

Scheme of Teaching and Examinations-2025 Outcome-Based Education (OBE) and Choice-Based Credit System (CBCS) (Effective from the academic year 2025-26)													
I Semester					(Chemistry Group)								
Sl. No	Course and Course Code		Course Title	TD/PSB	Teaching Hours/Week				Examination				Credits
					Theory Lecture	Tutorial	Practical/ Drawing	SAAE	Duration in hours	CIE Marks	SEE Marks	Total Marks	
1	ASC	1BMATx101	Applied Mathematics-I (Stream Specific)	Maths Dept	3	2	0		03	50	50	100	04
2	ASC(IC)	1BCHEx102	Applied Chemistry (Stream Specific)	CHE Dept	3	0	2		03	50	50	100	04
3	ETC	1BAIA103/ BETC105x	Introduction to AI and Applications	Any Dept	3	0	0		03	50	50	100	03
4	ESC	1BESC104x	Engineering Science Course I	Respective Engg Dept	3	0	0		03	50	50	100	03
5	PLC(IC)	1BPLC105x	Programming Language Course	CSE & allied Dept	3	0	2		03	50	50	100	04
6	AEC	1BENG106	Communication Skills	Humanities Dept	1	0	0		02	50	50	100	01
7	AEC (NCMC)	1BICO107	Indian Constitution & Engineering Ethics	Humanities Dept	1	0	0		--	100	--	100	PP
8	AEC/SDC	1BIDTL158	Innovation and Design Thinking Lab (Project-based learning)	Any Dept	0	0	2		02	50	50	100	01
	TOTAL				17	02	07		20	450	350	800	20
9	AICTE Activity Points (students have to earn 100 activity points between 01 to 08 semesters)				Compulsory requirement for the award of a degree								
ASC-Applied Science Course, ESC- Engineering Science Courses, IC – Integrated Course (Practical Course Integrated with Theory Course), PLC(IC)- Programming Language Course (Integrated Course), AEC- Ability Enhancement Course, NCMC: Non Credit Mandatory Course, AEC/SDC- Ability Enhancement Course/Skill Development course, TD/PSB- Teaching Department / Paper Setting Board, S- (SAAE)-Students’ Academic Activity Engagement Hours, CIE –Continuous Internal Evaluation, SEE- Semester End Examination, PP : (Pass/Pass) is assigned to a noncredit course. “PP” represents pass in a course provided students have successfully completed the CIE requirements. Otherwise, “NP-not pass shall be awarded. “PP” is essential for the award of the degree													
Credit Definition: 1-hour Lecture (L) per week=1Credit 2-hoursTutorial(T) per week=1Credit 2-hours Practical / Drawing (P) per week=1Credit				04-Credit courses are designed for 50 hours of Teaching-Learning sessions 04-Credit (IC) courses are designed for 40 hours’ theory and 10-12 hours of practical sessions 03-Credit courses are designed for 40 hours of Teaching-Learning Session 02- Credit courses are designed for 25 hours of Teaching-Learning Session 01-Credit courses are designed for 12 hours of Teaching-Learning sessions									

Applied Mathematics-I					Applied Chemistry				
Code	Title	L	T	P	Code	Title	L	T	P
1BMATC101	Differential Calculus and Linear Algebra: CV Stream	3	2	0	1BCHC102	Applied Chemistry for Sustainable Structure & Material Design (CV)	3	0	2
1BMATM101	Differential Calculus and Linear Algebra: ME Stream	3	2	0	1BCHEM102	Applied Chemistry for Advanced Metal Protection and Sustainable Energy Systems (ME)	3	0	2
1BMATE101	Differential Calculus and Linear Algebra; EEE stream	3	2	0	1BCHEE102	Applied Chemistry for Emerging Electronics and Futuristic Devices (EEE, ECE)	3	0	2
1BMATS101	Calculus And Linear Algebra: CSE stream	3	2	0	1BCHES102	Applied Chemistry for Smart Systems (CSE)	3	0	2
Engineering Science Courses-I (ESC-I)					Programming Language Courses (PLC)				
Code	Title	L	T	P	Code	Title	L	T	P
1BESC104A	Building Sciences & Mechanics	3	0	0	1BPLC105E	Introduction to C Programming (For none IT programmes)	3	0	0
1BESC104B	Introduction to Electrical Engineering	3	0	0	1BPLC105B	Python Programming (for CSE and allied programmes)	3	0	0
1BESC104C	Introduction to Electronics and Communication Engineering	3	0	0					
1BESC104D	Introduction to Mechanical Engineering	3	0	0					
1BESC104E	Essentials of Information Technology	3	0	0					
Integrated courses (IC), combining theory with practical components. (i) Theory sessions shall be conducted for 3 hours per week, while the practical sessions shall be conducted for 2 hours per week. (ii)Theory components shall be evaluated through both Continuous Internal Evaluation (CIE) and Semester End Examination (SEE). (iii)The practical component shall be assessed only through CIE.									
The Mathematics/Chemistry courses shall be taught by a single faculty member per session, with no sharing of the course (subject) modules. The tutorial sessions for the mathematics course shall be conducted in the laboratory environment using Maxima/Mathematica/ Python/Scilab/MATLAB software to enhance computational understanding and application skills.									
All students admitted to the engineering program have to complete Applied Mathematics-I and Applied Mathematics-II in I and II semesters by selecting the subjects prescribed for their stream, viz. CV, ME, EEE or CSE, under the heading Mathematics-I and Mathematics-II. Those who have completed the chemistry course under the heading Applied Chemistry in I semester have to select the prescribed stream wise physics course under the heading Applied physics during II semester.									
Engineering Sciences Courses-I (ESC-I): These courses are designed to broaden the technical knowledge of students beyond their core area of study. These courses enable students to gain a foundational understanding of engineering principles from other stream courses. Students are required to select and complete two courses that are not belong to their admitted program stream. For example, a student admitted to the any programme of the Civil Engineering stream should not select Introduction to Building Sciences but any other two. One course shall selected under ESC-I and another course under ESC-II. The two courses must be different from the other.									
Communication Skills: This course shall be conducted in a laboratory environment									

The **Student Induction Programme (SIP)**, initiated by the All India Council for Technical Education (AICTE), is designed to help newly admitted students in technical institutions transition smoothly into the higher education environment. It aims to familiarize students with the institutional culture, foster connections with peers and faculty, and provide a foundation for holistic learning. Activities under SIP may include Physical Activities, Creative Arts, Universal Human Values, Literary Events, and Proficiency Modules. Lectures shall be by Eminent Personalities, Local Area Visits, Department/Branch Familiarization, and Innovation-related sessions.

The first year of the Engineering programmes is composed of I semester, II semester and Summer Semester. SIP activities shall be scheduled in the afternoon sessions during the first week of class commencement of I and II semesters only.

The specific programmes to be conducted will be notified separately by the University via the academic calendar or through a separate notification.

AICTE Activity Points Requirement for BE/B.Tech. Programmes

As per AICTE guidelines (refer Chapter 6 – *AICTE Activity Point Program, Model Internship Guidelines*), in addition to academic requirements, students must earn a specified number of **Activity Points** to be eligible for the award of the degree. The points to be earned is:

1. **Regular students** admitted to a 4-year degree program must earn **100 Activity Points**.
2. **Lateral entry students** (joining from the second year) must earn **75 Activity Points**.
3. **Students transferred** from other universities directly into the fifth semester must earn **50 Activity Points** from the date of entry into VTU.

These Activity Points are **non-credit** and will not be considered for **the SGPA/CGPA** or be used for **vertical progression**. However, earning Activity Points is mandatory for the **award of the degree**, and the points earned will be reflected on the **eighth semester Grade Card**.

If a student completes all the semesters (eight or six) at the end of the programme but fails to earn the required Activity Points, the eighth-semester Grade Card will be withheld until the requirement is fulfilled. Also, the degree will be awarded only after the Grade Card has been released.

The hours spent earning the activity points will not be counted for regular attendance requirements. Students can accumulate these points at any time during their program period, including weekends, holidays, and vacations, starting from the year of admission, provided they meet the minimum hours of engagement prescribed for each activity by AICTE.

Sl. No	Stream	UG Programmes under the stream with code
1	Civil Engineering Stream (CV)	(1) Civil engineering (CV), (2) Mining Engineering (MI)
2	Mechanical Engineering Stream ME	(1)Aeronautical Engineering (AE), (2)Aerospace Engineering (AS),(3) Agreecultural Engineering (AG),(4)Automation and Robotics (AR), (5)Automobile Engineering (AU), (6)Chemical Engineering (CH), (7) Industrial & Production Engineering (IP), (8)Industrial Engineering & Management (IM), (9) Manufacturing Science and Engineering (MS), (10) Marine Engineering (MR), (11) Mechanical & Smart Manufacturing (MM), (12) Mechanical Engineering (ME), (13)Mechatronics (MT), (14) Petrochem Engineering (PC), (15)Robotics & Automation (RA),(16) Robotics and Artificial Intelligence (RI),(17)Silk Technology (ST), (18) Textile Technology (TX),(19)Energy Engineering (ER),(20) Smart Agritech (SA).
3	Electrical and Electronics Engineering Stream (EEE)	(1)Electronics & Communication Engineering (EC), (2)Biomedical Engineering (BM), (3)Electrical & Electronics Engineering (EE), (4) Electronics & Instrumentation Engineering (EI),(5) Electronics & Telecommunication Engineering (ET),(6) Industrial IoT (IO), (7) Medical Electronics Engineering (ML),(8) Electronics Engineering (VLSI Design and Technology) (VL),(9) Electronics & Communication(Advanced Communication Technology) (EA),(10) Electronics & Computer Engineering (UE).
4	Computer Science and Engineering Stream (CSE)	(1) Computer Science and Engineering (CS), (2)Computer Engineering (CE), (3) Artificial Intelligence and Data Science (AD), (4)Artificial Intelligence and Machine Learning (AI),(5)Biotechnology (BT),(6)Computer & Communication Engineering (CM), (7) Computer Science and Business System (CB),(8)Computer Science and Design (CG),(9)Computer Science and Engineering (IoT) (CO), (10)CSE(Artificial Intelligence and Machine Learning) (CI),(11) CSE(Artificial Intelligence) (CA),(12) CSE(Cyber Security) (CY), (13)CSE(Data Science) (CD),(14) CSE(IoT and Cyber Security including Block Chain Technology) (IC), (15) Data Science (DS), (16) Information Science & Engineering (IS),(17) Computer Science (CR).

Scheme of Teaching and Examinations-2025 Outcome-Based Education(OBE) and Choice Based Credit System(CBCS) (Effective from the academic year 2025-26)													
II Semester (For the students who have studied the Chemistry group in I semester)													
Sl. No	Course and Course Code		Course Title	TD/PSB	Teaching Hours/Week				Examination				Credits
					Theory Lecture	Tutorial	Practical/ Drawing	SAAE	Duration in hours	CIE Marks	SEE Marks	Total Marks	
1	ASC	1BMATx201	Applied Mathematics -II (Stream Specific)	Maths Dept	3	2	0		03	50	50	100	04
2	ASC(IC)	1BPHYx202	Applied Physics (Stream Specific)	PHY Dept	3	0	2		03	50	50	100	04
3	ESC	1BCEDx203	Computer-Aided Engineering Drawing (Stream Specific)	ME dept	2	0	2		03	50	50	100	03
4	ESC	1Bxxx204x	Engineering Science Course-II	Respective Engg Dept	3	0	0		03	50	50	100	03
5	PSC	1Bxxx205	Programme Specific Courses	Respective Engg Dept	3	0	0		03	50	50	100	03
6	AEC (NMC)	1BSKS206	Soft Skills	Humanities Dept	1	0	0		--	100	---	100	PP
7	PSC/ESC	1Bxxxl207x	Program-Specific Course Lab	Respective dept	0	0	2		02	50	50	100	01
8	AEC/SDC	1BPRJ258	Interdisciplinary Project-Based Learning	Combination of Departments	0	0	0	02	02	50	50	100	01
9	HSMC	1BKSK209(BKSK107)/ 1BKBK209(BKKBK107)	Sanskrutika Kannada/ Balake Kannada	Humanities Dept	1	0	0		01	50	50	100	01
	TOTAL				16	02	06		21	500	400	900	20
ASC-Applied Science Course, IC – Integrated Course (Practical Course Integrated with Theory Course), ESC- Engineering Science Courses, PSC-Programme Specific Course, ESC- Engineering Science Courses, ETC- Emerging Technology Course, AEC- Ability Enhancement Course, NCMC: Non Credit Mandatory Course, PP : (Pass/Pass) is assigned to a non credit course. “PP” represents pass in course provided students have successfully completed the CIE requirements. Otherwise, “NP-not pass shall be awarded. “PP” is essential for the award of the degree HSMC-Humanity, Social Science and management Course, AEC/SDC- Ability Enhancement Course/Skill Development course, TD/PSB- Teaching Department / Paper Setting Board, CIE –Continuous Internal Evaluation, SEE- Semester End Examination, S- (SAAE)-Students’ Academic Activity Engagement Hours,													

Applied Mathematics-II					Applied Physics				
Code	Title	L	T	P	Code	Title	L	T	P
1BMATC201	Differential Calculus and Numerical Methods: CV stream	3	2	0	1BPHYC202	Physics for Sustainable Structural Systems (CV stream)	3	0	2
1BMATM201	Multivariable Calculus and Numerical Methods: ME stream	3	2	0	1BPHYM202	Physics of Materials (Mech stream)	3	0	2
1BMATE201	Calculus, Laplace Transform, and Numerical Techniques: EEE stream	3	2	0	1BPHEC202	Quantum Physics and Electronic Sensors (ECE stream)	3	0	2
1BMATS201	Numerical Methods: CSE Stream	3	2	0	1BPHEE202	Electrical Engineering Materials (EEE)	3	0	2
					1BPHYS202	Quantum Physics and Applications (CSE stream)	3	0	2
Programme Specific Courses (PSC)					Programme Specific Courses Lab (PSCL)				
1BCIV205	Engineering Mechanics	3	0	0	1BMEML207	Mechanics and Materials Lab	0	0	2
1BEME205	Elements of Mechanical Engineering	3	0	0	1BEMEL207	Elements of Mechanical Engineering Lab	0	0	2
1BBEE205	Basics of Electrical Engineering	3	0	0	1BBEEL207	Basic Electrical Lab	0	0	2
1BECE205	Fundamentals of Electronics & Communication Engineering	3	0	0	1BECEL207	Fundamentals of Electronics & Communication Engineering Lab	0	0	2
1BEIT205	Programming in C	3	0	0	1BPOPL207	C Programming Lab	0	0	2
1BEBT205	Elements of Biotechnology and Biomimetics	3	0	0	1BSSAL207	Soil Science and Agronomy Field Lab	0	0	2
1BSSA205	Principles of Soil Science and Agronomy	3	0	0	1BECTL207	Elements of Biotechnology Lab	0	0	2
1BEAE205	Elements of Aeronautical Engineering	3	0	0	1BEAEL207	Elements of Aeronautical Engineering Lab	0	0	2
1BECHE205	Elements of Chemical Engineering	3	0	0	1BECHEL207	Elements of Chemical Engineering Lab	0	0	2
Engineering Science Courses-II (ESC-II)					Computer-Aided Engineering Drawing				
Code	Title	L	T	P	Code	Title	L	T	P
1BESC204A	Building Sciences & Mechanics	3	0	0	1BCEDC203	Computer-Aided Engineering Drawing for CV Stream	2	0	2
1BESC204B	Introduction to Electrical Engineering	3	0	0	1BCEDM203	Computer-Aided Engineering Drawing for ME stream Engineering	2	0	2
1BESC204C	Introduction to Electronics & Communication Engineering	3	0	0	1BCEDEC203	Computer-Aided Engineering Drawing for EEE stream	2	0	2
1BESC204D	Introduction to Mechanical Engineering	3	0	0	1BCEDEE203	Computer-Aided Engineering Drawing for EEE stream (Only for EEE Students)	2	0	2
1BESC204E	Essentials of Information Technology	3	0	0	1BCEDS203	Computer-Aided Engineering Drawing for CSE stream	2	0	2
Integrated courses (IC), combining theory with practical components. (i) Theory sessions will be conducted for 3 hours per week, while the practical sessions will be conducted for 2 hours per week. (ii) Theory component shall be evaluated through both Continuous Internal Evaluation (CIE) and Semester End Examination (SEE). (iii) The practical component will be assessed only through CIE.									
The Mathematics/Physics courses shall be taught by a single faculty member per session, with no sharing of the course (subject) modules. The tutorial sessions for the mathematics course shall be conducted in a laboratory environment using Maxima/Mathematica/ Python/Scilab/MATLAB software to enhance									

computational understanding and application skills.

Students admitted to a specific engineering stream are required to select and successfully complete **Applied Mathematics-I** and **Applied Physics** courses that are aligned to their program stream.

Programme Specific Courses (PSC): Programme Specific Courses (PSC) are a set of core courses tailored to a specific branch or discipline of engineering in which a student is enrolled (e.g., Mechanical Engineering, Computer Science, Civil Engineering, etc.). These courses are intended to provide students with in-depth knowledge and specialized skills essential for professional competence in the chosen field.

Students must select and complete the course from this group that **corresponds to their admitted program stream**.

Similarly, students are also required to choose and pass laboratory courses that are specific to their stream from the **Programme Specific Courses Laboratory (PSCL)** group.

Computer-Aided Engineering Drawing: The courses under this category are stream-specific. Students must select and complete the course that corresponds to their admitted engineering stream.

Engineering Sciences Courses-II (ESC-II): These courses are designed to broaden the technical knowledge of students beyond their core area of study. These courses enable students to gain a foundational understanding of engineering principles from other disciplines. Students are required to select and complete a course that does not belong to their admitted program stream. Students should select a course other than that was selected under ESC-I and other than course not belonging to their stream.

For the course **Interdisciplinary Project (BPRJ259)**, it is mandatory to form a team comprising students from multiple engineering disciplines. For example, a project team may include students from Mechanical Engineering, Electronics and Communication Engineering (ECE), and Computer Science and Engineering (CSE), working collaboratively to design and implement the project.



Scheme of Teaching and Examinations (2025) Outcome-Based Education (OBE)and Choice-Based Credit System (CBCS) (Effective from the academic year 2025-26)													
I Semester					(Physic Group)								
Sl. No	Course and Course Code		Course Title	TD/PSB	Teaching Hours/Week				Examination				Credits
					Theory Lecture	Tutorial	Practical/ Drawing	SAAE	Duration in hours	CIE Marks	SEE Marks	Total Marks	
1	ASC	1BMATx101	Applied Mathematics -I (Stream Specific)	Maths Dept	3	2	0		03	50	50	100	04
2	ASC(IC)	1BPHYx102	Applied Physics (Stream Specific)	PHY Dept	3	0	2		03	50	50	100	04
3	ESC	1BCEDx103	Computer-Aided Engineering Drawing (Stream Specific)	ME Dept	2	0	2		03	50	50	100	03
4	ESC	1BXXX104x	Engineering Science Courses-I	Respective Engg Dept	3	0	0		03	50	50	100	03
5	PSC	1Bxxx105	Programme Specific Course	Respective Engg dept	3	0	0		03	50	50	100	03
6	AEC (NCMC)	1BSKS106	Soft Skills	Humanities Dept	1	0	0		-	100	---	100	PP
7	PSC	1BxxxL107	Program-Specific Course Lab	Respective Engg Dept	0	0	2		02	50	50	100	01
8	AEC/SDC	1BIDTL158	Innovation and Design Thinking Lab (Project-based learning)	Respective Dept	0	0	2		02	50	50	100	01
9	HSMS	1BKSK109(BKSK107)/ 1BKBK109(BKKBK107)	Sanskrutika Kannada/ Balake Kannada	Humanities Dept	1	0	0		01	50	50	100	01
	TOTAL				16	02	08		20	500	400	900	20
10	AICTE Activity Points (students have to earn 100 activity points between 01 to 08 semester)				Compulsory requirement for the award of a degree								
				ASC -Applied Science Course, IC – Integrated Course (Practical Course Integrated with Theory Course), PSC -Programme Specific Course, ESC - Engineering Science Courses, ETC - Emerging Technology Course, AEC - Ability Enhancement Course, NCMC : Non Credit Mandatory Course, PP : (Pass/Pass) is assigned to a noncredit course. “PP” represents pass in course provided students have successfully completed the CIE requirements. Otherwise, “NP-not pass shall be awarded. “PP” is essential for the award of the degree. PLC(IC) - Programming Language Course (Integrated Course), AEC/SDC - Ability Enhancement Course/Skill Development course, TD/PSB - Teaching Department / Paper Setting Board, HSMS -Humanity, Social Science and management Course, S- (SAAE) Students' Academic Activity Engagement Hours, CIE –Continuous Internal Evaluation, SEE -Semester End Examination,									
Credit Definition: 1-hour Lecture (L) per week=1Credit 2-hoursTutorial(T) per week=1Credit 2-hours Practical / Drawing (P) per week=1Credit				04-Credit courses are designed for 50 hours of Teaching-Learning Session 04-Credit (IC) is designed for 40 hours' theory and 10-12 hours of practical sessions 03-Credit courses are designed for 40 hours of Teaching-Learning Session 02- Credit courses are designed for 25 hours of Teaching-Learning Session 01-Credit courses are to be designed for 12 hours of Teaching-Learning sessions									

Applied Mathematics-I					Applied Physics				
Code	Title	L	T	P	Code	Title	L	T	P
1BMATC101	Differential Calculus and Linear Algebra: CV Stream	3	2	0	1BPHYC102	Physics for Sustainable Structural Systems (CV stream)	3	0	2
1BMATM101	Differential Calculus and Linear Algebra: ME Stream	3	2	0	1BPHYM102	Physics of Materials (Mech stream)	3	0	2
1BMATE101	Differential Calculus and Linear Algebra: EEE stream	3	2	0	1BPHEC102	Quantum Physics and Electronics Sensors (EEE stream)	3	0	2
1BMATS101	Calculus and Linear Algebra: CSE Stream	3	2	0	1BPHEE102	Electrical Engineering Materials (EEE stream-only for EEE students)	3	0	2
					1BPHYS102	Quantum Physics and Applications (CSE stream)	3	0	2
Computer-Aided Engineering Drawing					Engineering Science Courses-I(ESC-I)				
1BCEDC103	Computer-Aided Engineering Drawing for CV Stream	2	0	2	1BESC104A	Building Sciences and Mechanics	3	0	0
1BCEDM103	Computer-Aided Engineering Drawing for ME stream	2	0	2	1BESC104B	Introduction to Electrical Engineering	3	0	0
1BCEADEC103	Computer-Aided Engineering Drawing for EEE stream	2	0	2	1BESC104C	Introduction to Electronics & Communication Engineering	3	0	0
1BCEADEE103	Computer-Aided Engineering Drawing for EEE stream(only for EEE students)	2	0	2	1BESC104D	Introduction to Mechanical Engineering	3	0	0
1BCEDS103	Computer-Aided Engineering Drawing for CSE stream				1BESC104E	Essentials of Information Technology	3	0	0
Programme Specific Courses (PSC)					Program-Specific Course Lab (PSCL)				
1BCIV105	Engineering Mechanics	3	0	0	1BMEML107	Mechanics and Materials Lab	0	0	2
1BBEE105	Basics of Electrical Engineering	3	0	0	1BBEEL107	Basic Electrical Lab	0	0	2
1BECE105	Fundamentals of Electronics & Communication Engineering	3	0	0	1BECCEL107	Fundamentals of Electronics & Communication Engineering Lab	0	0	2
1BEME105	Elements of Mechanical Engineering	3	0	0	1BEMEL107	Elements of Mechanical Engineering Lab	0	0	2
1BEIT105	Programming in C	3	0	0	1BPOPL107	C Programming Lab	0	0	2
1BEBT105	Elements of Biotechnology and Biomimetics	3	0	0	1BEBTL107	Elements of Biotechnology Lab	0	0	2
1BSSA105	Principles of Soil Science and Agronomy	3	0	0	1BSSAL107	Soil Science and Agronomy Field Lab	0	0	2
1BEAE105	Elements of Aeronautica Engineering	3	0	0	1BEAEL107	Elements of Aeronautica Engineering Lab	0	0	2
1BECHE105	Elements of Chemical Engineering	3	0	0	1BECHEL107	Elements of Chemical Engineering Lab	0	0	2
Integrated courses (IC), combining theory with practical components. (i) Theory sessions shall be conducted for 3 hours per week, while the practical sessions shall be conducted for 2 hours per week. (ii) Theory components shall be evaluated through both Continuous Internal Evaluation (CIE) and Semester End Examination (SEE). (iii) The practical component shall be assessed only through CIE.									
The Mathematics/Physics courses shall be taught by a single faculty member per session, with no sharing of the course (subject) modules. The tutorial sessions for the mathematics course shall be conducted in the laboratory environment using Maxima/Mathematica/ Python/Scilab/MATLAB software to enhance computational understanding and application skills (one hour for problem solving and one hour laboratory session).									
All students admitted to the engineering program have to complete Applied Mathematics-I and Applied Mathematics-II in I and II semesters by selecting the courses prescribed for									

their stream, viz. CV, ME, EEE or CSE, under the heading Mathematics –I and Mathematics-II.

