **CO 1.** Elucidte the basic architecture and functionalities of a computer and also recognize the hardware parts. **CO 2.** Apply programming constructs of C language to solve the real world problem. **CO 3.** Explore user-defined data structures like arrays in implementing solutions to problems like searching and sorting. **CO 4.** Explore user-defined data structures like structures, unions and pointers in implementing solutions. **CO 5.** Design and Develop Solutions to problems using modular programming constructs using functions.

Programming Assignments

1. Simulation of a Simple Calculator.

2. Compute the roots of a quadratic equation by accepting the coefficients. Print appropriate messages.

3. An electricity board charges the following rates for the use of electricity: for the first 200 units 80 paise per unit: for the next 100 units 90 paise per unit: beyond 300 units Rs 1 per unit. All users are charged a minimum of Rs. 100 as meter charge. If the total amount is more than Rs 400, then an additional surcharge of 15% of total amount is charged. Write a program to read the name of the user, number of units consumed and print out the charges.

4. Write a C Program to display the following by reading the number of rows as input,

```
    1
  1 2 1
 1 2 3 2 1
1 2 3 4 3 2 1
```

---

nth row

5. Implement Binary Search on Integers.

6. Implement Matrix multiplication and validate the rules of multiplication.

7. Compute sin(x)/cos(x) using Taylor series approximation. Compare your result with the built-in library function. Print both the results with appropriate inferences.

8. Sort the given set of N numbers using Bubble sort.

9. Write functions to implement string operations such as compare, concatenate, and find string length. Use the parameter passing techniques.

10. Implement structures to read, write and compute average- marks of the students, list the students scoring above and below the average marks for a class of N students. 11. Develop a program using pointers to compute the sum, mean and standard deviation of all elements stored in an array of N real numbers. 12. Write a C program to copy a text file to another, read both the input file name and target file name.

Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (**20 Marks** out of 50). The minimum passing mark for the SEE is 35% of the maximum marks (**18 Marks** out of 50). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 35% (**18 Marks** out of 50) in the semester-end examination(SEE), and a minimum of 40% (**40 Marks** out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

Continuous Internal Evaluation(CIE):

The CIE marks for the theory component of the IC shall be **25 Marks** and for the laboratory component **25 Marks**.

CIE for the theory component of the IC

- Three Tests each of **40 Marks** scale down to **15 Marks** and average of 3 test will be taken. The test will be after the completion of the syllabus of 35-40%, 65-70%, and 90-100% respectively.

  a) One Assignments and one quizzes/one seminars or b) one field survey and report presentation or c) one-course project with report totaling **10 Marks**.

Total Marks scored (test + assignments) will be for 15+10 = **25 Marks**

CIE for the practical component of the IC

- On completion of every experiment/program in the laboratory, the students shall be evaluated and marks shall be awarded on the same day. The **15 Marks** are for conducting the experiment and preparation of the laboratory record, the other **10 Marks** shall be for the test conducted at the end of the semester.
- The CIE marks awarded in the case of the Practical component shall be based on the continuous evaluation of the laboratory report. Marks of all "experiments write- ups + conduction + lab record" = 10+10+10 = **30 Marks** respectively. the total marks for all the experiments are added and scaled down to **15 Marks**.
- The laboratory test **(duration 02 hours)** at the end of the 15th week of the semester /after completion of all the experiments (whichever is early) shall be conducted for **50 Marks** and scaled down to **10 Marks.**
- Total Marks scored for the laboratory component of IC/IPCC (Lab Conduction + Lab Test) will be for 15+10 = **25 Marks**
- The minimum marks to be secured in CIE to appear for SEE shall be **10 Marks** (40% of maximum marks) in the theory component and **10 Marks** (40% of maximum marks) in the practical component. The laboratory component of the IC/IPCC shall be for CIE only. However, in SEE, the questions from the laboratory component shall be included**.** The theory component of the IC shall be for both CIE and SEE.

Semester End Examination(SEE):

Theory SEE will be conducted by Institution as per the scheduled timetable, with common question papers for the subject (**duration 03 hours)**

- The question paper shall be set for **100 Marks**. The medium of the question paper shall be English. The duration of SEE is 03 hours.

The question paper will have 10 questions. Two questions per module. Each question is set for **20 Marks**. The students have to answer 5 full questions, selecting one full question from each module. The student has to answer for **100 Marks** and **marks scored out of 100 shall be proportionally reduced to 50 Marks**.

Suggested Learning Resources:

Textbooks

1. Computer fundamentals and programming in c, "ReemaThareja", Oxford University, Second edition, 2017.

Reference Books:

1. E. Balaguruswamy, Programming in ANSI C, 7th Edition, Tata McGraw-Hill.
2. Brian W. Kernighan and Dennis M. Ritchie, The 'C' Programming Language, Prentice Hall of **India.**

Web links and Video Lectures (e-Resources):

1. elearning.vtu.ac.in/econtent/courses/video/BS/15PCD23.html

2. https://nptel.ac.in/courses/106/105/106105171/ MOOC courses can be adopted for more clarity in understanding the topics and verities of problem solving methods. 3. https://tinyurl.com/4xmrexre

Activity Based Learning (Suggested Activities in Class)/ Practical Based learning

- **Quizzes**
- **Assignments**
- **Seminars**

Course Title:	**Professional Writing Skills in English**		
Course Code:	BPWSK206-106	CIE Marks	50
Course Type (Theory/Practical /Integrated)	Theory	SEE Marks	50
		Total Marks	100
Teaching Hours/Week (L:T:P: S)	1:0:0:0	Exam Hours	01 Theory
Total Hours of Pedagogy	15 hours	Credits	01

Course objectives:

The course Professional Writing Skills in English (BPWSK206) will enable the students,

1. To Identify the Common Errors in Writing and Speaking of English.
2. To Achieve better Technical writing and Presentation skills for employment.
3. To read Technical proposals properly and make them to write good technical reports.
4. To Acquire Employment and Workplace communication skills.
5. To learn about Techniques of Information Transfer through presentation in different level.

Teaching-Learning Process

These are sample Strategies, which teacher can use to accelerate the attainment of the various course outcomes and make Teaching –Learning more effective: Teachers shall adopt suitable pedagogy for effective teaching - learning process. The pedagogy shall involve the combination of different methodologies which suit modern technological tools and software's to meet the present requirements of the Global employment market.

(i) Direct instructional method (Low/Old Technology), (ii) Flipped classrooms (High/advanced Technological tools), (iii) Blended learning (Combination of both), (iv) Enquiry and evaluation based learning,

(v) Personalized learning, (vi) Problems based learning through discussion, (vii) Following the method of expeditionary learning Tools and techniques, (viii) Use of audio visual methods through language Labs in teaching of of LSRW skills.

Apart from conventional lecture methods, various types of innovative teaching techniques through videos, animation films may be adapted so that the delivered lesson can progress the students In theoretical applied and practical skills in teaching of communicative skills in general.

Language Lab : To augment LSRW, grammar and Vocabulary skills (Listening, Speaking, Reading, Writing and Grammar, Vocabulary) through tests, activities, exercises etc., comprehensive web-based learning and assessment systems can be referred as per the AICTE / VTU guidelines.

Module-1 (03 hours of pedagogy)

Identifying Common Errors in Writing and Speaking English: Common errors identification in parts of speech, Use of verbs and phrasal verbs, Auxiliary verbs and their forms, Subject Verb Agreement (Concord Rules), Common errors

in Subject-verb agreement, Sequence of Tenses and errors identification in Tenses. Words Confused/Misused.

Module-2 (03 hours of pedagogy)

Nature and Style of sensible writing: Organizing Principles of Paragraphs in Documents, Writing Introduction and Conclusion, Importance of Proper Punctuation, Precise writing and Techniques in Essay writing, Sentence arrangements

and Corrections activities. Misplaced modifiers, Contractions, Collocations, Word Order, Errors due to the Confusion of words.