Those who have completed the physics course under the heading Applied Physics in I semester have to select the prescribed stream wise chemistry course under the heading Applied chemistry during II semester.

Programme Specific Courses (PSC): Programme Specific Courses (PSC) are a set of core courses tailored to a specific branch or discipline of engineering in which a student is enrolled (e.g., Mechanical Engineering, Computer Science, Civil Engineering, etc.). These courses are intended to provide students with in-depth knowledge and specialized skills essential for professional competence in the chosen field. Students must select and complete the course from this group that **corresponds to their admitted program stream**. Similarly, students are also required to choose and pass laboratory courses that are specific to their stream from the **Programme Specific Courses Laboratory (PSCL) group**.

Engineering Sciences Courses-I(ESC-I): These courses are designed to broaden the technical knowledge of students beyond their core area of study. These courses enable students to gain a foundational understanding of engineering principles from other stream courses. Students are required to select and complete two courses that are not belong to their admitted program stream. For example, a student admitted to the any programme of the Civil Engineering stream should not select Introduction to Building Sciences but any other two. One course shall be selected under ESC-I and another course under ESC-II. The two courses must be different from the other.

Computer-Aided Engineering Drawing: The courses under this category are stream-specific. Students must select and complete the course that corresponds to their admitted engineering stream.

The **Student Induction Programme (SIP)**, initiated by the All India Council for Technical Education (AICTE), is designed to help newly admitted students in technical institutions transition smoothly into the higher education environment. It aims to familiarize students with the institutional culture, foster connections with peers and faculty, and provide a foundation for holistic learning. Activities under SIP may include Physical Activities, Creative Arts, Universal Human Values, Literary Events, Proficiency Modules. Lectures shall be by Eminent Personalities, Local Area Visits, Department/Branch Familiarization, and Innovation-related sessions.

The first year of the Engineering programmes is composed of I semester, II semester and Summer Semester. SIP activities shall be scheduled in the afternoon sessions during the first week of class commencement of I and II semesters only.

The specific programmes to be conducted will be notified separately by the University via the academic calendar or through a separate notification.

AICTE Activity Points Requirement for BE/B.Tech. Programmes

As per AICTE guidelines (refer Chapter 6 – *AICTE Activity Point Program, Model Internship Guidelines*), in addition to academic requirements, students must earn a specified number of **Activity Points** to be earned is to be eligible for the award of their degree.

- **Regular students** admitted to a 4-year degree program must earn **100 Activity Points**.
- **Lateral entry students** (joining from the second year) must earn **75 Activity Points**.
- **Students transferred** from other universities directly into the fifth semester must earn **50 Activity Points** from the date of entry into VTU.

These Activity Points are **non-credit** and will not be considered for **the SGPA/CGPA** or be used for **vertical progression**. However, they are mandatory for the **award of the degree**, and the points earned will be reflected on the **eighth semester Grade Card**.

The hours spent for earning the activity points shall not be counted for regular attendance requirements. Students can accumulate these points at any time during their program, including on weekends, holidays, and vacations starting from the year of admission, provided they meet the minimum hours of engagement prescribed for each activity.

If a student fails to earn the required Activity Points, the eighth-semester Grade Card will be withheld until the requirement is fulfilled. Consequently, the degree will be awarded only after the Grade Card has been released.

SI No	Stream	UG Programmes under the stream with code
1	Civil Engineering Stream (CV)	(1) Civil engineering (CV), (2) Mining Engineering (MI)
2	Mechanical Engineering Stream (ME)	(1)Aeronautical Engineering (AE), (2)Aerospace Engineering (AS),(3) Agricultural Engineering (AG),(4)Automation and Robotics (AR), (5)Automobile Engineering (AU), (6)Chemical Engineering (CH), (7) Industrial & Production Engineering (IP), (8)Industrial Engineering & Management (IM), (9) Manufacturing Science and Engineering (MS), (10) Marine Engineering (MR), (11) Mechanical & Smart Manufacturing (MM), (12) Mechanical Engineering (ME), (13)Mechatronics (MT), (14) Petrochem Engineering (PC), (15)Robotics & Automation (RA),(16) Robotics and Artificial Intelligence (RI),(17)Silk Technology (ST), (18) Textile Technology (TX),(19)Energy Engineering (ER),(20) Smart Agritech (SA).
3	Electrical and Electronics Engineering Stream (EEE)	(1)Electronics & Communication Engineering (EC), (2)Biomedical Engineering (BM), (3)Electrical & Electronics Engineering (EE), (4) Electronics & Instrumentation Engineering (EI),(5) Electronics & Telecommunication Engineering (ET),(6) Industrial IoT (IO), (7) Medical Electronics Engineering (ML),(8) Electronics Engineering (VLSI Design and Technology) (VL),(9) Electronics & Communication(Advanced Communication Technology) (EA),(10) Electronics & Computer Engineering (UE).
4	Computer Science and Engineering Stream (CSE)	(1) Computer Science and Engineering (CS), (2) Computer Engineering (CE), (3)Artificial Intelligence and Data Science (AD), (4) Artificial Intelligence and Machine Learning (AI),(5) Biotechnology (BT),(6)Computer & Communication Engineering (CM), (7) Computer Science and Business System (CB),(8) Computer Science and Design (CG),(9) Computer Science and Engineering (IoT) (CO), (10)CSE(Artificial Intelligence and Machine Learning) (CI),(11) CSE(Artificial Intelligence) (CA),(12) CSE(Cyber Security) (CY), (13)CSE(Data Science) (CD),(14) CSE(IoT and Cyber Security including Block Chain Technology) (IC), (15) Data Science (DS), (16) Information Science & Engineering (IS),(17) Computer Science (CR).

Scheme of Teaching and Examinations (2025) Outcome-Based Education (OBE)and Choice-Based Credit System (CBCS) (Effective from the academic year 2025-26)													
II Semester (For the students who have studied Physics group in I semester)													
Sl. No	Course and Course Code		Course Title	TD/PSB	Teaching Hours/Week				Examination				Credits
					Theory Lecture	Tutorial	Practical/ Drawing	SAAE	Duration in hours	CIE Marks	SEE Marks	Total Marks	
					L	T	P	S					
1	ASC	1BMATx201	Applied Mathematics -II (Stream Specific)	Maths Dept	3	2	0		03	50	50	100	04
2	ASC(IC)	1BCHEx202	Applied Chemistry (Stream Specific)	CHE Dept	3	0	2		03	50	50	100	04
3	ETC	1BAIA203/ BETC205x	Introduction to AI and Applications	Any Dept	3	0	0		03	50	50	100	03
4	ESC	1BESC204x	Engineering Science Course-II	Respective Engg Dept	3	0	0		03	50	50	100	03
5	PLC(IC)	1BPLC205x	Programming Language Course	CSE & allied Dept	3	0	2		03	50	50	100	04
6	AEC	1BENG206	Communication Skills	Humanities Dept	1	0	0		02	50	50	100	01
7	AEC (NCMC)	1BICO207	Indian Constitution & Engineering Ethics	Humanities Dept	1	0	0		01	100	0	100	PP
8	AEC/SDC	1BPRJ258	Interdisciplinary Project-Based Learning	Respective Dept (Multiple Dept)	0	0	0	2	02	50	50	100	01
TOTAL					17	02	05	02	20	450	350	800	20
ASC-Applied Science Course, IC – Integrated Course (Practical Course Integrated with Theory Course), ESC- Engineering Science Courses, PLC(IC)- Programming Language Course (Integrated Course), AEC- Ability Enhancement Course, NCMC: Non Credit Mandatory Course, TD/PSB- Teaching Department / Paper Setting Board, HSMC- Humanity, Social Science and management Course, S- (SAAE)- Students’ Academic Activity Engagement Hours, AEC/SDC- Ability Enhancement Course/Skill Development course, CIE –Continuous Internal Evaluation, SEE- Semester End Examination, PP : (Pass/Pass) is assigned to a noncredit course. “PP” represents pass in course provided students have successfully completed the CIE requirements. Otherwise, “NP-not pass shall be awarded. “PP” is essential for the award of the degree													
Integrated courses (IC), combining theory with practical components. The theory sessions shall be conducted for 3 hours per week, while the practical sessions shall be conducted for 2 hours per week. - The theory component will be evaluated through both Continuous Internal Evaluation (CIE) and Semester End Examination (SEE). - The practical component will be assessed only through CIE.													
Communication Skills: This course shall be conducted in a laboratory environment													

Applied Mathematics-II					Applied Chemistry				
Code	Title	L	T	P	Code	Title	L	T	P
1BMATC201	Differential Calculus and Numerical Methods: CV Stream	3	2	0	1BCHEC202	Applied Chemistry for Sustainable Structure & Material Design (CV)	3	0	2
1BMATM201	Multivariable Calculus and Numerical Methods: ME Stream	3	2	0	1BCHEM202	Applied Chemistry for Advanced Metal Protection and Sustainable Energy Systems (ME)	3	0	2
1BMATE201	Calculus, Laplace Transform And Numerical Techniques: EEE stream	3	2	0	1BCHEE202	Applied Chemistry for Emerging Electronics and Futuristic Devices (EEE, ECE)	3	0	2
1BMATS201	Numerical Methods: CSE Stream	3	2	0	1BCHEC202	Applied Chemistry for Smart Systems (CSE)	3	0	2
Engineering Sciences Courses II(ESC-II)					Programming Language Courses (PLC)				
1BESC204A	Building Sciences & Mechanics	3	0	0	1BPLC205E	Introduction to C Programming (for non-IT programmes)	3	0	2
1BESC204B	Introduction to Electrical Engineering	3	0	0	1BPLC205B	Python Programming (For CSE and allied programmes)	3	0	2
1BESC204C	Introduction to Electronics & Communication Engineering	3	0	0					
1BESC204D	Introduction to Mechanical Engineering	3	0	0					
1BESC204E	Essentials of Information Technology	3	0	0					
The Mathematics/Chemistry courses shall be taught by a single faculty member per session, with no sharing of the course (subject) modules. The tutorial sessions for the mathematics course shall be conducted in the laboratory environment using Maxima/Mathematica/ Python/Scilab/MATLAB software to enhance computational understanding and application skills. Students admitted to a specific engineering stream are required to select and successfully complete Applied Mathematics-II and Applied Chemistry courses that are aligned to their program stream. Engineering Sciences Courses-II(ESC-II): These courses are designed to broaden the technical knowledge of students beyond their core area of study. These courses enable students to gain a foundational understanding of engineering principles from other disciplines. Students are required to select and complete a course under ESC-II that does not belong to their admitted program stream. Students should select a course other than that was selected under ESC-I and other than course not belonging to their stream.									
For the course Interdisciplinary Project (BPRJ259), it is mandatory to form a team comprising students from multiple engineering disciplines. For example, a project team may include students from Mechanical Engineering, Electronics and Communication Engineering (ECE), and Computer Science and Engineering (CSE), working collaboratively to design and implement the project.									



CALCULUS AND LINEAR ALGEBRA		Semester	1
Course Code	1BMATS101	CIE Marks	50
Teaching Hours/Week (L:T:P: S)	3:2:0:0	SEE Marks	50
Total Hours of Pedagogy	40Hours Theory + 20Hours Tutorial	Total Marks	100
Credits	4	Exam Hours	3 hrs
Examination type (SEE)	Theory		
Course Outcomes			
CO1: Apply the concepts of multivariable calculus and vector calculus to compute derivatives, optimize functions, and analyze vector fields for applications in computer science engineering.			
CO2: Solve system of linear equations and determine eigenvalues and eigenvectors using direct and iterative methods.			
CO3: Apply the concepts of vector spaces and linear transformations to problems in computer science engineering.			
CO4: Demonstrate the applications of computer science and allied engineering Science using modern ICT tools.			
Module-1: Calculus		(8Hours Theory + 4Hours Tutorial)	
Partial differentiation, total derivative, differentiation of composite functions, Jacobian, Statement of Taylor’s and Maclaurin’s series expansion for two variables. Maxima and minima for the function of two variables.			
Textbook-1: Chapter 5: Sections 5.1- 5.11			
Module-2: Vector Calculus		(8Hours Theory + 4Hours Tutorial)	
Scalar and vector fields, Gradient, directional derivatives, divergence and curl - physical interpretation, solenoidal vector fields, irrotational vector fields and scalar potential. Introduction to polar coordinates and polar curves. Curvilinear coordinates: Scale factors, base vectors, Cylindrical polar coordinates, Spherical polar coordinates, transformation between cartesian and curvilinear systems, orthogonality.			
Module-3: System of Linear Equations, Eigenvalues and Eigenvectors		(8Hours Theory + 4Hours Tutorial)	
Elementary row transformation of a matrix, Echelon form, rank of a matrix. Consistency and solution of system of linear equations: Gauss elimination method, Gauss Jordan method. Applications: Traffic flow. Eigenvalues and Eigenvectors, diagonalization of the matrix, modal matrix.			

Textbook-1: Chapter 2: Sections 2.7-2.16, Chapter 28: Sections 28.6 and 28.7 Textbook-2: Chapter-7	
Module-4: Vector Space (8Hours Theory + 4Hours Tutorial)	
Vector spaces: definition and examples, subspace: definition and examples. Linear Combinations, linear span, linearly independent and dependent sets, basis and dimension, row space and column space of a matrix, Coordinates vector, inner products and orthogonality.	
Textbook-3: Chapter 4: Sections 4.1 to 4.9 and 4.11	
Module-5: Linear Transformation (8Hours Theory + 4Hours Tutorial)	
Definition and examples, algebra of linear transformations, matrix of a linear transformation. Singular, non-singular linear transformations and invertible linear transformations. Rank and nullity of linear transformations, Rank-Nullity theorem.	
Textbook-3: Chapter 5: Sections 5.3- 5.7 Chapter 6: Sections-6.1-6.2	
Suggested Learning Resources: (Textbook/Reference Book): Textbooks: 1. B. S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 44th Ed., 2021. 2. E. Kreyszig, Advanced Engineering Mathematics, John Wiley&Sons, 10th Ed., 2018. 3. Seymour Lipschutz and Marc Lipson, Linear Algebra, Schaum's outlines series, 4th Ed., 2008. Reference books: 1. B.V. Ramana, Higher Engineering Mathematics" McGraw-Hill Education, 11th Ed., 2017 2. Gilbert Strang, Linear Algebra and its Applications, Cengage Publications, 4th Ed., 2022. 3. N. P. Bali and Manish Goyal, A Textbook of Engineering Mathematics, Laxmi Publications, 10th Ed., 2022. 4. James Stewart, Calculus, Cengage Publications, 7th Ed., 2019. 5. David Poole, Linear Algebra, a modern introduction, Cengage publishers, 4th Ed., 2014. 6. David C Lay, Linear Algebra and its Applications, Pearson Publishers, 4th Ed., 2018. 7. Gareth Williams, Linear Algebra with applications, Jones Bartlett Publishers Inc., 6th Ed., 2017.	
Web links and Video Lectures (e-Resources): • http://academicearth.org/ • VTU e-Shikshana Program • VTU EDUSAT Program • https://nptel.ac.in/courses/111106135 • https://nptel.ac.in/courses/111105160 • https://ocw.mit.edu/courses/18-06-linear-algebra-spring-2010/ • https://ocw.mit.edu/courses/18-02sc-multivariable-calculus-fall-2010/	
Teaching-Learning Process (Innovative Delivery Methods): The following are sample strategies that educators may adopt to enhance the effectiveness of the teaching-learning process and facilitate the achievement of 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).

Assessment Structure:

The assessment in each course is divided equally between Continuous Internal Evaluation (CIE) and the Semester End Examination (SEE), with each carrying 50% weightage.

The CIE Theory component consists of average of TWO IA tests for 25 marks and Continuous Comprehensive Assessments (CCA) for 25 marks.

- To qualify and become eligible to appear for SEE, in the **CIE**, a student must score at least **40% of 50 marks**, i.e., **20 marks**.
- To pass the **SEE**, a student must score at least **35% of 50 marks**, i.e., **18 marks**.
- Notwithstanding the above, a student is considered to have **passed the course**, provided the combined total of **CIE and SEE is at least 40 out of 100 marks**.

Continuous Comprehensive Assessments (CCA):

CCA will be conducted with a total of 25 marks. It is recommended to include a maximum of two learning activities aimed at enhancing the holistic development of students. These activities should align with course objectives and promote higher-order thinking and application-based learning.

Learning Activity-1: Tutorial: Practicing problems (Two objective type assessments for 7.5 marks each (Total 15 marks)).

Learning Activity-2: Choose either lab activity or seminar for 10 marks

- **Lab activity:** Execute the following lab exercises with the aid of any modern technological tool (Matlab/ Mathematica/ Scilab/ Python/ Maxima, etc).
- **Seminars:** The students has to present applications of mathematics related to syllabus as a group maximum of four members.

List of Lab Activities:

- 1) Finding partial derivatives and Jacobian,
- 2) Expansion of Taylor's and Maclaurin's series,
- 3) Finding Gradient, divergence and curl,
- 4) Finding rank, reduced echelon form, solving system of linear equations using Gauss elimination method,
- 5) Solving system of linear equations using Gauss-Seidel method,
- 6) Determine Eigenvalues and Eigenvectors,
- 7) Linearly Independence and Dependence sets,
- 8) Basis and dimension,
- 9) Linear transformation-range space and null space,
- 10) Verification of the rank nullity theorem.

Rubrics for Learning Activity (Based on the nature of learning activity, design the rubrics for each activity):

ACTIVITY-1	Superior (13-15)	Good (10-12)	Fair (7-9)	Needs Improvement (4-6)	Unacceptable (0-3)
Performance Indicator- 1 (CO-1/PO -1, PO-12 Mapping)	Demonstrates complete understanding of the topic	Shows good understanding with minor errors	some key points are missing	Shows little understanding	Very poor performance
Performance Indicator-2 (CO-2, CO-3 /PO-1, PO-12, Mapping)	creatively to solve problems	Participates regularly but may need occasional prompting	Demonstrates partial understanding	major misconceptions present	Inadequate performance
ACTIVITY-2	9-10	7-8	5-6	3-4	1-2
Performance Indicator-3 (CO-3/PO-5, PO-12, Mapping)	perform tasks independently	Applies knowledge correctly	limited creativity.	Unable to apply knowledge appropriately.	Identical performance

Suggested Learning Activities may include (but are not limited to):

- Course Project
- Case Study Presentation

- Programming Assignment
- Tool/Software Exploration
- Literature Review
- Open Book Test (preferably at RBL4 and RBL5 levels)
- GATE-based Aptitude Test
- Assignment (at RBL3, RBL4, or RBL5 levels)
- Any other relevant and innovative academic activity
- Use of MOOCs and Online Platforms

Suggested Innovative Delivery Methods may include (but are not limited to):

- Flipped Classroom
- Problem-Based Learning (PBL)
- Case-Based Teaching
- Simulation and Virtual Labs
- Partial Delivery of course by Industry expert/ industrial visits
- ICT-Enabled Teaching
- Role Play

NUMERICAL METHODS		Semester	2
Course Code	1BMATS201	CIE Marks	50
Teaching Hours/Week (L: T: P: S)	3:2:0:0	SEE Marks	50
Total Hours of Pedagogy	40Hours Theory + 20Hours Tutorial	Total Marks	100
Credits	4	Exam Hours	3 hrs
Examination type (SEE)	Theory		
Course outcome (Course Skill Set)			
CO1: Apply numerical methods to solve transcendental equations, perform interpolation, numerical integration, and solve ordinary differential equations.			
CO2: Solve first and higher-order differential equations using analytical methods and apply them to mathematical models.			
CO3: Demonstrate the applications of computer science and allied engineering science using modern ICT tools.			
Module-1: Introduction to Numerical Methods		(8Hours Theory + 4Hours Tutorial)	
Errors and their computation: Round off error, Truncation error, Absolute error, Relative error and Percentage error.			
Solution of algebraic and transcendental equations: Bisection, Regula-Falsi, Secant and Newton-Raphson methods.			
Textbook-1: Chapter-1: section 1.3, Chapter-2: sections 2.1-2.3.			
Module-2: Numerical solutions for system of linear equations		(8Hours Theory + 4Hours Tutorial)	
Norms: Vector norms and Matrix norms- L_1 , L_2 and L_∞ , Ill conditioned linear system, condition number.			
Solution of system of linear equations: Gauss Seidel method and LU-decomposition method.			
Eigenvalues and Eigen vectors: Rayleigh power method, Jacobi's method			
Module-3: Interpolation		(8Hours Theory + 4Hours Tutorial)	
Finite differences, interpolation using Newton Gregory forward and Newton Gregory backward difference formulae, Newton's divided difference. Lagrange interpolation formulae, piecewise interpolation-linear and quadratic.			
Textbook-1: Chapter-4: sections 4.1-4.4, 4.6			

Module-4: Differential Equations of First and Higher Order (8Hours Theory + 4Hours Tutorial)
Linear and Bernoulli's differential equations. Exact and reducible to exact differential equations with integrating factors on $\frac{1}{N}\left(\frac{\partial M}{\partial y} - \frac{\partial N}{\partial x}\right)$ and $\frac{-1}{M}\left(\frac{\partial M}{\partial y} - \frac{\partial N}{\partial x}\right)$. Homogeneous and non-homogeneous Differential equations of higher order with constant coefficients. Inverse differential operators - e^{ax}, $\sin(ax+b)$, $\cos(ax+b)$ and x^n. Textbook-3: Chapter-11: Sections 11.9-11.12 Chapter-13: Sections 13.1-13.7
Module-5: Numerical Integration and Numerical Solution of Differential Equations (8Hours Theory + 4Hours Tutorial)
Numerical integration: Trapezoidal, Simpson's $1/3^{rd}$, Simpson's $3/8^{th}$ rule and Weddle's rule. 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 method. Textbook-1: Chapter-5: Sections 5.6, 5.7. Chapter-6: Sections 6.3, 6.4, 6.7 Textbook-3: Chapter-30: Sections 30.4-30.10, Chapter-32: Sections 32.3-32.9,
Suggested Learning Resources: (Textbook/Reference Book): Textbooks: 1. M.K. Jain, S.R.K. Iyengar and R.K. Jain, Numerical Methods for Scientific and Engineering Computation, New Age International Publishers, 8thEd., 2022. 2. David C Lay, Linear Algebra and its Applications, Pearson Publishers, 5th Ed., 2023. 3. B. S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 44thEd., 2021. Reference books: 1. V. Ramana, Higher Engineering Mathematics, McGraw-Hill Education, 11th Ed., 2017 2. N. P. Bali and Manish Goyal, A Textbook of Engineering Mathematics, Laxmi Publications, 10th Ed., 2022. 3. S. S. Sastry, Introductory Methods of Numerical Analysis, PHI Learning Private Limited, 5th Ed. 2012. 4. Steven V. Chapra and Raymond P. Canale, Applied Numerical Methods with Matlab for Engineers and Scientists, McGraw-Hill, 3rd Ed., 2011. 5. Richard L. Burden, Douglas J. Faires, A. M. Burden, Numerical Analysis, 10th Edition., 2010, Cengage Publishers.
Web links and Video Lectures (e-Resources): • http://academicearth.org/ • VTU e-Shikshana Program • VTU EDUSAT Program • https://nptel.ac.in/courses/111105160 • https://nptel.ac.in/courses/127106019 • https://ocw.mit.edu/courses/18-335j-introduction-to-numerical-methods-spring-2019/ • https://ocw.mit.edu/courses/18-330-introduction-to-numerical-analysis-spring-2012/pages/syllabus/

Teaching-Learning Process (Innovative Delivery Methods):

The following are sample strategies that educators may adopt to enhance the effectiveness of the teaching-learning process and facilitate the achievement of course outcomes.

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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).
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 - 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).

Assessment Structure:

The assessment in each course is divided equally between Continuous Internal Evaluation (CIE) and the Semester End Examination (SEE), with each carrying 50% weightage.

The CIE Theory component consists of average of TWO IA tests for 25 marks and Continuous Comprehensive Assessments (CCA) for 25 marks.

- To qualify and become eligible to appear for SEE, in the **CIE**, a student must score at least **40% of 50 marks**, i.e., **20 marks**.
- To pass the **SEE**, a student must score at least **35% of 50 marks**, i.e., **18 marks**.
- Notwithstanding the above, a student is considered to have **passed the course**, provided the combined total of **CIE and SEE is at least 40 out of 100 marks**.

Continuous Comprehensive Assessments (CCA):

CCA will be conducted with a total of 25 marks. It is recommended to include a maximum of two learning activities aimed at enhancing the holistic development of students. These activities should align with course objectives and promote higher-order thinking and application-based learning.

Learning Activity-1: Tutorial: Practicing problems (Lab Activities/Surprise Test/ Seminar for 15 Marks)

Execute the following lab exercises with the aid of any modern technological tool (Matlab/ Mathematica/ Scilab/ Python/ Maxima, etc).

Learning Activity-2: Assignments (Marks-10).

List of Lab Activities:

- 1) Errors and approximation,
- 2) Root finding methods,
- 3) Norms, Condition number,
- 4) Gauss Seidel method and Rayleigh power's method,
- 5) Forward and Backward interpolation,
- 6) Lagrange's interpolation,
- 7) Solving differential equations of first and higher order,
- 8) Numerical integration,
- 9) Taylor's method, Modified Euler's method,
- 10) Runge-Kutta method of fourth order.

Rubrics for Learning Activity (Based on the nature of learning activity, design the rubrics for each activity):

ACTIVITY-1	Superior (13-15)	Good (10-12)	Fair (7-9)	Needs Improvement (4-6)	Unacceptable (0-3)
Performance Indicator- 1 (CO-1/PO -1, PO-12 Mapping)	Demonstrates complete understanding of the topic	Shows good understanding with minor errors	some key points are missing	Shows little understanding	Very poor performance
Performance Indicator-2 (CO-2 /PO-1, PO-12, Mapping)	creatively to solve problems	Participates regularly but may need occasional prompting	Demonstrates partial understanding	major misconceptions present	Inadequate performance
ACTIVITY-2	9-10	7-8	5-6	3-4	1-2
Performance Indicator-3 (CO-3/PO-5, PO-12, Mapping)	perform tasks independently	Applies knowledge correctly	limited creativity.	Unable to apply knowledge appropriately.	Identical performance

Suggested Learning Activities may include (but are not limited to):

- Course Project
- Case Study Presentation
- Programming Assignment
- Tool/Software Exploration
- Literature Review
- Open Book Test (preferably at RBL4 and RBL5 levels)
- GATE-based Aptitude Test
- Assignment (at RBL3, RBL4, or RBL5 levels)
- Any other relevant and innovative academic activity
- Use of MOOCs and Online Platforms

Suggested Innovative Delivery Methods may include (but are not limited to):

- Flipped Classroom
- Problem-Based Learning (PBL)
- Case-Based Teaching
- Simulation and Virtual Labs
- Partial Delivery of course by Industry expert/ industrial visits
- ICT-Enabled Teaching
- Role Play

QUANTUM PHYSICS AND APPLICATIONS		Semester	I/II
Course Code	1BPHYS102/202	CIE Marks	50
Teaching Hours/Week (L:T:P: S)	3:0:2:0	SEE Marks	50
Total Hours of Pedagogy (Theory and Lab hours)	64	Total Marks	100
Credits	04	Exam Hours	03
Examination type (SEE)	Descriptive		
Course outcome (Course Skill Set)			
At the end of the course, the student will be able to:			
1. Explain core quantum concepts and their computational relevance.			
2. Analyze electronic behavior in metals and semiconductors for key material properties.			
3. Discuss superconductivity phenomena and their role in quantum systems.			
4. Describe radiation-matter interaction and photonic device operation.			
5. Summarize fundamentals of quantum computing and predict simple circuit outcomes.			
Module-1			
Quantum Mechanics:			
de Broglie Hypothesis, Heisenberg's Uncertainty Principle and its application (Broadening of Spectral Lines), Principle of Complementarity, Wave Function, Time independent Schrödinger wave equation (Derivation), Physical significance of a wave function and Born Interpretation, Expectation value and its physical significance, Eigen functions and Eigen values, Particle inside one dimensional infinite potential well, Role of higher dimensions (Qualitative), Waveforms and Probabilities, Particle inside a finite potential well and quantum tunneling, Numerical Problems.			
Text Book : 1, 2		Reference Books : 1, 2	Number of
Hours: 8			
Module-2			
Electrical Properties of Metals and Semiconductors:			
Failures of classical free electron theory, Mechanisms of electron scattering in solids, Mattheissen's rule, Assumptions of Quantum Free Electron Theory, Density of States, Fermi Dirac statistics, Fermi Energy, Variation of Fermi Factor With Temperature and Energy, Expression for carrier concentration in a conductor, Mention of expression for electrical conductivity, Success of quantum free electron theory of metals, Derivation of electron concentration in an intrinsic semiconductor, Expression for electron and hole concentration in extrinsic semiconductor (Qualitative), Fermi level for intrinsic(with derivation) and extrinsic semiconductor (no derivation), Hall effect, Numerical Problems.			
Text Book : 1, 3		Reference Book : 1, 9	Number of
Module-3			
Superconductivity:			
Zero resistance state, Persistent current, Meissner effect, Critical temperature, Critical current (Silsbee Effect) – Derivation of expression of critical current for a cylindrical wire using ampere's law, Critical field, Formation of Cooper pairs - Mediation of phonons, Two-fluid model, BCS Theory - Phase coherent state, Limitations of BCS theory, examples of systems with low and high electron-phonon coupling, Type-I and Type-II superconductors, Formation of Vortices, Explanation for upper critical field, Cooper pair tunneling (Andreev reflection), Josephson junction, Flux quantization, DC and AC SQUID (Qualitative), Numerical Problems.			
Text Books : 1, 3		Reference Book: 3, 4	Number of
Hours: 8			
Module-4			
Photonics :			
Interaction of radiation with matter – Einstein's A and B coefficients and derivation of expression for energy density, Prerequisites for lasing actions, Types of LASER, Semiconductor diode LASER, Use of attenua-			

tors for single photon sources, Optical modulators – Pockel's effect, Kerr effect, Photodetectors – Single Photon Avalanche Diode, Superconducting Nanowire Single Photon Detector, Optical fiber, Derivation of Numerical aperture, V-number, Number of modes, losses in optical fiber, Mach-Zehnder interferometer, Numerical problems.

Text Books: 1, 2, Reference Book: 5, 6
Hours:8

Number of

Module-5

Quantum Computing:

Moore's law - limitation of VLSI, Classical vs Quantum Computation, bit, Qubit and its properties, Bloch Sphere, Dirac notation, Brief discussion on types of qubit, Superconducting qubits, Harmonic oscillator (qualitative) – Need for anharmonicity, Charge qubit, Operators and Operations (matrix form), Quantum Gates – Pauli Gates, Phase gate (S, T), Hadamard Gate, Two qubit gates – CNOT gate, Entanglement, Bell States, Predicting the outputs of various combinations of single and two-qubit gates, Numerical Problems.

Text Book: 4, Reference Book :7, 8
Hours:8

Number of

PRACTICAL COMPONENTS OF IPCC

PART – A: FIXED SET 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. Study the Characteristics of a Photo-Diode and to determine the power responsivity / Verification of Inverse Square Law of Light
4. Determination of Planck's Constant using LEDs / Black-Body.
5. Determination of Fermi Energy of Copper.
6. Determination of Energy gap of the given Semiconductor.
7. Black-Box Experiment (Identification of basic Electronic Components)
8. Resonance in LCR circuit and determination of coefficient of self induction.
9. Study the I-V Characteristics of a Bipolar Junction Transistor and hence determine α and β .
10. Determination of resistivity of a semiconductor by Four Probe Method.
11. Predicting the outputs of various combinations of single and two-qubit gates using QUIRK Quantum Simulator. a) <https://www.quirk-e.dev/> b) <https://algassert.com/quirk>
12. Predicting the outputs of various combinations of single and two-qubit gates using QISKIT.
13. Air-wedge / Newton's to study the interference by the division of amplitude.
14. Experimental Data Analysis using Spread Sheet.

Note :

1. At least ten laboratory experiments must be conducted.
2. Minimum one quantum simulation experiment is mandatory and should be conducted either in the computer lab for the entire batch or on dedicated systems in the physics lab.

Suggested Learning Resources: (Text Book/ Reference Book/ Manuals):

Text books:

1. Engineering Physics, Satyendra Sharma and Jyotsna Sharma, Pearson, 2018.
2. Engineering Physics, S L Kakani, Shubra Kakani, 3rd Edition, 2020, CBS Publishers and Distributors Pvt. Ltd., 2018
3. Solid State Physics, S. O. Pillai, New Age International
4. Quantum Computing, Parag K Lala, McGraw Hill, 2020.

Reference books / Manuals:

1. Beiser, A. (2002). Concepts of Modern Physics (6th ed.). McGraw-Hill Education..
2. Griffiths, D. J. (2018). Introduction to Quantum Mechanics (2nd or 3rd ed.). Pearson.
3. Tinkham, M. (2004). Introduction to Superconductivity (2nd ed.). Dover Publications.
4. Mishra, P. K. (2009). Superconductivity – Basics and Applications. Ane Books.

5. LASERS and Non-Linear Optics, B B Loud, New Age International,
6. Saleh, B. E. A., & Teich, M. C. (2019). Fundamentals of Photonics (3rd ed.). Wiley
7. Nielsen, M. A., & Chuang, I. L. (2010). Quantum Computation and Quantum Information (10th Anniversary ed.). Cambridge University Press.
8. Vishal Sahani, Quantum Computing, McGraw Hill Education, 2007 Edition.
9. Solid State Physics, A J Dekker (2000), Indian Ed., Macmillan Publishers India, New Delhi.

Web links and Video Lectures (e-Resources):

1. NPTEL – Quantum Mechanics I (IIT Madras): <https://nptel.ac.in/courses/115106066>
2. NPTEL – Physics: Introductory Quantum Mechanics (NOC): <https://archive.nptel.ac.in/courses/115/104/115104096>
3. Solid State Physics – NPTEL (IIT Madras) <https://nptel.ac.in/courses/115106127>
4. A Brief Course on Superconductivity – NPTEL IIT Guwahati (Prof. Saurabh Basu)
5. Playlist Introduction Video: <https://www.youtube.com/watch?v=SHoGV-sezNI>
6. Full playlist available via the YouTube channel description or archive link.
7. Concepts in Magnetism and Superconductivity – NOC (IIT Kharagpur) Series start (Lecture 1): <https://digimat.in/nptel/courses/video/115105131/L01.html>
8. Introduction to Photonics – NPTEL (IIT Madras, Prof. Balaji Srinivasan) Lecture 03 to Lecture 12 cover: Direct video link (start Lecture 03): <https://nptel.ac.in/courses/108106135/03>
9. Semiconductor Optoelectronics – NPTEL (IIT Delhi, Prof. M. R. Shenoy) Direct video link (start relevant lecture): <https://nptel.ac.in/courses/108108174/05>
10. Lecture 04 – Quantum Computing Basics: <https://www.youtube.com/watch?v=-fttE1SzpD8>
11. Lecture 08 – Quantum Gates and Circuits Part 1: https://www.youtube.com/watch?v=nGPr1QM_XrY

Teaching-Learning Process (Innovative Delivery Methods):

The following are sample strategies that educators may adopt to enhance the effectiveness of the teaching-learning process and facilitate the achievement of course outcomes.

1. Self-Learning using AI Tools
2. Activity Based Learning
3. Gamification of Activities
4. Short Animations and Videos
5. Models and Working Models
6. Simulations and Interactive Simulations
7. Experiential Learning
8. Flipped Class Learning
9. Hybrid Learning
10. ICT Based Learning

Assessment Structure:

The assessment for each course is equally divided between Continuous Internal Evaluation (CIE) and the Semester End Examination (SEE), with each component carrying 50% weightage (i.e., 50 marks each).

The **CIE Theory component** will be 25 marks and **CIE Practical component** will be 25 marks.

1. The CIE Theory component consists of Two IA tests for 25 marks and the Total is reduced to Maximum of 15 marks and Continuous Comprehensive Assessments (CCA) for 10 marks.
2. The CIE Practical component for continuous assessments will be for 15 marks through rubrics and for lab test will be for 10 marks.

Eligibility Criteria :

CIE – Theory

To qualify and become eligible to appear for SEE, in the CIE theory component, a student must score at least 40% in IA test and CCA respectively and in total a minimum of 10 Marks out of 25 marks.

CIE - LAB

To qualify and become eligible to appear for SEE, in the CIE Practical component, a student must secure a minimum of 40% in Continuous Assessment and LAB IA respectively and in total a Minimum of 10 marks out of 25 marks.

SEE

To pass the SEE, a student must secure a minimum of 35% of 50 marks, i.e., 18 marks.

Completion of the Course

A student is deemed to have successfully completed the course if the combined total of CIE and SEE is at least 40 out of 100 marks.

Continuous Comprehensive Assessments (CCA):

CCA will be conducted for a total of 10 marks. It is recommended to include any two learning activities aimed at enhancing the holistic development of students. This activities should align with course objectives and promote higher-order thinking and application-based learning.

Learning Activity – 1: (Marks - 5)

Learning Activity – 2: (Marks - 5)

CIE Practical component:

The CIE marks awarded in the case of the Practical component shall be based on the continuous evaluation of the laboratory report using a defined set of rubrics. Each experiment report can be evaluated for 15 marks. The summation of all the experiments marks to be scaled down to 15 marks.

The laboratory test (duration 02 hours) at the end of the last 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. For laboratory test, the student is required to conduct one experiment.

Rubrics for Learning Activity (Based on the nature of learning activity, design the rubrics for each activity):

	Superior	Good	Fair	Needs Improvement	Unacceptable
Performance Indicator 1 (CO1 - PO1, PO2, PO5, PO11)	Clearly explains quantum principles (e.g., uncertainty, wave function) with computational relevance	Explains core principles accurately with minor conceptual gaps	Basic understanding with limited linkage to applications	Fragmented explanation with weak application context	Fails to explain quantum concepts or relevance to computation
Performance Indicator 2 (CO2 - PO1, PO2, PO3, PO5, PO11)	Accurately analyzes electron behavior using classical and quantum models for conductivity	Reasonable analysis with some misinterpretation of models	Basic recognition of conduction principles with weak analysis	Limited understanding and incorrect application of models	No meaningful analysis of conduction mechanisms
Performance Indicator 3 (CO3 - PO1, PO2, PO4, PO5, PO11)	Effectively evaluates superconducting principles and applies them in quantum contexts	Good understanding of concepts but lacks depth in application	Identifies phenomena but struggles with significance or relevance	Limited and inaccurate explanation of superconductivity	Fails to explain or apply superconductivity principles
Performance Indicator 4 (CO4 - PO1, PO2, PO4, PO5, PO11)	Demonstrates clear understanding of radiation-matter interaction and device principles	Explains device operations with minor misconceptions	Recognizes device function but lacks technical depth	Inadequate understanding of photonic principles	Unable to interpret or explain device behavior
Performance	Accurately summarizes	Good explanation	Basic description	Inconsistent	Fails to explain or

	Superior	Good	Fair	Needs Improvement	Unacceptable
Indicator 5 (CO5 - PO1, PO2, PO3, PO5, PO11)	quantum computing concepts and predicts circuit behavior	tion of quantum gates with some errors in logic application	tion of qubits and circuits without predictive insight	understanding of quantum computing logic	apply quantum computing principles

Rubrics for CIE – Continuous assessment:

	Superior	Good	Fair	Needs Improvement	Unacceptable
Performance Indicator 1 (CO1 - PO1, PO2, PO5, PO11)	Clearly explains quantum principles (e.g., uncertainty, wave function) with computational relevance	Explains core principles accurately with minor conceptual gaps	Basic understanding with limited linkage to applications	Fragmented explanation with weak application context	Fails to explain quantum concepts or relevance to computation
Performance Indicator 2 (CO2 - PO1, PO2, PO3, PO5, PO11)	Accurately analyzes electron behavior using classical and quantum models for conductivity	Reasonable analysis with some misinterpretation of models	Basic recognition of conduction principles with weak analysis	Limited understanding and incorrect application of models	No meaningful analysis of conduction mechanisms
Performance Indicator 3 (CO3 - PO1, PO2, PO4, PO5, PO11)	Effectively evaluates superconducting principles and applies them in quantum contexts	Good understanding of concepts but lacks depth in application	Identifies phenomena but struggles with significance or relevance	Limited and inaccurate explanation of superconductivity	Fails to explain or apply superconductivity principles
Performance Indicator 4 (CO4 - PO1, PO2, PO4, PO5, PO11)	Demonstrates clear understanding of radiation-matter interaction and device principles	Explains device operations with minor misconceptions	Recognizes device function but lacks technical depth	Inadequate understanding of photonic principles	Unable to interpret or explain device behavior
Performance Indicator 5 (CO5 - PO1, PO2, PO3, PO5, PO11)	Accurately summarizes quantum computing concepts and predicts circuit behavior	Good explanation of quantum gates with some errors in logic application	Basic description of qubits and circuits without predictive insight	Inconsistent understanding of quantum computing logic	Fails to explain or apply quantum computing principles

Rubrics for SEE / CIE Test:

	Superior	Good	Fair	Needs Improvement	Unacceptable
Performance Indicator 1 (CO1 - PO1, PO2, PO5, PO11)	Clearly explains quantum principles (e.g., uncertainty, wave function) with computational relevance	Explains core principles accurately with minor conceptual gaps	Basic understanding with limited linkage to applications	Fragmented explanation with weak application context	Fails to explain quantum concepts or relevance to computation

Performance Indicator 2 (CO2 - PO1, PO2, PO3, PO5, PO11)	Accurately analyzes electron behavior using classical and quantum models for conductivity	Reasonable analysis with some misinterpretation of models	Basic recognition of conduction principles with weak analysis	Limited understanding and incorrect application of models	No meaningful analysis of conduction mechanisms
Performance Indicator 3 (CO3 - PO1, PO2, PO4, PO5, PO11)	Effectively evaluates superconducting principles and applies them in quantum contexts	Good understanding of concepts but lacks depth in application	Identifies phenomena but struggles with significance or relevance	Limited and inaccurate explanation of superconductivity	Fails to explain or apply superconductivity principles
Performance Indicator 4 (CO4 - PO1, PO2, PO4, PO5, PO11)	Demonstrates clear understanding of radiation-matter interaction and device principles	Explains device operations with minor misconceptions	Recognizes device function but lacks technical depth	Inadequate understanding of photonic principles	Unable to interpret or explain device behavior
Performance Indicator 5 (CO5 - PO1, PO2, PO3, PO5, PO11)	Accurately summarizes quantum computing concepts and predicts circuit behavior	Good explanation of quantum gates with some errors in logic application	Basic description of qubits and circuits without predictive insight	Inconsistent understanding of quantum computing logic	Fails to explain or apply quantum computing principles

Suggested rubrics for Practical continuous assessment:

Performance Indicators	Excellent	Very Good	Good	Satisfactory
Fundamental Knowledge (4) (PO1)	The student has well depth knowledge of the topics related to the course (4)	Student has good knowledge of some of the topics related to course (3)	Student is capable of narrating the answer but not capable to show in depth knowledge (2)	Student has not understood the concepts clearly (1)
Design Of Experiment (5) (PO2 & PO3)	Student is capable of discussing more than one design for his/her problem statement and capable of proving the best suitable design with proper reason (5)	Student is capable of discussing few designs for his/her problem statement but not capable of selecting best (4)	Student is capable of discussing single design with its merits and de-merits (3)	Student is capable of explaining the design (1-2)
Implementation (8) (PO3 & PO7)	Student is capable of implementing the design with best suitable algorithm considering optimal solution. (7-8)	Student is capable of implementing the design with best suitable algorithm and should be capable of explaining it (5-6)	Student is capable of implementing the design with proper explanation. (3-4)	Student is capable of implementing the design. (1-2)
Result & Analysis (5) (PO4)	Student is able to run the program on various cases and compare the result with proper analysis. (5)	Student will be able to run the program for all the cases. (4)	Student will be able to run the code for few cases and analyze the output (3)	Student will be able to run the program but not able to analyze the output (1-2)

Demonstration (8) (P08)	The lab record is well-organized, with clear sections (e.g., Introduction, Method, Results, Conclusion). Transitions between sections are smooth. (7-8)	The lab record is organized, with clear sections, but some sections are not well-defined. (5-6)	The lab record lacks clear organization or structure. Some sections are unclear or incomplete. (3-4)	The lab record is poorly organized, with missing or unclear sections. (1-2)
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Note: Can add Engineering & IT tool usage based on the nature of the course

Suggested Learning Activities may include (but are not limited to):

- Course Project
- Case Study Presentation
- Programming Assignment
- Tool/Software Exploration
- Literature Review
- Open Book Test (preferably at RBL4 and RBL5 levels)
- GATE-based Aptitude Test
- Assignment (at RBL3, RBL4, or RBL5 levels)
- Any other relevant and innovative academic activity
- Use of MOOCs and Online Platforms

Applied Chemistry for Smart Systems		Semester	I/II
Course Code	1BCHE102/202	CIE Marks	50
Teaching Hours/Week (L:T:P:S)	3:0:2:0	SEE Marks	50
Total Hours of Pedagogy (Theory and Lab hours)	64	Total Marks	100
Credits	04	Exam Hours	03
Examination type (SEE)	Descriptive		
Course outcome (Course Skill Set)			
At the end of the course, the student will be able to:			
CO1: Understand the structure, synthesis, and applications of functional materials in memory and display devices.			
CO2: Analyze quantum materials, conducting polymers, and their roles in energy and electronic systems.			
CO3: Evaluate next-generation energy systems, fuel cells, and green hydrogen technologies.			
CO4: Apply concepts of sensors, corrosion control, and green materials in sustainable electronics and e-waste management.			
Module-1 Functional Materials for Memory and Display Systems			
Memory Devices: Introduction, organic semiconductors; types of organic semiconductors used in memory devices, p-type semiconductor-pentacene and n-type semiconductor-perfluoropentacene. Differences between organic and inorganic memory devices. Construction, working and advantages of pentacene semiconductor chip.			
Resistive RAM (ReRAM) Materials: Introduction, synthesis of TiO ₂ -RAM nanomaterial by sol-gel method, properties and applications.			
Display Systems: Introduction, liquid crystals (LCs)-classification, properties and its applications. Construction, working principle and applications of Light Emitting Diodes (LEDs), Organic Light Emitting Diodes (OLEDs), Active-Matrix Organic Light Emitting Diodes (AMOLEDs) and Quantum Light Emitting Diodes (QLEDs).			
			Number of Hours: 08
Module-2 Quantum Materials and Polymers			
Quantum Dots: Introduction, size dependent properties-quantum confinement effect, surface-to-volume ratio & band gap. Synthesis of Cd-Se Quantum dots by wet chemical method and its applications. Construction, working principle and applications of quantum dot sensitized solar cells (QDSSCs).			
Polymer: Introduction, number average and weight average molecular weight of the polymers and numerical problems. Structure-properties relationship of polymers [Crystallinity, Strength, Elasticity and chemical resistivity]. Synthesis and properties of nylon-6,6 and its advantages in 3D printing applications. Synthesis and properties of chlorinated polyvinyl chloride (CPVC), and polymethyl methacrylate (PMMA) and their uses in device applications.			
Conducting polymers- Introduction, synthesis of polyaniline, conduction mechanism and its engineering applications.			
			Number of Hours: 08
Module-3 Sustainable Energy Systems			
Energy Systems: Introduction, basic overview of Nerns't equation, construction and working of concentration cell and numerical problems. Batteries-classification of batteries, construction, working and applications of Li-Ion battery.			

Next-Generation Energy Devices: Introduction, construction and working of sodium ion battery for EV applications. Construction and working of ultra-small asymmetric super capacitor and its applications in IoT/wearable devices.

Sustainable Energy Devices: Introduction, fuel cells, difference between fuel cell and battery. Construction, working principle, applications and limitations of solid-oxide fuel cell (SOFCs) and solar photovoltaic cell (PV cell). Production of green hydrogen by photocatalytic water splitting by TiO₂ catalyst and its advantages.

Number of Hours: **08**

Module-4 Sensors and Corrosion Science

Sensors: Introduction, terminologies-Transducer, Actuators and Sensors. Conductometric sensor-principle, construction and its application in the estimation of acid mixture. Colorimetric sensor-principle, instrumentation and its application in the estimation of copper in PCB. Electrochemical gas sensors- principle, construction and its application in the detection of NO_x and SO_x in air sample. Biosensor-principle, construction and working for the detection of glucose in biofluids.