Module-3 (03 hours of pedagogy)

Technical Reading and Writing Practices: Technical writing process, Introduction to Technical Reports writing, Significance of Reports, Types of Reports. Introduction to Technical Proposals Writing, Types of Technical Proposals, Characteristics of Technical Proposals. Scientific Writing Process. Grammar – Voices and Reported Speech, Spotting Error & Sentence Improvement, Cloze Test and Theme Detection Exercises.

Module-4 (03 hours of pedagogy)

Professional Communication for Employment: Listening Comprehension, Types of Listening, Listening Barriers, Improving Listening Skills. Reading Comprehension, Tips for effective reading. Job Applications, Types of official/employment/business Letters, Resume vs. Bio Data, Profile, CV. Writing effective resume for employment, Emails,

Blog Writing and Memos.

Module-5 (03 hours of pedagogy)

Professional Communication at Workplace: Group Discussion and Professional Interviews, Characteristics and Strategies

of a GD and PI's, Intra and Interpersonal Communication Skills at workplace, Non-Verbal Communication Skills and its importance in GD and Interview. Presentation skills and Formal Presentations by Students, Strategies of Presentation Skills.

Course outcome (Course Skill Set)

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

CO1	To understand and identify the Common Errors in Writing and Speaking.
CO2	To Achieve better Technical writing and Presentation skills.
CO3	To read Technical proposals properly and make them to Write good technical reports.
CO4	Acquire Employment and Workplace communication skills.
CO5	To learn about Techniques of Information Transfer through presentation in different level.

Assessment Details (both CIE and SEE)

The weight age of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (**20 Marks** out of 50). The minimum passing mark for the SEE is 35% of the maximum marks (**18 Marks** out of 50). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 35% (18 Marks out of 50) in the semester-end examination (SEE), and a minimum of 40% (**40 Marks** out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

Continuous Internal Evaluation(CIE):

- Two Tests each of **25 Marks** and average of both the test will be taken. The test will be after the completion of the syllabus of 50% and 100% respectively.

  a) One Assignments and one quizzes/one seminars or b) one field survey and report presentation or c) one-course project with report totalling **25 Marks**.

Total Marks scored (Test + Assignments) will be for 25+25 = **50 Marks**

Semester End Examinations (SEE)

SEE paper shall be set for 50 questions, each of the 01 mark. The pattern of the question paper is MCQ (multiple choice questions). The time allotted for SEE is 01 hour. The student must secure a minimum of 35% of the maximum marks for SEE.

Suggested Learning Resources:

Textbook:

1) **"Professional Writing Skills in English"** published by Fillip Learning – Education (ILS), Bangalore – 2022.
2) **"Functional English"** (As per AICTE 2018 Model Curriculum) (ISBN-978-93-5350-047-4) Cengage learning India Pvt Limited [Latest Edition 2019].

Reference Books:

1) **English for Engineers** by N.P.Sudharshana and C.Savitha, Cambridge University Press – 2018.
2) **Technical Communication** by Gajendra Singh Chauhan and Et al, (ISBN-978-93-5350-050-4), Cengage learning India Pvt Limited [Latest Revised Edition] - 2019.
3) **Technical Communication** – Principles and Practice, Third Edition by Meenakshi Raman and Sangeetha Sharma, Oxford University Press 2017.
4) **High School English Grammar & Composition** by Wren and Martin, S Chandh & Company Ltd – 2015.

Effective Technical Communication – Second Edition by M Ashraf Rizvi, McGraw Hill Education (India) Private

Activity Based Learning (Suggested Activities in Class)/ Practical Based learning

- ✓ Contents related activities (Activity-based discussions)
- ✓ For active participation of students instruct the students to prepare Flowcharts and Handouts
- ✓ Organising Group wise discussions Connecting to placement activities
- ✓ Quizzes and Discussions, Seminars and assignments