Corrosion: Introduction, electrochemical theory of corrosion, types of corrosion-differential metal and differential aeration corrosion-waterline and pitting corrosion. Corrosion control-galvanization and anodization. Vapour corrosion inhibitors for protecting computer circuit boards, corrosion penetration rate (CPR)-definition and numerical problems.

Number of Hours: **08**

Module-5 Green Materials and E-Waste Management

Green Chemistry: Introduction, properties and applications of green solvents for server heat management. Synthesis and properties of glycerol trioleate ester and its uses in IT infrastructure applications. Green synthesis of ZnO nanoparticles and its uses in magnetic Radio Frequency Identification (RFID) and Internet of Nano Things (IONT) system applications.

Biomaterials: Introduction, synthesis and properties of polylactic Acid (PLA) and polyethylene glycol (PEG) and its uses in touch screen applications. Synthesis and properties of Alginate Hydrogel and its uses in Brain-Computer Interfaces (BCIs) applications.

E-waste: Introduction, sources, composition of e-waste, effects of e-waste on environment and human health, Artificial intelligence in e-waste management, extraction of gold from e-waste by bioleaching method.

Number of Hours: **08**

PRACTICAL COMPONENTS OF IPCC

LIST OF EXPERIMENTS

1. Estimation of total hardness of water by EDTA method.
2. Determination of chemical oxygen demand (COD) of industrial effluent sample.
3. Estimation of iron in TMT bar by diphenyl amine indicator method.
4. Determination of total alkalinity of given water sample.
5. Determination of acid value of solder flux using KOH
6. Estimation of acid mixture using conductometric sensor (Conductometry).
7. Estimation of iron in rust sample using potentiometric sensor (Potentiometry).
8. Determination of pK_a of cooling fluids using pH sensor (Glass electrode).
9. Estimation of copper present in e-waste using optical sensor (Colorimetry).
10. Determination of viscosity coefficient of liquid coolant sample.
11. Interpretation of pK_a values of a cooling fluid using origin software.

12. Chemical structure drawing using software: Chem Draw/ Chem Sketch.

Suggested Learning Resources: (Text Book/ Reference Book/ Manuals):

Text books:

1. Engineering Chemistry, Suba Ramesh, Vairam, Ananda Murthy, 2011, Wiley India, ISBN: 9788126519880.
2. A Textbook of Engineering Chemistry, R.V. Gadag and Nityananda Shetty, I. K. International Publishing house. 2nd Edition, 2016.
3. Engineering Chemistry: Jain & Jain, Publisher: Dhanpat Rai Publishing Company, ISBN: 978-935316118.

Reference Books / Manuals:

1. Semiconducting Materials and Devices-Deepak Verma, ISBN: 978 9394777712,
2. Organic Thin Film Transistor Applications: Materials to Circuits-Brajesh K. Kaushik et al. ISBN 10: 9781498736534
3. High Quality Liquid Crystal Displays and Smart Devices – Ishihara, Kobayashi & Ukai (2019, IET), ISBN: 9781785619397
4. Quantum Dots and Polymer Nanocomposites: Synthesis, Chemistry, and Applications-yotishkumar Parameswaranpillai, Poushali Das, Sayan Ganguly, Publisher: CRC Press, 2022, ISBN 13: 978 1032210148
5. Green Carbon Quantum Dots: Environmental Applications; Vijay Kumar, Pardeep Singh, Devendra Kumar Singh (India), Springer Nature Singapore, Oct 2024, ISBN 13: 978 9819762026.
6. Conducting Polymers, Fundamentals and Applications: Including Carbon Nanotubes and Graphene: Prasanna Chandrasekhar (IIT Delhi alumnus), Springer, 2019 (2nd ed.), ISBN 13: 978 3030098858.

Web links and Video Lectures (e-Resources):

1. <https://youtu.be/1TGTvQbMIlc>
2. <https://www.youtube.com/watch?v=IzWONUYlQ5E&t=56s>
3. <https://youtu.be/3j0jLuOs0v4>
4. <https://youtu.be/CeZxn8CyM6Q>
5. <https://youtu.be/om0gppRTKoU>
6. https://youtu.be/_ubwkG7uCFA
7. <https://youtu.be/0EokkhdppgE?si=L6Znx5yXYjI9EVLw>
8. <https://youtu.be/hT2yCPnNEoI>
9. <https://www.youtube.com/watch?v=EE35ICGthR8>
10. <https://www.youtube.com/live/CMylb58vd4Q>
11. <https://www.youtube.com/watch?v=YsZcSnqV9lg>
12. <https://youtu.be/xrsK9FUdvRE?si=prlzf7fRocxxygJr>
13. <https://youtu.be/OEDApr-9lNE?si=CydVhq3d5ffzdXUC>
14. <https://youtu.be/QNKPaZkWC9Q?si=PyI4sQUL75340I9i>
15. <https://youtu.be/0Citdpy92EE>
16. <https://youtu.be/zaNdJ9I21YA>
17. <https://youtu.be/YAW7nMf8j0A>
18. <https://www.youtube.com/watch?v=FXGNQqdrBzc>
19. <https://www.youtube.com/watch?v=KvmqgAYO0MI>
20. <https://www.youtube.com/watch?v=SvlrAFDHOLc>
21. <https://youtu.be/kUCVBhSka2Q>

22. <https://www.youtube.com/watch?v=Ic5TEuKxj8M>
23. <https://www.youtube.com/watch?v=ATn92XwdgC4>
24. <https://www.youtube.com/watch?v=ldlniZfA2X4>
25. <https://www.youtube.com/watch?v=C0K1XRT1myg>
26. <https://www.youtube.com/watch?v=iVcSgej7-K8>

Teaching-Learning Process (Innovative Delivery Methods):

The following are sample strategies that educators may adopt to enhance the effectiveness of the teaching-learning process and facilitate the achievement of course outcomes.

1. Self-Learning using AI Tools
2. Activity Based Learning
3. Models and Working Models
4. Simulations and Interactive Simulations
5. Experiential Learning
6. Flipped Class Learning
7. Hybrid Learning
8. ICT Based Learning

Assessment Structure: Please refer to VTU circular; <https://vtu.ac.in/wp-content/uploads/2023/06/Revised-CIRCULAR-SEE-CIE-2022-scheme-1-1.pdf>

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) and for the SEE minimum passing mark is 35% of the maximum marks (18 out of 50 marks). The student is declared as a pass in the course if he/she secures 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.

To put it simply, evaluation techniques/methods are listed in the table for further understanding.

Course Assessment Plan (CAP) for Theory and Practical Integrated Courses (TPICs)						
		Continuous Internal Examinations (CIE)				
Assessment	Max. Marks	Component	Max Marks	Min. Passing Marks	Evaluation details	Passing Marks
Theory	25	IA	15	6	Average of the two IA each of 25 marks & scale down to 15	10/25
		CIE-CCA	10	4	Any two assessment (Assignment/Quiz/Seminar, etc)	
Practical	25	CIE	15	6	Record /Observation Book / Conduction & Evaluation	10/25
		CIE Lab IA	10	4	One test 50 marks & scale down to 10 Marks (DETAILS)	
Finalization of Continuous Internal Examinations (CIE)						
Theory Marks + Lab Marks = 25 + 25 = 50 [Passing Marks (40%): 10 + 10 = 20/50]						20/50
Semester End Examinations (SEE)						
Theory	50	Theory SEE conducted for 100 marks & then reduced to 50 Marks [Passing % = (35%)]				18/50
Minimum marks for course completion (40 % in the Sum total of CIE and SEE)						40/100

CIE Practical component:

The CIE marks awarded in the case of the practical component shall be based on the continuous evaluation of the laboratory report using a defined set of rubrics. Each experiment report can be evaluated for 15 marks including compulsorily one open ended (PART B)

experiment.

Rubrics for report evaluation:

Laboratory report/record	Conduction of experiments	Calculation/graph	Total
5 marks	5 marks	5 marks	15 marks

The average of all the experiments marks to be considered for CIE marks (15 marks).

The laboratory test (duration 02 hours) at the end of the last 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. For laboratory test, the student is required to conduct one experiment either from volumetric or from instrumental (In Part-A only). Part B related open-ended experiment for project-based work (team/group wise) related to preparation, conduction and write up work only and not involved in the final CIE practical test..

Rubrics for Learning Activity (Based on the nature of learning activity, design the rubrics for each activity):

Performance Indicator (CO/PO Mapping)	Superior	Good	Fair	Needs Improvement	Unacceptable
Performance Indicator 1 (CO1 - P01, P02, P03, P04, P06, P011)	Demonstrates an in-depth understanding of corrosion mechanisms and expertly applies appropriate surface coating techniques for effective material protection.	Shows clear understanding of corrosion processes and applies relevant surface coating methods with reasonable effectiveness for material protection.	Provides a general understanding of corrosion mechanisms and applies basic surface coating techniques with limited accuracy.	Displays minimal understanding of corrosion and surface coatings; application is unclear or inappropriate for material protection.	Fails to demonstrate understanding of corrosion or surface coating techniques; no evidence of application in engineering systems.
Performance Indicator 2 (CO2 - P01, P02, P03, P06, P011)	Demonstrates a thorough analysis of sustainable chemistry principles and critically evaluates various green energy fuels with strong justification.	Clearly analyses key sustainable chemistry concepts and evaluates green energy fuels with appropriate relevance	Shows a basic understanding of sustainable chemistry and provides a general evaluation of green fuels, but lacks depth.	Demonstrates minimal understanding of sustainable chemistry; evaluation of green fuels is weak.	Fails to analyse sustainable chemistry principles or evaluate green energy fuels.
Performance Indicator 3 (CO3 - P01, P02, P03, P011)	Thoroughly examines the synthesis methods and critically evaluates the applications of nanomaterials in advanced energy storage technologies.	Clearly examines common synthesis techniques and explains relevant applications of nanomaterials in energy storage technologies.	Demonstrates a basic understanding of nanomaterial synthesis and mentions general applications in energy storage.	Provides minimal explanation of synthesis, applications and shows limited understanding of nanomaterials in energy storage.	Fails to examine synthesis and application of nanomaterials.

Performance Indicator 4 (C04 - P01, P02, P03, P011)	Effectively applies appropriate functional materials in diverse engineering applications with clear justification.	Correctly applies functional materials in relevant engineering contexts and shows reasonable understanding of their impact.	Shows basic application of functional materials with limited understanding.	Applies functional materials inaccurately and limited connection to performance.	Fails to apply functional materials appropriately and no understanding of their use in engineering.
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Rubrics for CIE – Continuous assessment:

Performance Indicator (CO/PO Mapping)	Superior	Good	Fair	Needs Improvement	Unacceptable
Performance Indicator 1 (C01 - P01, P02, P03, P04, P06, P011)	Demonstrates an in-depth understanding of corrosion mechanisms and expertly applies appropriate surface coating techniques for effective material protection.	Shows clear understanding of corrosion processes and applies relevant surface coating methods with reasonable effectiveness for material protection.	Provides a general understanding of corrosion mechanisms and applies basic surface coating techniques with limited accuracy.	Displays minimal understanding of corrosion and surface coatings; application is unclear or inappropriate for material protection.	Fails to demonstrate understanding of corrosion or surface coating techniques; no evidence of application in engineering systems.
Performance Indicator 2 (C02 - P01, P02, P03, P06, P011)	Demonstrates a thorough analysis of sustainable chemistry principles and critically evaluates various green energy fuels with strong justification.	Clearly analyses key sustainable chemistry concepts and evaluates green energy fuels with appropriate relevance	Shows a basic understanding of sustainable chemistry and provides a general evaluation of green fuels, but lacks depth.	Demonstrates minimal understanding of sustainable chemistry; evaluation of green fuels is weak.	Fails to analyse sustainable chemistry principles or evaluate green energy fuels.
Performance Indicator 3 (C03 - P01, P02, P03, P011)	Thoroughly examines the synthesis methods and critically evaluates the applications of nanomaterials in advanced energy storage technologies.	Clearly examines common synthesis techniques and explains relevant applications of nanomaterials in energy storage technologies.	Demonstrates a basic understanding of nanomaterial synthesis and mentions general applications in energy storage.	Provides minimal explanation of synthesis, applications and shows limited understanding of nanomaterials in energy storage.	Fails to examine synthesis and application of nanomaterials.
Performance Indicator 4 (C04 - P01, P02, P03, P011)	Effectively applies appropriate functional materials in diverse	Correctly applies functional materials in relevant engineering contexts and	Shows basic application of functional materials with limited understanding.	Applies functional materials inaccurately and limited connection to	Fails to apply functional materials appropriately and no understanding

	engineering applications with clear justification.	shows reasonable understanding of their impact.		performance.	of their use in engineering.
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Rubrics for SEE / CIE Test:

Performance Indicator (CO/PO Mapping)	Superior	Good	Fair	Needs Improvement	Unacceptable
Performance Indicator 1 (C01 - P01, P02, P03, P04, P06, P011)	Demonstrates an in-depth understanding of corrosion mechanisms and expertly applies appropriate surface coating techniques for effective material protection.	Shows clear understanding of corrosion processes and applies relevant surface coating methods with reasonable effectiveness for material protection.	Provides a general understanding of corrosion mechanisms and applies basic surface coating techniques with limited accuracy.	Displays minimal understanding of corrosion and surface coatings; application is unclear or inappropriate for material protection.	Fails to demonstrate understanding of corrosion or surface coating techniques; no evidence of application in engineering systems.
Performance Indicator 2 (C02 - P01, P02, P03, P06, P011)	Demonstrates a thorough analysis of sustainable chemistry principles and critically evaluates various green energy fuels with strong justification.	Clearly analyses key sustainable chemistry concepts and evaluates green energy fuels with appropriate relevance	Shows a basic understanding of sustainable chemistry and provides a general evaluation of green fuels, but lacks depth.	Demonstrates minimal understanding of sustainable chemistry; evaluation of green fuels is weak.	Fails to analyse sustainable chemistry principles or evaluate green energy fuels.
Performance Indicator 3 (C03 - P01, P02, P03, P011)	Thoroughly examines the synthesis methods and critically evaluates the applications of nanomaterials in advanced energy storage technologies.	Clearly examines common synthesis techniques and explains relevant applications of nanomaterials in energy storage technologies.	Demonstrates a basic understanding of nanomaterial synthesis and mentions general applications in energy storage.	Provides minimal explanation of synthesis, applications and shows limited understanding of nanomaterials in energy storage.	Fails to examine synthesis and application of nanomaterials.
Performance Indicator 4 (C04 - P01, P02, P03, P011)	Effectively applies appropriate functional materials in diverse engineering applications with clear justification.	Correctly applies functional materials in relevant engineering contexts and shows reasonable understanding of their impact.	Shows basic application of functional materials with limited understanding.	Applies functional materials inaccurately and limited connection to performance.	Fails to apply functional materials appropriately and no understanding of their use in engineering.

Suggested rubrics for Practical continuous assessment:

Performance Indicators	Excellent	Very Good	Good	Satisfactory
Fundamental Knowledge (4) (PO1)	The student has well depth knowledge of the topics related to the course (4)	Student has good knowledge of some of the topics related to course (3)	Student is capable of narrating the answer but not capable to show in depth knowledge(2)	Student has not understood the concepts clearly (1)
Design Of Experiment (5) (PO2 and PO3)	Student is capable of discussing more than one design for his/her problem statement and capable of proving the best suitable design with proper reason (5)	Student is capable of discussing few designs for his/her problem statement but not capable of selecting best (4)	Student is capable of discussing single design with its merits and de-merits (3)	Student is capable of explaining the design (1-2)
Implementation (8) (PO3 and PO8)	Student is capable of implementing the design with best suitable algorithm considering optimal solution. (7-8)	Student is capable of implementing the design with best suitable algorithm and should be capable of explaining it (5-6)	Student is capable of implementing the design with proper explanation. (3-4)	Student is capable of implementing the design. (1-2)
Result and Analysis (5) (PO4)	Student is able to run the program on various cases and compare the result with proper analysis. (5)	Student will be able to run the program for all the cases. (4)	Student will be able to run the code for few cases and analyze the output (3)	Student will be able to run the program but not able to analyze the output (1-2)
Demonstration (8) (PO9)	The lab record is well-organized, with clear sections (e.g., Introduction, Method, Results, Conclusion). Transitions between sections are smooth. (7-8)	The lab record is organized, with clear sections, but some sections are not well-defined. (5-6)	The lab record lacks clear organization or structure. Some sections are unclear or incomplete. (3-4)	The lab record is poorly organized, with missing or unclear sections. (1-2)

Note: Can add Engineering and IT tool usage based on the nature of the course

Suggested Learning Activities may include (but are not limited to):

- Course Project
- Case Study Presentation
- Programming Assignment
- Tool/Software Exploration
- Literature Review
- Open Book Test (preferably at RBL4 and RBL5 levels)
- GATE-based Aptitude Test
- Assignment (at RBL3, RBL4, or RBL5 levels)
- Any other relevant and innovative academic activity
- Use of MOOCs and Online Platforms

Introduction to AI and Applications		Semester	I/II
Course Code	1BAIA103/203	CIE Marks	50
Teaching Hours/Week (L:T:P: S)	3:0:0:0	SEE Marks	50
Total Hours of Pedagogy	40	Total Marks	100
Credits	3	Exam Hours	3
Examination type (SEE)	Theory		
Course outcome (Course Skill Set)			
At the end of the course, the student will be able to: CO1: Explain the concepts and types of artificial intelligence. CO2: Illustrate basic machine learning methods for regression, classification and clustering. CO3: Identify real-world applications across different disciplines. CO4: Make use of prompt engineering techniques to interact with generative AI tools. CO5: Outline recent trends in artificial intelligence and machine learning.			
Module-1			
Introduction to Artificial Intelligence: Artificial Intelligence, How Does AI Work?, Advantages and Disadvantages of Artificial Intelligence, History of Artificial Intelligence, Types of Artificial Intelligence, Weak AI, Strong AI, Reactive Machines, Limited Memory, Theory of Mind, Self-Awareness, Is Artificial Intelligence Same as Augmented Intelligence and Cognitive Computing, Machine Learning and Deep Learning.			
Machine Intelligence: Defining Intelligence, Components of Intelligence, Differences Between Human and Machine Intelligence, Agent and Environment, Search, Uninformed Search Algorithms, Informed Search Algorithms: Pure Heuristic Search, Best-First Search Algorithm (Greedy Search).			
Knowledge Representation: Introduction, Knowledge Representation, Knowledge-Based Agent, Types of Knowledge.			
Textbook 1: Chapter 1 (1.1-1.5), Chapter 3 (3.1-3.7.2), Chapter 4 (4.1-4.4)		Number of Hours: 08	
Module-2			
Introduction to Prompt Engineering, Introduction to Prompt Engineering, The Evolution of Prompt Engineering, Types of Prompts, How Does Prompt Engineering Work?, Comprehending Prompt Engineering's Function in Communication, The Advantages of Prompt Engineering, The Future of LLM Communication.			
Prompt Engineering Techniques for ChatGPT, Introduction to Prompt Engineering Techniques, Instructions Prompt Technique, Zero, One, and Few Shot Prompting, Self-Consistency Prompt.			
Prompts for Creative Thinking: Introduction, Unlocking Imagination and Innovation.			
Prompts for Effective Writing: Introduction, Igniting the Writing Process with Prompts.			
Textbook 2: Chapters 1, 3, 4 & 5		Number of Hours: 08	
Module-3			
Machine Learning: Techniques in AI, Machine Learning Model, Regression Analysis in Machine Learning, Classification Techniques, Clustering Techniques, Naïve Bayes Classification, Neural Network, Support Vector Machine (SVM).			
Textbook 1: Chapter 2 (2.1-2.8)		Number of Hours: 08	
Module-4			
Trends in AI: AI and Ethical Concerns, AI as a Service (AIaaS), Recent trends in AI, Expert System, Internet of Things, Artificial Intelligence of Things (AIoT).			
Textbook 1: Chapter 8 (8.1, 8.2, 8.4), Chapter 9 (9.1- 9.3)		Number of Hours: 08	

Module-5	
Robotics, Robotics-an Application of AI, Drones Using AI, No Code AI, Low Code AI.	
Textbook 1: Chapter 8 (8.3), Chapter 1 (1.7, 1.8, 1.10, 1.11)	
Industrial Applications of AI: Application of AI in Healthcare, Application of AI in Finance, Application of AI in Retail, Application of AI in Agriculture, Application of AI in Education, Application of AI in Transportation, AI in Experimentation and Multi-disciplinary research.	
Textbook 3: Chapter 3, Chapter 5 (5.1)	Number of Hours: 08
Suggested Learning Resources: (Textbook/ Reference Book/ Manuals):	
Textbooks: 1. Reema Thareja, Artificial Intelligence: Beyond Classical AI, Pearson Education, 2023. 2. Ajantha Devi Vairamani and Anand Nayyar, Prompt Engineering: Empowering Communication, 1st Edition, CRC Press, Taylor & Francis Group, 2024. (DOI: https://doi.org/10.1201/9781032692319). 3. Saptarsi Goswami, Amit Kumar Das and Amlan Chakrabarti, "AI for Everyone – A Beginner's Handbook for Artificial Intelligence", Pearson, 2024.	
Reference books / Manuals: 1. Stuart Russell and Peter Norvig, <i>Artificial Intelligence: A Modern Approach</i> (4th Edition), Pearson Education, 2023. 2. Elaine Rich, Kevin Knight, and Shivashankar B. Nair, <i>Artificial Intelligence</i>, McGraw Hill Education. 3. Tom Taulli, <i>Prompt Engineering for Generative AI: ChatGPT, LLMs, and Beyond</i>, Apress, Springer Nature. 4. Nilakshi Jain, <i>Artificial Intelligence: Making A System Intelligent</i>, First Edition, Wiley.	
Web links and Video Lectures (e-Resources):	
1. Elements of AI – https://www.elementsofai.com 2. CS50's Introduction to Artificial Intelligence with Python – Harvard https://cs50.harvard.edu/ai/ 3. Google Machine Learning Crash Course – https://developers.google.com/machine-learning/crash-course 4. Learn Prompting (Open-Source Guide) – https://learnprompting.org 5. Google AI – Learn with Google AI https://ai.google/education/ 6. Coursera – Machine Learning by Andrew Ng (Stanford University) https://www.coursera.org/learn/machine-learning 7. OpenAI Prompt Engineering Guide (for ChatGPT) https://platform.openai.com/docs/guides/gpt-best-practices 8. Prompt Engineering for Developers – DeepLearning.AI + OpenAI https://www.deeplearning.ai/short-courses/chatgpt-prompt-engineering-for-developers/ 9. Ethics in AI – Google Responsible AI Practices https://ai.google/responsibilities/responsible-ai-practices/ 10. Google Teachable Machine (Train AI models visually without code) https://teachablemachine.withgoogle.com	
Teaching-Learning Process (Innovative Delivery Methods):	
The following are sample strategies that educators may adopt to enhance the effectiveness of the teaching-learning process and facilitate the achievement of course outcomes. - Flipped Classroom - Problem-Based Learning (PBL) - Case-Based Teaching	

- Simulation and Virtual Labs
- ICT-Enabled Teaching
- Tool Demonstration

Assessment Structure:

The assessment in each course is divided equally between Continuous Internal Evaluation (CIE) and the Semester End Examination (SEE), with each carrying 50% weightage.

- To qualify and become eligible to appear for SEE, in the **CIE**, a student must score at least **40% of 50 marks**, i.e., **20 marks**.
- To pass the **SEE**, a student must score at least **35% of 50 marks**, i.e., **18 marks**.
- Notwithstanding the above, a student is considered to have **passed the course**, provided the combined total of **CIE and SEE is at least 40 out of 100 marks**.

Continuous Comprehensive Assessments (CCA):

CCA will be conducted for a total of 25 marks. It is recommended to include a maximum of two learning activities aimed at enhancing the holistic development of students. These activities should align with course outcomes and promote higher-order thinking and application-based learning.

Learning Activity -1: Practical Assignment on Creating Effective Prompts (Marks- 25)**INSTRUCTIONS:**

1. Students must demonstrate the solutions to the course instructor and submit the record containing prompt creation (procedure), prompt execution and results with observations.
2. Course instructor must evaluate the student performance as per the rubrics.

Sl. No	Activity on Creating Effective Prompts
Note: To conduct the activity students can use any of the AI tools such as ChatGPT.	
1	Basic Prompt writing: Create two different prompts to ask an AI about the topic "Electricity." The first prompt should be vague, and the second prompt should be clear and specific. Compare the responses you get and describe which prompt gave a better answer and why.
2	Zero-Shot Prompting: Create a prompt that asks an AI to explain Ohm's Law without giving any example or background. Evaluate how well the AI explains the concept based on your prompt alone.
3	One-Shot and Few-Shot Prompting: Provide the AI with a single example of how to calculate the resistance in a simple circuit. Then write your own prompt asking the AI to solve a similar resistance calculation. After that, add two more examples to your prompt and observe any changes in the AI's response quality.
4	Chain-of-Thought Prompting: Develop a prompt that guides the AI step-by-step through calculating current flow in a circuit using Ohm's Law with resistors in series. Then, ask a final question for the AI to solve. Analyze how breaking down the reasoning steps impacts the accuracy of the answer.
5	Prompt Refinement: Start with an ambiguous prompt related to the "Water Cycle." Test the AI's response, note the confusion or errors, and then refine your prompt to make it clearer and more specific. Repeat this process twice and record how the AI's responses improve with each refinement. Role-Based Prompting: Create three prompts asking the AI to explain "Newton's Laws of Motion," each with a different role instruction: (a) as an expert engineer, (b) as a high school teacher, (c) as a beginner. Compare the tone, detail, and style of the responses.
6	Creative Engineering Problem Prompts: Craft a prompt that asks the AI to brainstorm ideas for designing a low-cost water purification system suitable for rural areas. Encourage creativity by adding phrases like " limited resources " and " sustainability ".

7	Ethical Prompt Design Discussion: Identify a biased prompt related to job descriptions (e.g. language with respect to a gender). Rewrite the prompt to remove bias and create a neutral, inclusive version. Explain why this revision is more ethical.
8	Simulated Customer Support Chatbot: Develop a prompt that instructs the AI to play the role of a technical support agent helping a customer troubleshoot a failure in an electronic circuit. Include instructions to keep the tone friendly and professional and to ask diagnostic questions.
9	Multi-Language Prompting: Develop a prompt that asks the AI to translate a simple engineering glossary (5 technical terms) from English to your native language. Then modify the prompt to request additional explanations of these terms in the translated language.
10	Review a curated set of different prompt types (e.g., for summarization, information extraction, paraphrasing, question answering) from a “Prompt Gallery.” For each prompt type, match it with a real-world task (e.g., summarizing a lecture note, extracting names from a project report). Test at least three prompt templates on an AI tool or by role-play (students simulate being the AI), with varied wording. Record the outcomes and discuss which prompt (or template) was most effective for each task, and explain why you think it worked best. Reflect on how changing small parts of a prompt can alter model response quality, completeness, or accuracy.
11	Choose a real engineering challenge or societal problem relevant to your field (e.g., “Reducing plastic waste in campus cafeterias” or “Optimizing solar panel placement on campus rooftops”). Draft an initial prompt that asks an AI to propose practical solutions. Share the AI’s (or peer’s) answer in small groups and identify aspects that are missing, vague, or not actionable. Refine your prompt based on feedback (e.g., specify constraints, ask for step-by-step solutions, or require a list of pros and cons). Repeat the process one more time, refining again for further clarity or specificity. Document the entire prompt-refinement process and share the best solution generated, along with a brief analysis of how prompt improvements led to better responses.

Rubrics for Learning Activity (Creating Effective Prompts):

Component & CO-PO Mapping	Outstanding (5)	Exceeds Expectations (4)	Meets Expectations (3)	Needs Improvement (2)	Unsatisfactory (1)
Appropriate Use of Prompting Technique [C04] [P01, P05]	Demonstrates precise and creative application of the intended prompting technique (e.g., zero-shot, few-shot, role-based) with full alignment to objectives.	Correctly applies the prompting technique with minor gaps or missed opportunities.	Uses the prompting technique, but with partial understanding or inconsistent application.	Limited understanding of the technique; incorrect or weak application.	No evidence of correct prompting technique use.
Analysis & Comparison of Responses [C01] [P02, P04]	Provides thorough, insightful, and well-supported analysis of AI responses, comparisons highlight key strengths and weaknesses.	Provides clear analysis with relevant comparisons, though slightly less detailed.	Provides basic analysis with limited insight, comparisons are present but shallow.	Minimal analysis, comparisons are weak or incomplete.	No meaningful analysis or comparison.
Creativity & Problem-Solving [C03, C05] [P03, P011]	Demonstrates outstanding creativity and innovation in crafting prompts, especially for problem-solving or design tasks.	Demonstrates creativity and some innovation; solutions are practical.	Shows moderate creativity; prompts are functional but not innovative.	Minimal creativity; prompts are repetitive or unimaginative.	No creativity or problem-solving is evident.
Ethical Awareness & Inclusivity [C0-5] [P07]	Identifies biases clearly and revises prompts to be fully ethical, inclusive, and culturally sensitive.	Identifies some biases and revises prompts to improve inclusivity.	Attempts bias identification, but revisions are incomplete or partly effective.	Minimal effort is made to address bias; inclusivity not fully considered.	No consideration of bias or ethics is used in prompts.
Clarity & Specificity of Prompts, Documentation & Reflection [C01, C04] [P08, P09, P011]	Prompts are self-explanatory, specific, and well-structured for the intended activity; no ambiguity is present. Documentation is complete, well-organized, and includes deep reflection on improvements across iterations.	Prompts are clear and mostly specific; minor ambiguity is present. Documentation is complete with some reflection on prompt refinement.	Prompts are somewhat clear but could be more specific; moderate ambiguity. Documentation is present but lacks detail or depth in reflection.	Prompts are vague and lack clarity; high ambiguity. Incomplete documentation, reflection is minimal.	Prompts are unclear, incomplete, or irrelevant to the activity. No documentation or reflection provided as per schedule

Computer Aided Engineering Drawing for CS Stream		Semester	I/II
Course Code	1BCEDS103/203	CIE Marks	50
Teaching Hours/Week (L:T:P: S)	2 :0 :2 : 0	SEE Marks	50
Total Hours of Pedagogy	40	Total Marks	100
Credits	03	Exam Hours	03
Examination type (SEE)	Theory (Conducted in batches similar to practical's)		
Course Outcomes			
At the end of the course, the student will be able to:			
CO 1. Generate orthographic projections of points, lines, planes, and solids manually and with computer-aided tools.			
CO 2. Develop the lateral surfaces of solids for real-world applications.			
CO 3. Draw isometric views and convert isometric drawings to orthographic views.			
CO 4. Create 3D models of embedded, networking, and IoT devices.			
Module-1			
Introduction:			
Significance of Engineering drawing, BIS Conventions of Engineering Drawing, Free hand sketching of engineering drawing, Scales.			
Introduction to Computer Aided Drafting software, Co-ordinate system and reference planes HP, VP, RPP & LPP of 2D/3D environment. Selection of drawing sheet size and scale. Commands and creation of Lines, coordinate points, axes, polylines, square, rectangle, polygons, splines, circles, ellipse, text, move, copy, off-set, mirror, rotate, trim, extend, break, chamfer, fillet and curves.			
Orthographic Projections of Points, Lines and Planes:			
Introduction to Orthographic projections, Orthographic projections of points in 1 st and 3 rd quadrants.			
Orthographic projections of lines (Placed in First quadrant only as per BIS)			
Orthographic projections of planes: triangular, square, rectangular, pentagonal, hexagonal and circular lamina (Placed in First quadrant only using change of position method).			
			Number of Hours: 08
Module-2			
Orthographic Projection of Solids:			
Orthographic projection of right regular solids (Resting on HP only and inclined to both the planes); Prisms, Pyramids, Cylinders & Cones.			
			Number of Hours: 08
Module-3			
Section of Solids:			
Introduction, Section planes, Sectional views: apparent shapes and true shapes, Sections of right regular prisms, pyramids, cylinders and cones resting with their base on HP. (Concepts only and No Problems for practice)			
Development of Lateral Surfaces of Solids:			
Development of lateral surfaces of right regular Prisms, Pyramids, Cylinders & Cones and their frustums and truncations. Problems on applications of development of lateral surfaces like funnels and trays.			
			Number of Hours: 08

Module-4	
Isometric Views: Introduction to Isometric views, Isometric projections, Isometric scale. Isometric view of hexahedron (cube), right regular prisms, pyramids, cylinders, cones and spheres, Isometric view of combination of two simple solids, step block. Conversion of simple isometric drawings into orthographic views: Problems on conversion of Isometric view of simple objects / engineering components into orthographic views.	Number of Hours: 08
Module-5	
Computer Network Drawing (For CIE Only): 2D Network drawing with wired and wireless, Network topology - wired and wireless. 3D Modeling: Raspberry Pi / Arduino boards, Router & switches, IoT devices - Concept of converting to 3D printing format (stl) Concept of Industrial drawing	Number of Hours: 08
Suggested Learning Resources: (Textbook/ Reference Book/ Manuals):	
<u>Textbooks:</u> 1. K. R. Gopalakrishna, & Sudhir Gopalakrishna: A Textbook of Computer Aided Engineering Drawing, 39th Edition, Subash Stores, Bangalore, 2017 2. Bhatt, N.D., Engineering Drawing: Plane and Solid Geometry, 53rd Edition, Charotar Publishing House Pvt. Limited, 2023.	
<u>Reference books:</u> 1. S. N. Lal and T. Madhusudhan, Engineering Visualisation, engage Learning India Pvt. Ltd.; First Edition, 2022 2. P.J. Shah, Computer Aided Engineering Drawing, S. Chand Publishing, 2021 3. M. B. Shah & B.C. Rana., Engineering Drawing, Pearson Education, Revised Edition, 2009 4. Frederick E. Giesecke, et al., Technical Drawing with Engineering Graphics, Prentice Hall, 2016	
Web links and Video Lectures (e-Resources): • https://nptel.ac.in/courses/112104172 • https://nptel.ac.in/courses/112102304 • https://nptel.ac.in/courses/112105294 • https://www.coursera.org/courses?query=3d%20modeling&utm • https://www.youtube.com/watch?v=zbqrNg4C98U	
Teaching-Learning Process (Innovative Delivery Methods): The following are sample strategies that educators may adopt to enhance the effectiveness of the teaching-learning process and facilitate the achievement of course outcomes. • Flipped Classroom • Case-Based Teaching • Simulation and Virtual Labs • Partial Delivery of course by Industry expert/ industrial visits • ICT-Enabled Teaching	

Assessment Structure:

The assessment in each course is divided equally between Continuous Internal Evaluation (CIE) and the Semester End Examination (SEE), with each carrying 50% weightage.

- To qualify and become eligible to appear for SEE, in the **CIE**, a student must score at least **40% of 50 marks, i.e., 20 marks.**
- To pass the **SEE**, a student must score at least **35% of 50 marks, i.e., 18 marks.**
- Notwithstanding the above, a student is considered to have **passed the course**, provided the combined total of **CIE and SEE is at least 40 out of 100 marks.**

Continuous Internal Evaluation (CIE):

CIE shall be evaluated for 50 marks as detailed below:

The final CIE (50) = Class work marks (30) + Test marks (20)

- Class work marks should comprise of continuous evaluation of Drawing work of students as and when the Modules are covered based on the weightage as shown in the following table.

Module	Max. Marks Weightage	Evaluation Weightage in marks	
		Computer display and print out (a)	Sketching (b)
Module 1	20	15	05
Module 2	20	15	05
Module 3	20	15	05
Module 4	20	15	05
Module 5	20	15	05
Total	100	75	25
Consideration of Class work		Total of [(a) + (b)] = 100 Scaled down to 30 Marks	

- At least one **Test** covering all the modules is to be conducted for 100 marks and evaluation to be based as per SEE pattern, and the obtained marks is to be scaled down to **20 Marks.**

Semester End Examination (SEE):

- SEE shall be conducted in batches similar to practical's and evaluated for maximum of 100 Marks. Obtained marks shall be accounted for SEE final marks, reducing it by 50%.
- Two full questions shall be set from Modules 1, 2, 3 and 4. Students need to answer one full question from each module.
- Two full questions set from each Module shall cover the entire topic of the respective module.
- Question papers shall be provided by the University for each batch as per schedule.
- SEE shall be conducted by one Internal and one External Examiner.
- Evaluation shall be carried out jointly by both the examiners.
- The student may be awarded full marks, if he/she completes a solution on computer display without sketch.

- The weightage and distribution of marks for each Module is as shown in the following table:

Module	Max. Marks Weightage	Evaluation Weightage in marks	
		Computer display and print out (a)	Sketching (b)
Module 1	20	15	05
Module 2	30	25	05
Module 3	25	20	05
Module 4	25	20	05
Total	100	80	20
Consideration of SEE Marks		Total of (a + b) ÷ 2 = Final SEE marks	



VISVESVARAYA TECHNOLOGICAL UNIVERSITY, BELAGAVI

“Jnana Sangama” Macche Belagavi - 590018

Innovation & Design Thinking Lab		Semester	1
Course Code:	1BIDTL158	CIE Marks	50
Teaching Hours/Week (L:T:P: S)	0:0:2	SEE Marks	50
Total Hours of Pedagogy	2 (Full day of Saturday may be allotted)	Total Marks	100
Credits	1	Exam Hours	
Examination type (SEE)	Practical/Presentation/Seminar		
Course Outcome (Course Skill Set) -			
At the end of the course, the student will be able to:			
1. Empathize with community problems and define meaningful challenges. 2. Apply design thinking principles and multidisciplinary skills to develop user-centric solutions. 3. Build and test basic prototypes using tools available in the Atal Idea/Tinkering Lab or Makers Space. 4. Pitch socially relevant ideas with scalable models. 5. Collaborate effectively in diverse teams.			
Week 1, 2 & 3: Orientation and Team Formation			
Week -1&2: Introduction to Social Entrepreneurship, Innovation and Design Thinking Group discussion on What is Innovation vs Invention . Why Design Thinking is important. Brief about 5 stages : Empathize – Define – Ideate – Prototype – Test.			
Week -3: Innovation warm-up activities, forming interdisciplinary teams, Instructions about Next week activities			
Week 4-5: Empathy and Field Exploration			
Week-4&5: Field (any public places of student’s interest Eg- Village, Government Office, Industry. R&D institute, NGO etc) visits, stakeholder interviews and interaction. Recording all interaction through handwritten in activity book prescribed by the University.			
Week 6, 7 and 8: Problem Definition			
Week-6: Documentation, categorization and Group discussion on interactions and problems/challenges.			
Week-7&8: Problem framing using “How Might We” approach, Identification of social problems and user insights through affinity Clustering and Problem Tree. Mention of clearly defined challenge statements.			
Week 9, 10 &11: Ideation Sprint			
Week-9&10: Presentation by teams on Defined Problems, Brainstorming interactions and Mind Mapping.			
Week-10: Idea Filtering - Shortlist of creative, eco -friendly and feasible ideas. Selection of one Suitable IDEA for next process, Designing/Structuring of Prototype model.			



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Week 12, 13 &14: Rapid Prototyping using Atal Idea Lab/Makers Space
Week-12&13: Building low-fidelity and working models using tools like Arduino, 3D printers, Digital fabrication, electronics kits and recycled materials Week-14: User testing, Feedback collection, Iteration - Observation Notes, Feedback Forms (Designing a business model for impact and scalability, if possible) Preparation of Draft of social venture plan
Week 15 &16: Final Demo and Social Pitch
<i>Innovation showcase, Poster display, Project pitching to jury</i> <i>Presentation of the project with impact with assessment, prototype, and sustainability plan</i>
Teaching-Learning Process (Innovative Delivery Methods) 1.Activity Based Learning 2.Group discussion, Presentations. 3. one faculty member shall be assigned to group of 60 students or one division. 4. Each group shall contain Min. 4 and Max. 6 students. 5. Nature of the group shall be multidisciplinary. (Group shall be formed by selecting students from all branches)
Assessment Structure: The assessment in each course is divided equally between Continuous Internal Evaluation (CIE) and the Semester End Examination (SEE), with each carrying 50% weightage. - To qualify and become eligible to appear for SEE, in the CIE, a student must score at least 40% of 50 marks, i.e., 20 marks. - To pass the SEE, a student must score at least 35% of 50 marks, i.e., 18 marks. Notwithstanding the above, a student is considered to have passed the course, provided the combined total of CIE and SEE is at least 40 out of 100 marks.



VISVESVARAYA TECHNOLOGICAL UNIVERSITY, BELAGAVI

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Continuous Internal Evaluation (CIE) –

**CIE Marks allocation Parameters for Social Entrepreneurship, Innovation & Design
Thinking using Atal Idea/Tinkering Lab or Maker Space**

CIE Parameters (50 Marks)

Sl. No.	CIE Component/Week	Marks	Description
1	Orientation Activities & Communication Skills	5	Participation in Week 1–3 orientation, communication and teamwork skill-building exercises.
2	Empathy & Field Exploration Documentation	10	Quality and completeness of field visit reflections, stakeholder interviews, and activity book.
3	Problem Definition and Framing	10	Clarity of challenge statements, use of “How Might We”, Affinity Mapping, Problem Trees.
4	Ideation & Mind Mapping	5	Participation in brainstorming, mind mapping, idea filtering sessions.
5	Prototype Development & Iteration	10	Quality and creativity of prototype/model, user testing, feedback collection, iterations.
6	Final Presentation & Pitch	5	Project pitching, poster presentation, storytelling and scalability model.
7	Teamwork, Journal, and Engagement	5	Peer and mentor evaluation of participation, teamwork, journal updates.
8	Total CIE marks	50	Final CIE marks to be considered

***Minimum to Qualify for SEE: 20 out of 50 in CIE**



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Semester End Examination (SEE) -

SEE to be conducted in batches where the students will exhibit their projects along with the presentation and Viva -voce. - 100 Marks

“SEE shall be conducted by one Internal and one External Examiner”

Sl. No.	Evaluation Parameter	Marks	Details
1	Prototype / Solution Demonstration	30	Working functionality, creativity, use of lab tools, relevance to the problem.
2	Final Presentation / Social Pitch	20	Clarity, storytelling, problem-solution fit, communication, visual aids.
3	Business Model or Sustainability Plan	10	Feasibility, cost-effectiveness, scalability, and alignment with SDGs.
4	Viva Voce	20	Individual understanding, contribution, tools used, learning outcomes.
5	Documentation Report / Portfolio	20	Project report, reflection, team activity log, stakeholder input summaries.

Submission Requirements:

- Handwritten activity book with CIE marks and Final project report (Typed or Handwritten).
- Final presentation ppt/pdf (hard and soft copy).
- Prototype or working model [physical or conceptual (shall be drawn/sketched clearly on card sheet paper)].
- Peer/team feedback and reflection entries (if applicable).

COMMUNICATION SKILLS		Semester	I / II
Course Code	1BENG106/206	CIE Marks	50
Teaching Hours/Week (L: T:P: S)	1:0:0	SEE Marks	50
Total Hours of Pedagogy	15 hours +15 hours	Total Marks	100
Credits	01	Exam Hours	02
Examination type (CIE+SEE)			

COURSE OUTCOMES

- **CO1:** Build essential verbal, non-verbal, and phonetic communication skills for clarity and effectiveness.
- **CO2:** Use interpersonal skills in group discussions, presentations, and professional interactions.
- **CO3:** Apply formal writing, email etiquette, and creative content development for employability.
- **CO4:** Communicate effectively in digital platforms, following netiquette and academic integrity.
- **CO5:** Prepare job applications, resumes, and perform confidently in interviews.

UNIT 1 COMMUNICATION SKILLS (3 Hours)

Glimpses of Essential English for Engineers (General Overview). Communication Skills: Process, Verbal and Non-Verbal, Proxemics, Chronemics and Barriers. **Writing:** Word Classification – Parts of Speech, Sentence structures. **Speaking & Listening:** Listening to English Pronunciation – English Phonemes – Intelligible Accent – Speech Organs- Syllable Structures, Stress, Intonation, and Practice.

Teaching Methodology	TBTL (Task-Based Teaching Learning) & Eclectic Approach
Language Lab	Quiklrn.com
Digital Tools	ALL 44 sounds of English in 75 minutes - https://www.youtube.com/watch?v=QxQUapA-2w4&t=51s . AI-based grammar and writing tools (e.g., Grammarly, ChatGPT, Quillbot) to analyze and classify parts of speech. AI-based pronunciation tools (Google Speech-to-Text) for real-time feedback
Reading Material	“ The Chimney Sweeper ” by William Blake Martin Luther King Jr's “I Have a Dream” Speech
Assessment Techniques and Tools	Role Play: Formal/informal scenarios, Group Discussion (GD) , Case Studies Analysis: Identify barriers and suggest solutions, Mini-Presentation: Focused on proxemics. Observation Rubric (for body language, tone, time cues), (Sample Rubric, please refer the annexure), Video Recording + Self-evaluation Sheet.

UNIT 2 INTERPERSONAL SKILLS (3 Hours)

Speaking: Role Play Exercises Based on Workplace Contexts, Introducing Oneself - PEP Talks- Personal Empowerment, Participating in Group Discussion and Debates, Giving Technical Presentation. **Reading:** Reading the Interview of an Achiever (Skimming and Scanning) (Case Studies). **Writing:** Writing a Short Biography of an Achiever Based on given reflections, **Grammar:** Sentence patterns. **Vocabulary Development:** Idioms and Phrases.

Teaching Methodology	TBTL (Task-Based Teaching Learning) & Eclectic Approach
Language Lab	Quiklrn.com
Digital Tools	Google Meet / Zoom + AI Transcription- Practice group discussions with live transcription. Grammarly - Highlights grammar issues with explanations. Oxford Learner's Dictionaries (https://www.oxfordlearnersdictionaries.com/) - Includes etymology, pronunciation, synonyms/antonyms.
Assessment Techniques and Tools	Group discussion performance (listening, turn-taking, clarity) Technical presentations (confidence, structure, clarity) Role plays (relevance, tone, spontaneity) Case Studies Oral communication rubric (clarity, relevance, tone, confidence, non-verbal cues), Activity: Read a short interview of an achiever (e.g., A. P. J. Abdul Kalam, Sudha Murthy) LMS (Learning Management Systems): Moodle or Google Classroom for submissions and reflections. Video Submissions: Students submit videos of role plays or presentations for asynchronous review.

UNIT 3 ENGLISH FOR EMPLOYABILITY (3 Hours)

Writing: Formal Letter writing (Enquiry, Order, and Complaint). Tenses – Reported Speech-Voice - Email Etiquettes, Structure, Writing and Responding to Emails. Paragraph Writing (Descriptive, Argumentative, Expository, Short Story, and Narrative), Blog Writing. **Reading:** Proof Reading (Spelling, Punctuation, Grammar). Error Identification Exercises. **Speaking:** Questions & Requests (non-Wh questions and Question tags).

Pedagogy	TBTL (Task-Based Teaching Learning) & Eclectic Approach
Language Lab	Quiklrn.com
Digital Tools	Grammarly – Check grammar, tone, spelling Canva – Free templates to create posters, ads, infographics Adobe Express – Visual storytelling and ad design
Assessment Techniques and Tools	Paragraph Writing - Descriptive, Argumentative, Expository, Short Story, Narrative - Paragraph rubric (structure, logic, vocabulary, grammar) Writing - Tool: Digital submission + rubric for content originality, reader engagement, clarity. Speaking Skills - Oral assessment rubric (intonation, clarity, accuracy) Email simulator (Google Forms/Canvas/Docs template)

UNIT 4 ENGLISH IN DIGITAL WORLD (3 Hours)

Writing: Framing of search terms / keywords in search engines/ Commands for search on open AIs - Tools to support synchronous communication such as webinar platforms, and asynchronous communication such as forums and social media - Online communication - Types – pros and cons of online communication. Acceptable online roles and behaviours – Netiquettes - Etiquettes of social media. Problems and opportunities in handling digital resources -Tools to check grammar. **Writing:** Citing information accurately from source material - Plagiarism – Infringement, Importance of academic integrity.

Pedagogy	TBTL (Task-Based Teaching Learning) & Eclectic Approach
Language Lab	Quiklrn.com
Digital Tools	Google Meet - Integrated with Gmail, free for students Google Classroom - Forum, assignments, comments
Assessment Techniques and Tools	Write a short essay (150–200 words) on the problems and opportunities . Evaluation rubric (structure, coherence, grammar). Grammar assessment rubric (before vs after comparison, understanding of corrections).

UNIT 5 APPLYING FOR JOBS (3 Hours)

Listening: TED Talks. **Speaking:** Mock Interview, Telephone Interviews. **Reading:** Reading a Job Interview- language used in formal professional settings, formal vs. informal tone, non-verbal communication cues, Statement of Purpose, Company Profile and Completing Comprehension Exercises **Writing:** Job Applications and Resumes **Grammar:** Conditional Clauses, Modal verbs **Vocabulary Development:** Technical Vocabulary, Purpose Statement.

Pedagogy	TBTL (Task-Based Teaching Learning) & Eclectic Approach
Language Lab	Quiklrn.com
Assessment Techniques and Tools	Listening to professional talks, analyzing tone and structure - https://www.ted.com/talks Non-verbal cues in professional reading - https://www.youtube.com/c/Mindsight Grammar AI practice - https://quillbot.com/grammar-check
Assessment Techniques and Tools	TED Talk worksheet - Listening rubric (comprehension, inference, note-taking), Reading comprehension tests, Resume & Application rubric (content, layout, tone, language), Grammar MCQs / Editing worksheet, Scenario-based MCQs or roleplay, Vocabulary worksheet

Extra Reading

1. Kumar, A. R. (2008). *English for engineers and technologists*. Orient BlackSwan.

2. Raman, M., & Sharma, S. (2015). *Technical communication: Principles and practice* (3rd ed.). Oxford University Press.
3. Floyd, K., & Cardon, P. W. (2019). *Business and professional communication* (3rd ed.). Principles of Scientific and Technical Writing, 1e, By Pratap K. J. Mohapatra, Sanjib Moulick, © 2025 | Published: December 23, 2024
4. Effective Technical Communication, 3e, By Ashraf M. Rizvi, Priyadarshi Patnaik, © 2024 | Published: September 12, 2024
5. Yadav, D. P. (2022). *A course in English pronunciation*. Notion Publications.

Learning Resources:

- Oxford Advance Learners Dictionary
- Cambridge English Skills Real Listening and Speaking by Miles Craven
- Communicative English for Professionals by Nitin Bhatnagar and Mamta Bhatnagar

Other Digital Resources

- Google Docs + Voice Typing - <https://docs.google.com>
- LearnEnglish – <https://learnenglish.britishcouncil.org/>
- TakeIELTS - <https://www.britishcouncil.in/exam/ielts>
- British Council Apps - **bbcLearnEnglishonline Grammar**
LearnEnglish Podcasts
IELTS Word Power
Bbclearningenglishgrammer online
Sounds Right (Phonemic Chart)

CURRICULUM DESIGN

Pronunciation Phonology in the upper secondary English curriculum includes: diphthongs, consonants, consonant clusters, word stress, strong and weak forms of pronunciation, ellipsis, assimilation, linking, sentence stress, rhythm and intonation.

Vocabulary. The target vocabulary of around 600-800 vocabulary items at level 3. Upon completion of the unit, students must know around 2,500 vocabulary items.

Grammar Communicative competences at level 3 including relative clauses, conditional sentences (type 1 and 2), compound and complex sentences, simple present, present continuous, present perfect, past simple, past continuous, past perfect, future simple, future continuous, near future, conjunctions, modal verbs, phrasal verbs, passive voice, etc.

SPECIFIC OUTCOMES

Themes	Topics	Communicative Competences	Linguistic Knowledge
Our Academic Journey	Transition from school to engineering college Choosing an engineering discipline Student life and academic challenges	Listening Understand and identify the main points of dialogues, monologues of 330-350 words on familiar topics regularly encountered in life, work, school, etc., within the scope of the curriculum. Follow simple instructions such as recipes, how to use common utensils, etc. Listen and guess meanings (through the expressions and feelings of the speakers) in familiar monologues and conversations in everyday life	Pronunciation Diphthongs Words with stress (special cases) – Words without stress Sentence stress, assimilation, linking vowels with vowels Question intonation (consolidation and extension) Homophones
Our Technical Society	Role of engineers in society Ethics in engineering Impact of technology on social structures Interdisciplinary collaboration	Understand the main points of news programs, broadcasts, interviews, etc., on familiar topics which are clearly delivered in simple language, and with illustrative images.	Vocabulary Words related to themes and topics of higher proficiency. Grammar Present perfect (consolidation and extension) Past simple and past continuous Types of sentences: simple, compound and complex
Our Built and Natural Environment Our Future Innovations	Artificial intelligence and automation Emerging technologies in engineering Lifelong learning and professional development Entrepreneurship and start-ups in engineering The future of work in the tech-driven world		

Speaking

- Pronounce clearly and relatively accurately
- Words with or without stress, sentence stress, assimilation, and liaison.
- Speak and interact with fellow speakers about familiar topics, express personal views and exchange information about the topics covered in the curriculum.

Reading

- Read and comprehend the main points, specific contents of a text of 380-400 words on current and familiar topics.
- Read and understand the argument flow of texts, identify main conclusions in texts using clear language.
- Read to find and summarize short texts of everyday use such as simple letters, brochures, using words and structures from the original texts.

Writing

- Write simple connected and coherent texts of 280-300 words; write short reports based on suggestions, providing factual information and reasons for the recommendations made in the reports; collect short information from several sources and summarize it.
- Complete (write/fill) administrative forms such as resumes, letter of application for employment, etc.
- Write composition texts

Upon successful completion of the upper secondary English curriculum, students will be able to:

- Use English as a communication tool through the four skills of listening, speaking, reading and writing to meet basic and practical communication needs on familiar topics related to college, recreational activities, career, etc.
- Continue to formulate and develop basic knowledge of English, including pronunciation, vocabulary and grammar; and through English, have more extensive understanding of the landscape, people and culture of English-speaking countries and other countries in the world.
- Use English to improve the quality of learning other subjects in the general education curriculum.
- Use English for further education or immediate employment upon completion level 6.
- Use a variety of learning strategies to manage learning time, apply information technology in learning and self-learning, consolidate self-learning and self-assessment

methodology and take responsibility for learning outcomes, and form lifelong learning habits.

Mapping Course Outcomes with Program Outcomes:

Course Outcomes	Program Outcomes*											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
1									1	3		2
2										3		2
3										3		2
4									1	3		2
5									1	3		2

Course Assessment and Evaluation:

		What	To Whom	When/ Where (Frequency in the course)	Max Marks	Evidence Collected	Contributing to Course Outcomes
Indirect assessment Methods	CIE	Internal assessment tests	Students	Two Tests (Average of the two will be computed)	25	Blue books/Answer Scripts	1 to 5
		Creative writing	Students	Assignment-1 (10) Assignment-2 (15)	15+10=25	Quiz Projects Presentations Assignment Questions and Answers	1 to 5
		Case Analysis	Students	-----	-----	-----	-----
		Surprise Quiz		-----	-----	-----	-----
	SEE	Standard examination Students Feedback	Students	End of course (Answering 5 of 10 questions), 10 Case Studies 10 MCQs	30+10+10	Answer scripts Feedback Forms	1 to 5
		End of course Survey		End of course	-	Questionnaire	-

Questions for CIE and SEE will be designed to evaluate the various educational components (Bloom's taxonomy) such as:

CIE and SEE Evaluation:

SL. No	Bloom's Category	Test 1	Test 2	Semester-End Examination
1	Remember	34%	34%	30%

2	Understand	55%	20%	30%
3	Apply	00%	23%	20%
4	Analyse	11%	00%	10%
5	Evaluate	00%	00%	00%
6	Create	00%	23%	10%

Course Assessment Methods:

- Continuous Assessment of Skills: Assignments/Quiz/Presentations/Projects
- Written Tests
- End Semester Examination

Sample Rubric for Presentation

Criteria	Excellent (2)	Good (1)	Needs Work (0)
Self-awareness	✓	✓	✓
Goal clarity	✓	✓	✓
Communication & delivery	✓	✓	✓
Insight into opportunities	✓	✓	✓
Realistic challenges	✓	✓	✓

Sample Rubric

Grammar & Writing Rubric (for Essays/Reports/Emails)

Criteria	Excellent (5)	Good (4)	Satisfactory (3)	Needs Improvement (1-2)
Clarity and Structure	Well-organized, coherent, clear transitions	Organized with minor lapses in clarity	Understandable but lacks coherence	Difficult to follow, lacks structure
Language Use	Professional, precise, varied vocabulary	Clear, mostly appropriate language	Some awkward phrasing or repetitive vocabulary	Frequent errors, unclear language
Grammar and Punctuation	Virtually no errors	Few minor errors	Several errors affecting readability	Multiple errors impacting readability
Relevance & Depth	Thorough, detailed analysis	Solid analysis with minor gaps	Basic analysis, lacks depth	

Model Question Paper

Course – Communication Skills

- i) Answer the 10 marks MCQ compulsory questions from Part A. Each question carries one mark.
- ii) Answer compulsory 10 marks case study questions Part B.
- iii) Answer any five questions from Part C selecting one question from each unit. 6 marks each.

Q. No.	PART-A	CO's	LO	Marks
	Multiple choice questions. (Compulsory)			
1.	Choose the correct option for the following.	CO1-5	LO1	10X1=10
	a. What is the primary purpose of communication in engineering? A) To entertain B) To inform and collaborate C) To confuse others D) To express personal opinions			
	b. Which of the following is considered a barrier to effective communication? A) Clear articulation B) Technical jargon C) Active listening D) Open-ended questions			
	c. In terms of English pronunciation, which of the following is true for engineers? A) Pronunciation is not important in technical communication. B) Clear pronunciation is essential for avoiding misunderstandings. C) Engineers should only focus on writing skills. D) Accents should be completely eliminated.			
	d. How many syllables are in the word "engineering"? A) 2 B) 3 C) 4 D) 5			
	e. Which of the following prepositions correctly completes the sentence: "The report is due _____ Friday"? A) in B) on C) at D) for.			
	f. What is the past tense of the verb "to communicate"? A) Communicate B) Communicating C) Communicated D) Communicates			
	g. Which of the following is an example of mother tongue influence in English communication? A) Using idiomatic expressions B) Mispronouncing words due to native language sounds C) Employing technical vocabulary correctly D) Using varied sentence structures			
	h. In reading comprehension, which skill is most important for engineers when reviewing technical documents? A) Skimming for general ideas B) Memorizing all details C) Scanning for specific information D) Ignoring unfamiliar technical terms			
	i. Which of the following vocabulary words is most relevant to project management? A) Ambiguous B) Deadline C) Casual D) Informal			
	j. When using tenses, which sentence is correct? A) The engineer designs the project last year. B) The engineer design the project next year. C) The engineer will design the project next year. D) The engineer designed the project next year.			

Part – B (Co1-5) L3					
Case Studies (2 × 5 = 10 Marks)					
(Answer both the questions. Each carry 5 marks.)					
Case Study 1 – Communication Barriers You are working in a multinational company where your team includes members from different cultural backgrounds. During a meeting, some members misinterpret instructions due to differences in communication styles and accents. • Identify at least three barriers to communication in this scenario. • Suggest three solutions to overcome them. Case Study 2 – Workplace Scenario In a technical presentation, a student uses too many slides filled with text, speaks in a monotonous tone, and rarely makes eye contact with the audience. • Identify the issues with the presentation delivery. • Suggest improvements for verbal and non-verbal communication.					
PART-C					
Answer ANY FIVE questions selecting ONE full question from each unit. (6X5=30)					
UNIT – I					
1.		How can engineers ensure that their communication is considerate of the diverse backgrounds of their team members? Give two strategies you would implement.	CO1	LO ₂	(6)
2.		How do interpersonal skills complement technical skills in the engineering field? Provide examples of how these skills can work together in a project.	CO1	LO ₂	(6)
UNIT – II					
3.		How does incorrect intonation impact the meaning of a sentence in technical discussions or job interviews? Illustrate with examples.	CO2	LO ₂	(6)
4.		Discuss the role of intelligible pronunciation in making communication clearer. Identify English sounds that are often mispronounced by non-native.	CO2	LO ₂	(6)
UNIT – III					
5.		Use the following idioms with their figurative meanings and construct workplace place -related sentences:	CO3	LO6	(6)
		a. Hit the nail on the head b. Back to the drawing board c. In hot water d. Think outside the box e. A blessing in disguise f. Burn the midnight oil			
6.		Complete the sentences by filling in the blanks with suitable prepositions and articles. a. The team submitted the proposal _____ manager before the end of the day. b. She placed the confidential file _____ desk in the conference room.	CO3	LO2	(6)

	c. Our office is located _____ corner of Main Street and Park Avenue. d. He arrived _____ meeting room just a few minutes late. e. We will launch the new product _____ second quarter of the financial year. f. There was an error _____ final report, which needs immediate correction.			
UNIT – IV				
7.	Complete the sentences by forming the correct word (noun, verb, adjective, or adverb) from the word given in brackets. a. The manager gave a very _____ presentation on the new project. (<i>inform</i>) b. His _____ in the final decision was minimal. (<i>involve</i>) c. The engineers worked _____ to meet the product launch deadline. (<i>efficient</i>) d. The software update led to a significant _____ in system performance. (<i>improve</i>) e. She handled the client's complaint with great _____. (<i>professional</i>) f. Innovation and creativity are key to _____ in a competitive market. (<i>succeed</i>)	CO4	LO2	(6)
8.	Fill in the blanks with the correct tense of the verb in brackets. a. By the time the meeting started, the manager _____ (prepare) all the necessary documents. b. I _____ (work) on this report since morning, and I still have two sections to complete. c. The team _____ (complete) the task before the deadline yesterday. d. While we _____ (discuss) the new project, the client walked in unexpectedly. e. She usually _____ (respond) to emails within an hour. f. If the supplier delivers on time, we _____ (be) ready for the launch next week.	CO4	LO2	(6)
UNIT – V				
9.	Identify three common challenges engineers face during oral presentations and propose practical strategies to overcome them.	CO5	LO2	(6)
10.	How can voice modulation and body language enhance the effectiveness of a public speech in a technical seminar? Give examples.	CO5	LO2	(6)

Soft Skills	Semester	I/II	
Course Code	1BSKS106/206	CIE Marks	100
Teaching Hours/Week (L:T:P: S)	1:0:0	SEE Marks	--
Total Hours of Pedagogy	Theory/Practical/Lab: 15 Hours	Total Marks	100
Credits	PP	Exam Hours	--

COURSE OBJECTIVES

The competencies those are important for engineering students joining the digital age workforce or looking to become entrepreneurs are listed in 5 modules:

CO1: Apply social skills for clear communication, persuasion, self-awareness, and active listening.

CO2: Use emotional skills to build confidence, manage stress, and adapt to change.

CO3: Set ambitious goals, practice empathy, and apply creativity for problem-solving.

CO4: Demonstrate discipline, time management, and structured problem-solving.

CO5: Work in teams, negotiate, resolve conflicts, and think critically.

Module I – Social Skills (3 hours)

- **Communication:** Principles of clear and effective exchange of ideas in professional and social contexts.
- **Persuasion:** Techniques to influence and convince through logical, emotional, and ethical appeals.
- **Self-Awareness:** Identifying personal strengths, weaknesses, opportunities, and challenges (SWOC analysis).
- **Active Listening:** Paraphrasing, questioning techniques, and demonstrating attentiveness.

Instructional Design	Each competency is taught and assessed through guided visualisations, reflections, explainers and hands on activities conducted during sessions build both conceptual understanding and real-world application.
Teaching Methodology	TBTL (Task-Based Teaching Learning) – interactive workshops, simulations, activities, peer feedback. Eclectic Approach
Language Lab	Quicklrn.com
Experiential Learning Methods	To embed skills, participants get hands-on through: Guided reflections and explainers to connect concepts with relatable real-life situations Guided visualization to prompt reflection and self-discovery Role-plays and activities to practice behaviours in context

	Peer discussions to gain diverse perspectives.
Assessment Methods	Formative: Role-plays, activities, group discussions, peer feedback. Summative: Presentations, written reflections, problem-solving exercises.

Module II Emotional Skills I (3 hours)

- **Emotional Intelligence (EI):** Recognizing and managing emotions, empathy, relationship management, and conflict resolution.
- **Stress Management:** Identifying stress triggers, relaxation techniques, work-life balance strategies, and mindfulness practices.
- **Time Management:** Prioritization (Eisenhower Matrix), setting SMART goals, avoiding procrastination, and effective scheduling.
- **Adaptability & Resilience:** Handling change, bouncing back from setbacks, and developing a growth mindset.

Instructional Design	Each competency is taught and assessed through guided visualisations, reflections, explainers and hands on activities conducted during lab sessions those build both conceptual understanding and real-world application.
Teaching Methodology	TBTL (Task-Based Teaching Learning) – interactive workshops, simulations, activities, peer feedback. Eclectic Approach
Language Lab	Quicklrn.com
Experiential Learning Methods	• To embed skills, participants get hands-on through: • Guided reflections and explainers to connect concepts with relatable real-life situations • Guided visualization to prompt reflection and self-discovery • Role-plays and activities to practice behaviours in context • Peer discussions to gain diverse perspectives.
Assessment Methods	Formative: Role-plays, activities, group discussions, peer feedback. Summative: Presentations, written reflections, problem-solving exercises.

Module 3 Emotional Skills II (3 hours)

- **Ambition & Goal Setting:** Defining personal and professional aspirations, creating SMART goals, and aligning actions with long-term vision.
- **Sympathy & Empathy:** Understanding emotional perspectives, differentiating between the two, and applying them in workplace and social interactions.

- **Creativity & Innovation:** Generating original ideas, problem-solving, and applying creative thinking techniques (mind-mapping, SCAMPER).

Instructional Design	Each competency is taught and assessed through guided visualisations, reflections, explainers and hands on activities conducted during lab sessions those build both conceptual understanding and real-world application.
Teaching Methodology	TBTL (Task-Based Teaching Learning) – interactive workshops, simulations, activities, peer feedback. Eclectic Approach
Language Lab	Quicklrn.com
Experiential Learning Methods	• To embed skills, participants get hands-on through: • Guided reflections and explainers to connect concepts with relatable real-life situations • Guided visualization to prompt reflection and self-discovery • Role-plays and activities to practice behaviours in context • Peer discussions to gain diverse perspectives.
Assessment Methods	Formative: Role-plays, activities, group discussions, peer feedback. Summative: Presentations, written reflections, problem-solving exercises.

Module 4 Professional Skills I (3 hours)

- **Problem Solving:** Identifying root causes, analysing options, and implementing solutions using methods like 5 Whys and Fishbone Diagram.
- **Discipline:** Building consistency, accountability, and professional habits.
- **Time Management:** Prioritizing tasks (Eisenhower Matrix), scheduling, avoiding procrastination.

Instructional Design	Each competency is taught and assessed through guided visualisations, reflections, explainers and hands on activities conducted during lab sessions those build both conceptual understanding and real-world application.
Teaching Methodology	TBTL (Task-Based Teaching Learning) – interactive workshops, simulations, activities, peer feedback. Eclectic Approach.
Language Lab	Quicklrn.com
Experiential Learning Methods	To embed skills, participants get hands-on through: Guided reflections and explainers to connect concepts with relatable real-life situations Guided visualization to prompt reflection and self-discovery Role-plays and activities to practice behaviours in context Peer discussions to gain diverse perspectives.
Assessment Methods	Formative: Role-plays, activities, group discussions, peer feedback. Summative: Presentations, written reflections, problem-solving exercises.

Module 5 Professional Skills II (3 hours)

- **Collaboration & Teamwork:** Working effectively in diverse teams, fostering trust, and achieving shared goals.

- **Negotiation & Conflict Resolution:** Strategies to resolve differences and reach win-win outcomes.
- **Critical Thinking:** The ability to analyze, evaluate, and synthesize information to make well-reasoned decisions.

Instructional Design	Each competency is taught and assessed through guided visualisations, reflections, explainers and hands on activities conducted during lab sessions those build both conceptual understanding and real-world application.
Teaching Methodology	TBTL (Task-Based Teaching Learning) – interactive workshops, simulations, peer feedback. Eclectic Approach
Language Lab	Quicklrm.com
Experiential Learning Methods	To embed skills, participants get hands-on through: Guided reflections and explainers to connect concepts with relatable real-life situations Guided visualization to prompt reflection and self-discovery Role-plays and activities to practice behaviours in context Peer discussions to gain diverse perspectives.
Assessment Methods	Formative: Role-plays, group discussions, peer feedback. Summative: Presentations, written reflections, problem-solving exercises.

Extra Reading

1. Principles of Scientific and Technical Writing, 1e, By Pratap K. J. Mohapatra, Sanjib Moulick, © 2025 | Published: December 23, 2024
2. Soft Skills, 1e, By Soma Mahesh Kumar © 2024 | Published: June 8, 2023
3. Effective Technical Communication, 3e, By Ashraf M. Rizvi, Priyadarshi Patnaik, © 2024 | Published: September 12, 2024
4. Yadav, D. P. (2022). *A course in English pronunciation*. Notion Publications.

Learning Resources:

- Oxford Advance Learners Dictionary
- Cambridge English Skills Real Listening and Speaking by Miles Craven
- Communicative English for Professionals by Nitin Bhatnagar and Mamta Bhatnagar

Digital Resources

- Google Docs + Voice Typing - <https://docs.google.com>
- LearnEnglish – <https://learnenglish.britishcouncil.org/>
- TakeIELTS - <https://www.britishcouncil.in/exam/ielts>
- British Council Apps - **bbcLearnEnglishonline Grammar**
LearnEnglish Podcasts
IELTS Word Power
Bbclearningenglishgrammar online
Sounds Right (Phonemic Chart)

Mapping Course Outcomes with Program Outcomes:

Course Outcomes	Program Outcomes*											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
1									1	3		2
2										3		2
3										3		2
4									1	3		2
5									1	3		2

Assessment Plan – 100 Marks

CO Mapping & Components (100 Marks)

CO	Modules	Assessment Component	Description	Marks
CO1: Apply social skills for clear communication, persuasion, self-awareness, and active listening	Module I	Role-Play & Oral Presentation	Scenario-based role-play (persuasion, active listening) + short presentation; assessed on clarity, articulation, engagement, and non-verbal cues.	20
CO2: Use emotional skills to build confidence, manage stress, and adapt to change	Module II	Stress Management Activity & Reflection Journal	Guided stress-relief simulation + reflection linking EI concepts to personal experiences.	20
CO3: Set goals, practice empathy, and apply creativity for problem-solving	Module III	Goal-Setting & Creativity Project	SMART goal plan + creative problem-solving idea using mind-mapping or SCAMPER.	20
CO4: Demonstrate discipline, time management, and structured problem-solving	Module IV	Problem-Solving Exercise (Case-Based)	Apply 5 Whys/Fishbone diagram to a business/engineering problem; structured solution submission.	20
CO5: Work in teams, negotiate, resolve conflicts, and think critically	Module V	Group Debate/Negotiation Simulation	Teams negotiate a given scenario and defend solutions in a debate; assessed on teamwork, arguments, and conflict resolution.	20

Mark Distribution by Assessment Type

- **Formative (Continuous Assessment) – 50 Marks**
- **Summative (End of Course) – 50 Marks**

Bloom's Taxonomy Weightage (100 Marks)

Sl. No	Bloom's Category	Formative (Role-play, Reflection, Creativity, Case studies)	Summative (Presentation + Problem-solving)	Overall
1	Remember	20%	10%	10%
2	Understand	25%	20%	20%
3	Apply	35%	30%	30%
4	Analyse	20%	20%	20%
5	Evaluate	10%	15%	15%
6	Create	10%	10%	10%
Total		100%	100%	100%

Assessment Rubric – 100 Marks

CO's rubric is scaled **out of 20 marks**

CO1 – Role-Play & Oral Presentation (20 marks)

Criteria	Excellent (8)	Good (6)	Satisfactory (4)	Needs Improvement (2)	Marks
Clarity & Articulation	Speaks fluently, precise pronunciation	Minor lapses	Frequent lapses	Hesitant, unclear	4
Persuasion & Engagement	Strong persuasive appeal, engages fully	Reasonable persuasion	Weak persuasion	No strategy	4
Non-Verbal Communication	Confident posture, gestures, eye contact	Mostly confident	Minimal use	Poor body language	6
Active Listening	Accurately paraphrases, responds appropriately	Mostly accurate	Limited paraphrasing	Ignores cues	6

CO2 – Stress Management & Reflection Journal (20 marks)

Criteria	Excellent (8)	Good (6)	Satisfactory (4)	Needs Improvement (2)	Marks
Understanding of EI Concepts	Deep insight + examples	Good understanding	Basic understanding	Misunderstands	6
Application in Activity	Fully applies techniques	Mostly effective	Few techniques	No application	6

Criteria	Excellent (8)	Good (6)	Satisfactory (4)	Needs Improvement (2)	Marks
Reflection Quality	Highly personal, analytical	Some insights	Descriptive only	No reflection	4
Structure & Clarity	Well-organized	Mostly clear	Some disorganization	Poorly structured	4

CO3 – Goal-Setting & Creativity Project (20 marks)

Criteria	Excellent (8)	Good (6)	Satisfactory (4)	Needs Improvement (2)	Marks
SMART Goal Setting	All SMART criteria, inspiring	Most criteria	Some criteria	Vague	6
Creativity & Originality	Highly original	Some originality	Limited	None	6
Presentation & Visuals	Engaging, clear, strong visuals	Clear visuals	Basic visuals	Poor/no visuals	4
Feasibility & Relevance	Practical, relevant	Mostly practical	Partially relevant	Irrelevant	4

CO4 – Problem-Solving Exercise (20 marks)

Criteria	Excellent (8)	Good (6)	Satisfactory (4)	Needs Improvement (2)	Marks
Problem Analysis	Identifies all root causes	Most causes	Few causes	No clear causes	6
Application of Tools	Fully accurate	Mostly accurate	Partial	Incorrect	4
Solution Quality	Highly logical, feasible	Mostly logical	Some gaps	Illogical	4
Structure & Clarity	Clear flow	Mostly clear	Some unclear parts	Disorganized	6

CO5 – Debate/Negotiation Simulation (20 marks)

Criteria	Excellent (8)	Good (6)	Satisfactory (4)	Needs Improvement (2)	Marks
Team Collaboration	Fully cooperative	Mostly cooperative	Limited	Uncooperative	4
Argument Quality	Strong evidence-based reasoning	Mostly sound	Weak reasoning	No reasoning	6
Conflict Resolution	Balanced, win-win focus	Mostly balanced	Minimal attempt	Aggressive/avoidant	4
Critical Thinking	Insightful, anticipates counterpoints	Thoughtful	Limited depth	None	6

*** Final Marking CO1 (Criteria + Marks)**

- Understanding of EI Concepts → **5/6**
- Application in Activity → **4/6**
- Reflection Quality → **2/4**
- Structure & Clarity → **4/4**

Final Marks = 15/20

Indian Constitution and Engineering Ethics			
Course Code	1BICO107/207	CIE Marks	100
Teaching Hours/Week (L: T:P: S)	1:0:0	SEE Marks	---
Total Hours of Pedagogy	01Hours/Week	Total Marks	100
Credits	00	Exam Hours	-
Course objectives: This course will enable the students 1. To know about the basic structure of the Indian Constitution. 2. To know the Fundamental Rights (FRs), DPSP's, and Fundamental Duties (FD's) of our constitution. 3. To know about our Union Government, political structure & codes, and 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) Personalized learning, (vi) Problems based learning through discussion. 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			
Introduction to Indian Constitution: The Necessity of the Constitution, The Societies before and after the Constitution adoption. Introduction to the Indian constitution, The Making of the Constitution, The Role of the Constituent Assembly. The Preamble of Indian Constitution & Key concepts of the Preamble. Salient features of India Constitution.			
Module - 2			
FR's, FD's and DPSP's: Fundamental Rights and its Restriction and limitations in different Complex Situations. Directive Principles of State Policy (DPSP) and its present relevance in our society with examples. Fundamental Duties and its Scope and significance in Nation building.			
Module - 3			
Union Executive : Parliamentary System, Union Executive – President, Prime Minister, Union Cabinet, Parliament - LS and RS, Parliamentary Committees, Important Parliamentary Terminologies. Supreme Court of India, Judicial Reviews and Judicial Activism.			
Module - 4			
State Executive & Elections, Amendments and Emergency Provisions: State Executive, Election Commission, Elections & Electoral Process. Amendment to Constitution (How and Why) and Important Constitutional Amendments till today. Emergency Provisions.			
Module-5			
Professional Ethics: Ethics & Values. Types of Ethics. Scope & Aims of Professional & Engineering Ethics. Positive and Negative Faces of Engineering Ethics. Clash of Ethics, Conflicts of Interest. The impediments to Responsibility. Trust & Reliability in Engineering, IPRs (Intellectual Property Rights), Risks, Safety and liability in Engineering.			
Course outcome (Course Skill Set) : At the end of the course the student will be able to :			
C01	Analyse the basic structure of Indian Constitution.		
C02	Remember their Fundamental Rights, DPSP's and Fundamental Duties (FD's) of our constitution.		
C03	know about our Union Government, political structure & codes, procedures.		
C04	Understand our State Executive & Elections system of India.		
C05	Remember the Amendments and Emergency Provisions, other important provisions given by the constitution.		

Assessment Structure:

The assessment in each course is divided equally between Continuous Internal Evaluation (CIE) and the Semester End Examination (SEE), with each carrying 50% weightage.

1. To qualify and become eligible to appear for SEE, in the **CIE**, a student must score at least **40% of 50 marks**, i.e., **20 marks**.
2. To pass the **SEE**, a student must score at least **35% of 50 marks**, i.e., **18 marks**.
3. Notwithstanding the above, a student is considered to have **passed the course**, provided the combined total of **CIE and SEE is at least 40 out of 100 marks**.

Continuous Comprehensive Assessments (CCA):

CCA will be conducted for a total of 25 marks. It is recommended to include a maximum of two learning activities aimed at enhancing the holistic development of students. These activities should align with course objectives and promote higher-order thinking and application-based learning.

Learning Activity -1: (Marks- __)

Learning Activity -2 (optional): (Marks- __)

Suggested Learning Resources:**Textbook:**

1. **“Constitution of India” (for Competitive Exams)** - Published by Naidhruva Edutech Learning Solutions, Bengaluru. – 2022.
2. **“Engineering Ethics”**, M.Govindarajan, S.Natarajan, V.S.Senthilkumar, Prentice –Hall, 2004.

Reference Books:

1. **“Samvidhana Odu”** - for Students & Youths by Justice HN Nagamohan Dhas, Sahayana, kerekon.
2. **“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.
3. **“Introduction to the Constitution of India”**, (Students Edition.) by Durga Das Basu (**DD Basu**): Prentice –Hall, 2008.
4. **“The Constitution of India”** by Merunandan K B: published by Merugu Publication, Second Edition, Bengaluru.

Rubrics for Learning Activity (Based on the nature of learning activity, design the rubrics for each activity):

	Superior	Good	Fair	Needs Improvement	Unacceptable
Performance Indicator- 1 (CO/PO Mapping)					
Performance Indicator-2 (CO/PO Mapping)					
...					
Performance Indicator-n (CO/PO Mapping)					

Suggested Learning Activities may include (but are not limited to):

- Course Project
- Case Study Presentation
- Programming Assignment
- Tool/Software Exploration
- Literature Review
- Open Book Test (preferably at RBL4 and RBL5 levels)
- GATE-based Aptitude Test
- Assignment (at RBL3, RBL4, or RBL5 levels)
- Any other relevant and innovative academic activity
- Use of MOOCs and Online Platforms

Suggested Innovative Delivery Methods may include (but are not limited to):

- Flipped Classroom
- Problem-Based Learning (PBL)
- Case-Based Teaching
- Simulation and Virtual Labs
- Partial Delivery of course by Industry expert/ industrial visits
- ICT-Enabled Teaching
- Role Play

Theory - 01 Credit Course

ಬಳಕೆ ಕನ್ನಡ - baLake Kannada (Kannada for Usage)

ಕನ್ನಡ ಕಲಿಕೆಗಾಗಿ ನಿಗದಿಪಡಿಸಿದ ಪಠ್ಯಪುಸ್ತಕ - (Prescribed Textbook to Learn Kannada)

Course Title:	ಬಳಕೆ ಕನ್ನಡ		
Course Code:	1BKBK109	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 : ಬಳಕೆ ಕನ್ನಡ ಪಠ್ಯ ಕಲಿಕೆಯ ಉದ್ದೇಶಗಳು:

The course (2020-21/22) will enable the students,

1. To Create the awareness regarding the necessity of learning local language for comfortable and healthy life.
2. To enable learners to Listen and understand the Kannada language properly.
3. To speak, read and write Kannada language as per requirement.
4. To train the learners for correct and polite conversation.
5. To know about Karnataka state and its language, literature and General information about this state.

ಬೋಧನೆ ಮತ್ತು ಕಲಿಕಾ ವ್ಯವಸ್ಥೆ (Teaching-Learning Process - General Instructions) :

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

1. ಬಳಕೆ ಕನ್ನಡವನ್ನು ತರಗತಿಯಲ್ಲಿ ಶಿಕ್ಷಕರು ಬೋಧಿಸಲು ವಿಟಿಯು ಸೂಚಿಸಿರುವ ಪಠ್ಯಪುಸ್ತಕವನ್ನು ಉಪಯೋಗಿಸಬೇಕು.
2. ಪ್ರಮುಖ ಅಂಶಗಳ ಚಾರ್ಟ್ ಗಳನ್ನು ತಯಾರಿಸಲು ವಿದ್ಯಾರ್ಥಿಗಳನ್ನು ಉತ್ತೇಜಿಸುವುದು ಮತ್ತು ತರಗತಿಯಲ್ಲಿ ಅವುಗಳನ್ನು ಚರ್ಚಿಸಲು ಅವಕಾಶ ಮಾಡಿಕೊಡುವುದು.
3. ಪ್ರತಿ ವಿದ್ಯಾರ್ಥಿ ಪುಸ್ತಕವನ್ನು ತರಗತಿಯಲ್ಲಿ ಬಳಸುವಂತೆ ನೋಡಿಕೊಳ್ಳುವುದು ಮತ್ತು ಪ್ರತಿ ಪಾಠ ಮತ್ತು ಪ್ರವಚನಗಳ ಮೂಲ ಅಂಶಗಳಿಗೆ ಸಂಬಂಧಪಟ್ಟಂತೆ ಪೂರಕ ಚಟುವಟಿಕೆಗಳಿಗೆ ತೊಡಗಿಸತಕ್ಕದ್ದು.
4. ಡಿಜಿಟಲ್ ತಂತ್ರಜ್ಞಾನದ ಮುಖಾಂತರ ಇತ್ತೀಚೆಗೆ ಡಿಜಿಟಲೀಕರಣ ಗೊಂಡಿರುವ ಭಾಷೆ ಕಲಿಕೆಯ ವಿಧಾನಗಳನ್ನು ಪಿಪಿಟಿ ಮತ್ತು ದೃಶ್ಯ ಮಾಧ್ಯಮದ ಮುಖಾಂತರ ಚರ್ಚಿಸಲು ಕ್ರಮಕೈಗೊಳ್ಳುವುದು. ಇದರಿಂದ ವಿದ್ಯಾರ್ಥಿಗಳನ್ನು ತರಗತಿಯಲ್ಲಿ ಹೆಚ್ಚು ಏಕಾಗ್ರತೆಯಿಂದ ಪಾಠ ಕೇಳಲು ಮತ್ತು ಅಧ್ಯಯನದಲ್ಲಿ ತೊಡಗಲು ಅನುಕೂಲವಾಗುತ್ತದೆ.
5. ಭಾಷಾಕಲಿಕೆಯ ಪ್ರಯೋಗಾಲಯದ ಮುಖಾಂತರ ಬಹುಬೇಗ ಕನ್ನಡ ಭಾಷೆಯನ್ನು ಕಲಿಯಲು ಅನುಕೂಲವಾಗುವಂತೆ ಕಾರ್ಯಚಟುವಟಿಕೆಗಳನ್ನು ಮತ್ತು ಕ್ರಿಯಾ ಯೋಜನೆಗಳನ್ನು ರೂಪಿಸುವುದು.

Module - 1

(03 hours of pedagogy)

1. Introduction, Necessity of learning a local language. Methods to learn the Kannada language.
2. Easy learning of a Kannada Language: A few tips. Hints for correct and polite conversation, Listening and Speaking Activities, Key to Transcription
3. ವೈಯಕ್ತಿಕ, ಸ್ವಾಮ್ಯಸೂಚಕ/ಸಂಬಂಧಿತ ಸಾರ್ವನಾಮಗಳು ಮತ್ತು ಪ್ರಶ್ನಾರ್ಥಕ ಪದಗಳು - Personal Pronouns, Possessive Forms, Interrogative words

Module - 2	(03 hours of pedagogy)
1. ನಾಮಪದಗಳ ಸಂಬಂಧಾರ್ಥಕ ರೂಪಗಳು, ಸಂದೇಹಾಸ್ಪದ ಪ್ರಶ್ನೆಗಳು ಮತ್ತು ಸಂಬಂಧವಾಚಕ ನಾಮಪದಗಳು - Possessive forms of nouns, dubitive question and Relative nouns 2. ಗುಣ, ಪರಿಮಾಣ ಮತ್ತು ವರ್ಣಬಣ್ಣ ವಿಶೇಷಣಗಳು, ಸಂಖ್ಯಾವಾಚಕಗಳು Qualitative, Quantitative and Colour Adjectives, Numerals	
3. ಕಾರಕ ರೂಪಗಳು ಮತ್ತು ವಿಭಕ್ತಿ ಪ್ರತ್ಯಯಗಳು -ಸಪ್ತಮಿ ವಿಭಕ್ತಿ ಪ್ರತ್ಯಯ - (ಆ, ಅದು, ಅವು, ಅಲ್ಲಿ) - Predictive Forms, Locative Case	
Module - 3	(03 hours of pedagogy)
1. ಚತುರ್ಥಿ ವಿಭಕ್ತಿ ಪ್ರತ್ಯಯದ ಬಳಕೆ ಮತ್ತು ಸಂಖ್ಯಾವಾಚಕಗಳು - Dative Cases, and Numerals 2. ಸಂಖ್ಯಾಗುಣವಾಚಕಗಳು ಮತ್ತು ಬಹುವಚನ ನಾಮರೂಪಗಳು - Ordinal numerals and Plural markers 3. ನ್ಯೂನ/ನಿಷೇಧಾರ್ಥಕ ಕ್ರಿಯಾಪದಗಳು & ವರ್ಣ ಗುಣವಾಚಕಗಳು - Defective/Negative Verbs & Colour Adjectives	
Module- 4	(03 hours of pedagogy)
1. ಅಪ್ಪಣೆ / ಒಪ್ಪಿಗೆ, ನಿರ್ದೇಶನ, ಪ್ರೋತ್ಸಾಹ ಮತ್ತು ಒತ್ತಾಯ ಆರ್ಥರೂಪ ಪದಗಳು ಮತ್ತು ವಾಕ್ಯಗಳು Permission, Commands, encouraging and Urging words (Imperative words and sentences) 2. ಸಾಮಾನ್ಯ ಸಂಭಾಷಣೆಗಳಲ್ಲಿ ದ್ವಿತೀಯ ವಿಭಕ್ತಿ ಪ್ರತ್ಯಯಗಳು ಮತ್ತು ಸಂಭವನೀಯ ಪ್ರಕಾರಗಳು Accusative Cases and Potential Forms used in General Communication	
3. “ಇರು ಮತ್ತು ಇರಲ್ಲ” ಸಹಾಯಕ ಕ್ರಿಯಾಪದಗಳು, ಸಂಭಾವ್ಯಸೂಚಕ ಮತ್ತು ನಿಷೇಧಾರ್ಥಕ ಕ್ರಿಯಾ ಪದಗಳು - Helping Verbs “iru and iralla”, Corresponding Future and Negation Verbs 4. ಹೋಲಿಕೆ (ತರತಮ), ಸಂಬಂಧ ಸೂಚಕ, ವಸ್ತು ಸೂಚಕ ಪ್ರತ್ಯಯಗಳು ಮತ್ತು ನಿಷೇಧಾರ್ಥಕ ಪದಗಳ ಬಳಕೆ- Comparative, Relationship, Identification and Negation Words	
Module - 5	(03 hours of pedagogy)
1. ಕಾಲ ಮತ್ತು ಸಮಯದ ಹಾಗೂ ಕ್ರಿಯಾಪದಗಳ ವಿವಿಧ ಪ್ರಕಾರಗಳು - Different types of Tense, Time and Verbs 2. ದ್, -ತ್, - ತು, - ಇತು, - ಆಗಿ, - ಅಲ್ಲ, - ಗ್, -ಕ್, ಇದೆ, ಕ್ರಿಯಾ ಪ್ರತ್ಯಯಗಳೊಂದಿಗೆ ಭೂತ, ಭವಿಷ್ಯತ್ ಮತ್ತು ವರ್ತಮಾನ ಕಾಲ ವಾಕ್ಯ ರಚನೆ - Formation of Past, Future and Present Tense Sentences with Verb Forms	
3. Kannada Vocabulary List :ಸಂಭಾಷಣೆಯಲ್ಲಿ ದಿನೋಪಯೋಗಿ ಕನ್ನಡ ಪದಗಳು -Kannada Words in Conversation	

Course outcome (Course Skill Set)

ಬಳಕೆ ಕನ್ನಡ ಪಠ್ಯ ಕಲಿಕೆಯಿಂದ ವಿದ್ಯಾರ್ಥಿಗಳಿಗೆ ಆಗುವ ಅನುಕೂಲಗಳು ಮತ್ತು ಫಲಿತಾಂಶಗಳು:

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

C01	To understand the necessity of learning of local language for comfortable life.
C02	To speak, read and write Kannada language as per requirement.
C03	To communicate (converse) in Kannada language in their daily life with kannada speakers.
C04	To Listen and understand the Kannada language properly.
C05	To speak in polite conversation.

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 Comprehensive Assessments (CCA):CCA will be conducted for a total of 25 marks. It is recommended to include a maximum of two learning activities aimed at enhancing the holistic development of students. These activities should align with course objectives and promote higher-order thinking and application-based learning. Learning Activity -1: (Marks- ____) Learning Activity -2 (optional): (Marks- ____)

University Prescribed Textbook :

ಬಳಕೆ ಕನ್ನಡ

ಡಾ. ಎಲ್. ತಿಮ್ಮೇಶ

ಪ್ರಕಟಣೆ : ಪ್ರಸಾರಾಂಗ,

ವಿಶ್ವೇಶ್ವರಯ್ಯ ತಾಂತ್ರಿಕ ವಿಶ್ವವಿದ್ಯಾಲಯ, ಬೆಳಗಾವಿ.

ಸೂಚನೆ :

ವಿಶೇಷ ಸೂಚನೆ : 1. ಮೇಲಿನ ಪಠ್ಯಕ್ರಮಕ್ಕೆ ಸೀಮಿತವಾಗಿ ಅಂತಿಮ ಪರೀಕ್ಷೆಯ ಪ್ರಶ್ನೆಪತ್ರಿಕೆ ಇರುತ್ತದೆ.

2. ಮೇಲಿನ ಪಠ್ಯಕ್ರಮವನ್ನು ಹೊರತುಪಡಿಸಿದ ಬಳಕೆ ಕನ್ನಡ ಪಠ್ಯಪುಸ್ತಕದಲ್ಲಿನ ಉಳಿದ ಭಾಗಗಳನ್ನು ಹೆಚ್ಚುವರಿ ಪೂರಕ ಓದಿಗಾಗಿ ಬಳಸಿಕೊಳ್ಳಬಹುದು. ಅಂತಿಮ ಪರೀಕ್ಷೆಯಲ್ಲಿ ಈ ಪಾಠಗಳಿಂದ ಪ್ರಶ್ನೆಗಳನ್ನು ಕೇಳಲಾಗುವುದಿಲ್ಲ.

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3. ಹೆಚ್ಚಿನ ಮಾಹಿತಿ ಮತ್ತು ವಿವರಣೆಗಳಿಗೆ ಡಾ. ಎಲ್. ತಿಮ್ಮೇಶ (9900832331) ಇವರನ್ನು ಸಂಪರ್ಕಿಸಿ.

4. ಮಾದರಿ ಪ್ರಶ್ನೆಪತ್ರಿಕೆ, ಕೋರ್ಸ್ ಆಯ್ಕೆ ಮಾಹಿತಿ, ಅಧ್ಯಯನ ಸಾಮಗ್ರಿ & ಬಹು ಆಯ್ಕೆ ಮಾದರಿಯ ಪ್ರಶ್ನೆಗಳ ಕೈಪಿಡಿಗಾಗಿ ವಿಶ್ವವಿದ್ಯಾಲಯದ ವೆಬ್ ಸೈಟ್ ನೋಡುವುದು.

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.

ಸಾಂಸ್ಕೃತಿಕ ಕನ್ನಡ - ಕನ್ನಡ ಬಲ್ಲ ಮತ್ತು ಕನ್ನಡ ಮಾತೃಭಾಷೆಯ ವಿದ್ಯಾರ್ಥಿಗಳಿಗೆ ನಿಗದಿಪಡಿಸಿದ ಪಠ್ಯಕ್ರಮ

Course Title:	ಸಾಂಸ್ಕೃತಿಕ ಕನ್ನಡ		
Course Code:	1BKS109	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 : ಸಾಂಸ್ಕೃತಿಕ ಕನ್ನಡ ಪಠ್ಯ ಕಲಿಕೆಯ ಉದ್ದೇಶಗಳು:

The course (22KSK17/27) will enable the students,

1. ಪದವಿ ವಿದ್ಯಾರ್ಥಿಗಳಾಗಿರುವುದರಿಂದ ಕನ್ನಡ ಭಾಷೆ, ಸಾಹಿತ್ಯ ಮತ್ತು ಸಂಸ್ಕೃತಿಯ ಪರಿಚಯ ಮಾಡಿಕೊಡುವುದು.
2. ಕನ್ನಡ ಸಾಹಿತ್ಯದ ಪ್ರಧಾನ ಭಾಗವಾದ ಆಧುನಿಕಪೂರ್ವ ಮತ್ತು ಆಧುನಿಕ ಕಾವ್ಯಗಳನ್ನು ಪರಿಚಯಿಸುವುದು.
3. ವಿದ್ಯಾರ್ಥಿಗಳಲ್ಲಿ ಸಾಹಿತ್ಯ ಮತ್ತು ಸಂಸ್ಕೃತಿಯ ಬಗ್ಗೆ ಅರಿವು ಹಾಗೂ ಆಸಕ್ತಿಯನ್ನು ಮೂಡಿಸುವುದು.
4. ತಾಂತ್ರಿಕ ವ್ಯಕ್ತಿಗಳ ಪರಿಚಯವನ್ನು ಹಾಗೂ ಅವರಗಳ ಸಾಧಿಸಿದ ವಿಷಯಗಳನ್ನು ಪರಿಚಯಿಸುವುದು.
5. ಸಾಂಸ್ಕೃತಿಕ, ಜನಪದ ಹಾಗೂ ಪ್ರವಾಸ ಕಥನಗಳ ಪರಿಚಯ ಮಾಡಿಕೊಡುವುದು.

ಬೋಧನೆ ಮತ್ತು ಕಲಿಕಾ ವ್ಯವಸ್ಥೆ (Teaching-Learning Process - General Instructions) :

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

1. ಸಾಂಸ್ಕೃತಿಕ ಕನ್ನಡವನ್ನು ಬೋಧಿಸಲು ತರಗತಿಯಲ್ಲಿ ಶಿಕ್ಷಕರು ಪ್ರಸ್ತುತ ಪುಸ್ತಕ ಆಧಾರಿಸಿ ಬ್ಲಾಕ್ ಬೋರ್ಡ್ ವಿಧಾನವನ್ನು ಅನುಸರಿಸುವುದು. ಪ್ರಮುಖ ಅಂಶಗಳ ಚಾರ್ಟ್ ಗಳನ್ನು ತಯಾರಿಸಲು ವಿದ್ಯಾರ್ಥಿಗಳನ್ನು ಪ್ರೇರೇಪಿಸುವುದು ಮತ್ತು ತರಗತಿಯಲ್ಲಿ ಅವುಗಳನ್ನು ಚರ್ಚಿಸಲು ಅವಕಾಶ ಮಾಡಿಕೊಡುವುದು.
2. ಇತ್ತೀಚಿನ ತಂತ್ರಜ್ಞಾನದ ಅನುಕೂಲಗಳನ್ನು ಬಳಸಿಕೊಳ್ಳುವುದು - ಅಂದರೆ ಕವಿ-ಕಾವ್ಯ ಪರಿಚಯದಲ್ಲಿ ಕವಿಗಳ ಚಿತ್ರಣ ಮತ್ತು ಲೇಖನಗಳು ಮತ್ತು ಕಥೆ ಕಾವ್ಯಗಳ ಮೂಲ ಅಂಶಗಳಿಗೆ ಸಂಬಂಧಪಟ್ಟ ಧ್ವನಿ ಚಿತ್ರಗಳು, ಸಂಭಾಷಣೆಗಳು, ಈಗಾಗಲೇ ಇತರ ವಿಮರ್ಶಕರು ಬರೆದಿರುವ ವಿಮರ್ಶಾತ್ಮಕ ವಿಷಯಗಳನ್ನು ಟಿಪಿಟಿ, ಡಿಜಿಟಲ್ ಮಾಧ್ಯಮಗಳ ಮುಖಾಂತರ ವಿಶ್ಲೇಷಿಸುವುದು.
3. ನವೀನ ಮಾದರಿಯ ಸಾಹಿತ್ಯ ಬೋಧನೆಗೆ ಸಂಬಂಧಪಟ್ಟ ವಿಧಾನಗಳನ್ನು ಶಿಕ್ಷಕರು ವಿದ್ಯಾರ್ಥಿಗಳಿಗೆ ಅನುಕೂಲವಾಗುವ ರೀತಿಯಲ್ಲಿ ಅಳವಡಿಸಿಕೊಳ್ಳಬಹುದು.

ಘಟಕ -1 ಕನ್ನಡ ಸಂಸ್ಕೃತಿ ಮತ್ತು ಭಾಷೆ ಕುರಿತಾದ ಲೇಖನಗಳು (03 hours of pedagogy)

1. ಕರ್ನಾಟಕ ಸಂಸ್ಕೃತಿ - ಹಂಪ ನಾಗರಾಜಯ್ಯ
2. ಕರ್ನಾಟಕದ ಏಕೀಕರಣ : ಒಂದು ಅಪೂರ್ವ ಚರಿತ್ರೆ - ಜಿ. ವೆಂಕಟಸುಬ್ಬಯ್ಯ
3. ಆಡಳಿತ ಭಾಷೆಯಾಗಿ ಕನ್ನಡ - ಡಾ. ಎಲ್. ತಿಮ್ಮೇಶ ಮತ್ತು ಪ್ರೊ. ವಿ. ಕೇಶವಮೂರ್ತಿ

ಘಟಕ - 2 ಆಧುನಿಕ ಪೂರ್ವದ ಕಾವ್ಯ ಭಾಗ (03 hours of pedagogy)

1. ವಚನಗಳು : ಬಸವಣ್ಣ, ಅಕ್ಕಮಹಾದೇವಿ, ಅಲ್ಲಮಪ್ರಭು, ಆಯ್ದಕ್ಕಿ ಮಾರಯ್ಯ, ಜೇಡರದಾಸಿಮಯ್ಯ, ಆಯ್ದಕ್ಕಿ ಲಕ್ಕಮ್ಮ.
2. ಕೀರ್ತನೆಗಳು : ಅದರಿದೇನು ಫಲ ಇದರಿದೇನು ಫಲ - ಪುರಂದರದಾಸರು
ತಲ್ಲಣಿಸದಿರು ಕಂಡ್ಯ ತಾಳು ಮನವೇ - ಕನಕದಾಸರು
3. ತತ್ವಪದಗಳು : ಸಾವಿರ ಕೊಡಗಳ ಸುಟ್ಟು - ಶಿಶುನಾಳ ಶರೀಫ

ಘಟಕ -3 ಆಧುನಿಕ ಕಾವ್ಯಭಾಗ (03 hours of pedagogy)

1. ದಿವಿಜಿ ರವರ ಮಂಕುತಿಮ್ಮನ ಕಗ್ಗದಿಂದ ಅಯ್ದ ಕೆಲವು ಭಾಗಗಳು
2. ಕುರುಡು ಕಾಂಚಾಣ : ದಾ.ರಾ. ಬೇಂದ್ರೆ
3. ಹೊಸಬಾಳಿನ ಗೀತೆ : ಕುವೆಂಪು

ಘಟಕ - 4 ತಾಂತ್ರಿಕ ವ್ಯಕ್ತಿಗಳ ಪರಿಚಯ (03 hours of pedagogy)

1. ಡಾ. ಸರ್. ಎಂ. ವಿಶ್ವೇಶ್ವರಯ್ಯ : ವ್ಯಕ್ತಿ ಮತ್ತು ಐತಿಹ್ಯ - ಎ. ಎನ್. ಮೂರ್ತಿರಾವ್
2. ಕರಕುಶಲ ಕಲೆಗಳು ಮತ್ತು ಪರಂಪರೆಯ ವಿಜ್ಞಾನ : ಕರೀಗೌಡ ಬೀಚನಹಳ್ಳಿ

ಘಟಕ - 5 ಸಾಂಸ್ಕೃತಿಕ, ಜನಪದ ಕಥೆ ಮತ್ತು ಪ್ರವಾಸ ಕಥನ (03 hours of pedagogy)

1. ಯುಗಾದಿ : ವಸುಧೇಂದ್ರ
2. ಮೆಗಾನೆ ಎಂಬ ಗಿರಿಜನ ಪರ್ವತ : ಹಿ.ಚಿ. ಬೋರಲಿಂಗಯ್ಯ

Course outcome (Course Skill Set)

ಸಾಂಸ್ಕೃತಿಕ ಕನ್ನಡ (22KSK17/27) ಪಠ್ಯ ಕಲಿಕೆಯ ನಂತರ ವಿದ್ಯಾರ್ಥಿಗಳಲ್ಲಿ :

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

C01	ಕನ್ನಡ ಭಾಷೆ, ಸಾಹಿತ್ಯ ಮತ್ತು ಕನ್ನಡದ ಸಂಸ್ಕೃತಿಯ ಕುರಿತು ಅರಿವು ಮೂಡಿರುತ್ತದೆ.
C02	ಕನ್ನಡ ಸಾಹಿತ್ಯದ ಆಧುನಿಕ ಪೂರ್ವ ಮತ್ತು ಆಧುನಿಕ ಕಾವ್ಯಗಳನ್ನು ಸಾಂಕೇತಿಕವಾಗಿ ಕಲಿತು ಹೆಚ್ಚಿನ ಓದಿಗೆ

	ಮತ್ತು ಜ್ಞಾನಕ್ಕೆ ಸ್ಪೂರ್ತಿ ಮೂಡುತ್ತದೆ.
C03	ವಿದ್ಯಾರ್ಥಿಗಳಲ್ಲಿ ಸಾಹಿತ್ಯ ಮತ್ತು ಸಂಸ್ಕೃತಿಯ ಬಗ್ಗೆ ಅರಿವು ಹಾಗೂ ಆಸಕ್ತಿಯನ್ನು ಹೆಚ್ಚಾಗುತ್ತದೆ.
C04	ತಾಂತ್ರಿಕ ವ್ಯಕ್ತಿಗಳ ಪರಿಚಯ ಹಾಗೂ ಅವರುಗಳ ಸಾಧಿಸಿದ ವಿಷಯಗಳನ್ನು ತಿಳಿದುಕೊಂಡು ನಾಡಿನ ಇನ್ನಿತರ ವ್ಯಕ್ತಿಗಳ ಬಗ್ಗೆ ತಿಳಿದುಕೊಳ್ಳಲು ಕೌತುಕ ಹೆಚ್ಚಾಗುತ್ತದೆ.
C05	ಸಾಂಸ್ಕೃತಿಕ, ಜನಪದ ಹಾಗೂ ಪ್ರವಾಸ ಕಥನಗಳ ಪರಿಚಯ ಮಾಡಿಕೊಡುವುದು.

Assessment Structure:

The assessment in each course is divided equally between Continuous Internal Evaluation (CIE) and the Semester End Examination (SEE), with each carrying 50% weightage.

- To qualify and become eligible to appear for SEE, in the CIE, a student must score at least 40% of 50 marks, i.e., 20 marks.
- To pass the SEE, a student must score at least 35% of 50 marks, i.e., 18 marks.
- Notwithstanding the above, a student is considered to have passed the course, provided the combined total of CIE and SEE is at least 40 out of 100 marks

Continuous Comprehensive Assessments (CCA):

CCA will be conducted for a total of 25 marks. It is recommended to include a maximum of two learning activities aimed at enhancing the holistic development of students.

These activities should align with course objectives and promote higher-order thinking and application-based learning. Learning Activity -1: (Marks- ___) Learning Activity -2 (optional): (Marks- ___)

University Prescribed Textbook :

ಸಾಂಸ್ಕೃತಿಕ ಕನ್ನಡ

ಡಾ. ಹಿ.ಚಿ.ಬೋರಲಿಂಗಯ್ಯ ಮತ್ತು ಡಾ. ಎಲ್. ತಿಮ್ಮೇಶ,

ಪ್ರಕಟಣೆ : ಪ್ರಸಾರಾಂಗ,

ವಿಶ್ವೇಶ್ವರಯ್ಯ ತಾಂತ್ರಿಕ ವಿಶ್ವವಿದ್ಯಾಲಯ, ಬೆಳಗಾವಿ.

ವಿಶೇಷ ಸೂಚನೆ : 1. ಮೇಲಿನ ಪಠ್ಯಕ್ರಮಕ್ಕೆ ಸೀಮಿತವಾಗಿ ಅಂತಿಮ ಪರೀಕ್ಷೆಯ ಪ್ರಶ್ನೆಪತ್ರಿಕೆ ಇರುತ್ತದೆ.

2. ಮೇಲಿನ ಪಠ್ಯಕ್ರಮವನ್ನು ಹೊರತುಪಡಿಸಿದ ಸಾಂಸ್ಕೃತಿಕ ಕನ್ನಡ ಪಠ್ಯಪುಸ್ತಕದಲ್ಲಿನ ಉಳಿದ ಪದ್ಯ & ಗದ್ಯ ಭಾಗ ಹಾಗೂ ಇತರ ಲೇಖನಗಳನ್ನು ಹೆಚ್ಚುವರಿ ಪೂರಕ ಓದಿಗಾಗಿ ಬಳಸಿಕೊಳ್ಳಬಹುದು. ಅಂತಿಮ ಪರೀಕ್ಷೆಯಲ್ಲಿ ಈ ಪಾಠಗಳಿಂದ ಪ್ರಶ್ನೆಗಳನ್ನು ಕೇಳಲಾಗುವುದಿಲ್ಲ.

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3. ಹೆಚ್ಚಿನ ಮಾಹಿತಿ ಮತ್ತು ವಿವರಣೆಗಳಿಗೆ ಡಾ. ಎಲ್. ತಿಮ್ಮೇಶ (9900832331) ಇವರನ್ನು ಸಂಪರ್ಕಿಸಿ.

4. ಮಾದರಿ ಪ್ರಶ್ನೆಪತ್ರಿಕೆ, ಕೋರ್ಸ್ ಆಯ್ಕೆ ಮಾಹಿತಿ, ಅಧ್ಯಯನ ಸಾಮಗ್ರಿ & ಬಹು ಆಯ್ಕೆ ಮಾದರಿಯ ಪ್ರಶ್ನೆಗಳ ಕೈಪಿಡಿಗಾಗಿ ವಿಶ್ವವಿದ್ಯಾಲಯದ ವೆಬ್ ಸೈಟ್ ನೋಡುವುದು.

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.

PYTHON PROGRAMMING		Semester	I/II
Course Code	1BPLC105B/205B	CIE Marks	50
Teaching Hours/Week (L:T:P: S)	3:0:2:0	SEE Marks	50
Total Hours of Pedagogy (Theory and Lab hours)	40 + 24 (Practical)	Total Marks	100
Credits	4	Exam Hours	3
Examination type (SEE)	Theory		
Course outcome (Course Skill Set)			
At the end of the course, the student will be able to: CO1: Develop scripts using primitive language constructs of python. CO2: Identify the methods to manipulate primitive python data structures. CO3: Make use of Python standard libraries for programming. CO4: Build scripts for performing file operations. CO5: Illustrate the concepts of Object-Oriented Programming as used in Python.			
Module-1			
The way of the program: The Python programming language, what is a program? What is debugging? Syntax errors, Runtime errors, Semantic errors, Experimental debugging. Variables, Expressions and Statements: Values and data types, Variables, Variable names and keywords, Statements, Evaluating expressions, Operators and operands, Type converter functions, Order of operations, Operations on strings, Input, Composition, The modulus operator. Iteration: Assignment, Updating variables, the for loop, the while statement, The Collatz 3n + 1 sequence, tables, two-dimensional tables, break statement, continue statement, paired data, Nested Loops for Nested Data. Functions: Functions with arguments and return values. Chapters: 1.1-1.7, 2.1-2.12, 3.3, 4.4, 4.5 Number of Hours:8			
Module-2			
Strings: Working with strings as single things, working with the parts of a string, Length, Traversal and the for loop, Slices, String comparison, Strings are immutable, the in and not in operators, A find function, Looping and counting, Optional parameters, The built-in find method, The split method, Cleaning up your strings, The string format method. Tuples: Tuples are used for grouping data, Tuple assignment, Tuples as return values, Composability of Data Structures. Lists: List values, accessing elements, List length, List membership, List operations, List slices, Lists are mutable, List deletion, Objects and references, Aliasing, cloning lists, Lists and for loops, List parameters, List methods, Pure functions and modifiers, Functions that produce lists, Strings and lists, list and range, Nested lists, Matrices. Chapter: 5.1, 5.2, 5.3 Number of Hours: 8			
Module-3			
Dictionaries: Dictionary operations, dictionary methods, aliasing and copying. Numpy: About, Shape, Slicing, masking, Broadcasting, dtype. Files: About files, writing our first file, reading a file line-at-a-time, turning a file into a list of lines, Reading the whole file at once, working with binary files, Directories, fetching something from the Web. Chapter: 5.4, 6.1-6.5, 7.1-7.8 Number of Hours:8			
Module-4			

Modules: Random numbers, the time module, the math module, creating your own modules, Namespaces, Scope and lookup rules, Attributes and the dot Operator, Three import statement variants. Mutable versus immutable and aliasing Object oriented programming: Classes and Objects — The Basics, Attributes, Adding methods to our class, Instances as arguments and parameters, Converting an instance to a string, Instances as return values. Chapter: 8.1-8.8, 9.1, 11.1	Number of Hours: 8
Module-5	
Object oriented programming: Objects are mutable, Sameness, Copying. Inheritance: Pure functions ,Modifiers, Generalization, Operator Overloading, Polymorphism. Exceptions: Catching Exceptions, Raising your own exceptions. Chapter: 11.2.2-11.2.4, 11.3.2-11.3.9, 12.1, 12.2	Number of Hours:8
PRACTICAL COMPONENTS OF IPCC	
PART – A: FIXED SET OF EXPERIMENTS	
- Develop a python program to read 2 numbers from the keyboard and perform the basic arithmetic operations based on the choice. (1-Add, 2-Subtract, 3-Multiply, 4-Divide). - Develop a program to read the name and year of birth of a person. Display whether the person is a senior citizen or not. - Develop a program to generate Fibonacci sequence of length (N). Read N from the console. - Write a python program to create a list and perform the following operations - Inserting an element - Removing an element - Appending an element - Displaying the length of the list - Popping an element - Clearing the list - Read N numbers from the console and create a list. Develop a program to print mean, variance and standard deviation with suitable messages. - Read a multi-digit number (as chars) from the console. Develop a program to print the frequency of each digit with a suitable message. - Develop a program to print 10 most frequently appearing words in a text file. [Hint: Use a dictionary with distinct words and their frequency of occurrences. Sort the dictionary in the reverse order of frequency and display the dictionary slice of the first 10 items. - Develop a program to read 6 subject marks from the keyboard for a student. Generate a report that displays the marks from the highest to the lowest score attained by the student. [Read the marks into a 1-Dimesional array and sort using the Bubble Sort technique]. - Develop a program to sort the contents of a text file and write the sorted contents into a separate text file. [Hint: Use string methods strip(), len(), list methods sort(), append(), and file methods open(), readlines(), and write()].	

7. Develop a function named DivExp which takes TWO parameters a, b, and returns a value c ($c=a/b$). Write a suitable assertion for $a>0$ in the function DivExp and raise an exception for when $b=0$. Develop a suitable program that reads two console values and calls the function DivExp.
8. Define a function that takes TWO objects representing complex numbers and returns a new complex number with the sum of two complex numbers. Define a suitable class 'Complex' to represent the complex number. Develop a program to read N ($N \geq 2$) complex numbers and to compute the addition of N complex numbers.
9. Text Analysis Tool: Build a tool that analyses a paragraph: frequency of each word, longest word, number of sentences, etc.
10. Develop Data Summary Generator: Read a CSV file (like COVID data or weather stats), convert to dictionary form, and allow the user to run summary queries: max, min, average by column.
11. Develop Student Grade Tracker: Accept multiple students' names and marks. Store them in a list of tuples or dictionaries. Display summary reports (average, topper, etc.).
12. Develop a program to display contents of a folder recursively (Directory) having sub-folders and files (name and type).

Suggested Learning Resources: (Text Book/ Reference Book/ Manuals):

Text books:

1. Peter Wentworth, Jeffrey Elkner, Allen B. Downey and Chris Meyers- How to think like a computer scientist: learning with python 3. Green Tea Press, Wellesley, Massachusetts, 2020
<https://media.readthedocs.org/pdf/howtothink/latest/howtothink.pdf>

Reference books / Manuals:

1. Al Sweigart, "Automate the Boring Stuff with Python, 2nd Edition: Practical Programming for Total Beginners", 2nd Edition, No Starch Press, 2022. (Available under CC-BY-NC-SA license at <https://automatetheboringstuff.com/>)
2. Kyla McMullen, Elizabeth Matthews and June Jamrich Parsons, Programming with Python, Cengage, 2023.

Web links and Video Lectures (e-Resources):

<https://www.learnbyexample.org/python/>

<https://www.learnpython.org/>

<https://pythontutor.com/visualize.html#mode=edit>

Teaching-Learning Process (Innovative Delivery Methods):

The following are sample strategies that educators may adopt to enhance the effectiveness of the teaching-learning process and facilitate the achievement of course outcomes.

1. Chalk and talk
2. PPT presentation
3. Demonstration
4. Problem-Based Learning (PBL)
5. Case-Based Teaching

Assessment Structure:

The assessment for each course is equally divided between Continuous Internal Evaluation (CIE) and the Semester End Examination (SEE), with each component carrying **50% weightage** (i.e., 50 marks each). The CIE Theory component will be 25 marks and CIE Practical component will be 25 marks.

The CIE Theory component consists of IA tests for 25 marks and Continuous Comprehensive Assessments (CCA) for 5 marks. The CIE Practical component for continuous assessments will be for 15 marks through rubrics and for lab tests will be for 5 marks.

- To qualify and become eligible to appear for SEE, in the **CIE theory component**, a student must score at least **40% of 30 marks**, i.e., **12 marks**.
- To qualify and become eligible to appear for SEE, in the **CIE Practical component**, a student must secure a **minimum of 40% of 20 marks**, i.e., **08 marks**.
- To pass the **SEE**, a student must secure a **minimum of 35% of 50 marks**, i.e., **18 marks**.
- A student is deemed to have **successfully completed the course** if the **combined total of CIE and SEE is at least 40 out of 100 marks**.

Continuous Comprehensive Assessments (CCA):

CCA will be conducted for a total of 5 marks. It is recommended to include any one learning activity aimed at enhancing the holistic development of students. This activity should align with course outcomes and promote higher-order thinking and application-based learning.

Learning Activity -1: (Marks- 5)

Students must identify a real-life scenario and develop a Python-based solution using fundamental programming constructs/Data structures (Below given are the sample examples).

1. E.g.: Banking System: Simulate bank accounts using classes. Implement deposit, withdraw, and balance check using class methods. Create your own utility module.
2. E-commerce Cart System: Build a class Product, extend it with Electronics, Clothing using inheritance. Create a Cart class. Handle errors like invalid quantity using custom exceptions.
3. Smart Attendance System: Use file I/O to maintain logs, dictionaries for student info, and exception handling for invalid entries.
4. Develop/Simulate snake and ladder game by choosing suitable data structures of Python.

CIE Practical component:

The CIE marks awarded in the case of the Practical component shall be based on the continuous evaluation of the laboratory report using a defined set of rubrics. Each experiment report can be evaluated for 30 marks. The summation of all the experiments marks to be scaled down to 15 marks.

The laboratory test (duration 03 hours) at the end of the last week of the semester /after completion of all the experiments (whichever is early) shall be conducted for 50 marks and scaled down to 5 marks. For laboratory test, the student is required to conduct one experiment each from both Part A and Part B.

Rubrics for Learning Activity (Based on the nature of learning activity, design the rubrics for each activity):

Note: Marks obtained (25) is scaled down to 5.

Component & CO-PO Mapping	Outstanding (5)	Exceeds Expectations (4)	Meets Expectations (3)	Needs Improvement (2)	Unsatisfactory (1)
Identification of real-life problem and its relevance [C01] [P02]	Clearly defined and contextually relevant problem; innovative approach	Relevant and well-described problem	Partially relevant with limited context	Vague or not fully relevant problem	No identifiable or valid problem
Use of primitive constructs (variables, loops, functions, conditionals) [C01] [P01]	All constructs used correctly with proper logic and flow	Most constructs used properly	Basic constructs applied with some errors	Minimal construct usage with logical flaws	Incorrect or missing constructs
Manipulation of Python data structures (lists, tuples, dictionaries, sets) [C02] [P01]	Effective and optimized usage of Data Structures	Mostly appropriate usage	Some usage with basic understanding	Incorrect or limited use	Not used or misused entirely
Use of standard libraries and file operations (if applicable) [C03, C04] [P05]	Libraries and file operations used correctly and meaningfully	Minor issues in usage	Limited or partially correct use	Attempted but faulty implementation	Not attempted or irrelevant
Code structure, modularity, and documentation [C04] [P09, P011]	Modular, structured code with comments and output samples	Structured code with basic documentation	Limited comments or unclear structure	Poor documentation and readability	No documentation, disorganized code

Rubrics for CIE – Continuous assessment:

Component & CO-PO Mapping	Outstanding (5)	Exceeds Expectations (4)	Meets Expectations (3)	Needs Improvement (2)	Unsatisfactory (1)
Fundamental Knowledge: Understanding the problem statement [C01-5] [P01, P02]	The student has in depth knowledge of the topics related to the problem. Student is able to completely understand the problem definition.	Student has good knowledge of some of the topics related to problem. Student is able to understand the problem definition.	Student is capable of narrating the answer but not capable to show in depth knowledge and the problem definition.	Student has not understood the concepts partially. Student is able to partially understand the problem definition	Student has not understood the concepts and the problem definition clearly.
Design of algorithm/flow chart and program [C01-5] [P02, P03]	Student is capable of discussing more than one design for his/her problem statement and capable of proving the best suitable design with proper reason.	Student is capable of discussing few designs for his/her problem statement but not capable of selecting best.	Student is capable of discussing single design with its merits and de-merits.	Student is capable of explaining the design.	Student is capable of explaining the design partially.
Implementation (Program coding) with suitable tools [C01-5] [P05, P08]	Student is capable of implementing the design with best suitable language structure considering optimal solution/optimal efficiency.	Student is capable of implementing the design with best suitable language structure and should be capable of explaining it.	Student is capable of implementing the design with proper explanation.	Student is capable of implementing the design.	Student is capable of implementing the design with errors.
Program debugging and testing with suitable tools [C01-5] [P05, P08]	Student is capable to compile and debug the program with no errors (syntax, semantic and logical).	Student is able to compile and debug the program with errors (syntax, semantic and logical) and rectified errors with full understanding of error descriptions.	Student is able to compile and debug the program with errors (syntax, semantic and logical) and rectified errors with partial understanding of error descriptions.	Student is able to compile and debug the program with errors (syntax, semantic and logical) and rectified errors with no understanding of error descriptions.	Student is able to compile and debug the program with errors (syntax, semantic and logical) and rectified errors with assistance.
Results & interpretation /analysis [C01-5] [P04]	Student is able to run the program on various cases and compare the result with proper analysis.	Student is able to run the program for all the cases.	Student is able to run the code for few cases and analyze the result.	Student is able to run the program but not able to analyze the result.	Student is able to run the program but not able to verify the correctness of the result.
Demonstration and documentation [C01-4] [P08, P09, P011]	Demonstration and lab record is well-organized, with clear sections.	Demonstration and lab record is organized, with clear sections, but some	Demonstration and lab record lacks clear organization or structure. Some sections are	Demonstration and lab record is poorly organized, with missing or unclear sections.	Demonstration and lab record is poorly organized, with missing sections. Record

	The record is well structured with suitable formatting (e.g: font, spacing, labelling of figures and tables, equations numbered and etc).	sections are not well-defined. The record is structured with formatting (e.g: font, spacing, labelling of figures and tables, equations numbered and etc).	unclear or incomplete. The record is partially structured with formatting (e.g: font, spacing, labelling of figures and tables, equations numbered and etc).	The record is not properly structured with suitable formatting (e.g: font, spacing, labelling of figures and tables, equations numbered and etc).	not submitted on time. The record is not structured with minimum formatting (e.g: font, spacing, labelling of figures and tables, equations numbered and etc).
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Rubrics for CIE Test:

Component & CO-PO Mapping	Excellent (5)	Good (4)	Fair (3)	Marginal (2)	Unsatisfactory (1)
Fundamental Knowledge (2) [CO1, CO2] [PO1]	The student has well depth knowledge of the topics related to the problem & course	Student has good knowledge of some of the topics related to problem & course	Student has average knowledge of some of the topics related to problem & course	Student is capable of narrating the answer but not capable to show in depth knowledge	Student has not understood the concepts clearly
Understanding of problem definition (1) [CO1, CO2] [PO2]	Student is able to completely understand the problem definition	Student is able to understand the problem definition but not clearly	Student has a basic understanding of the problem definition that is partial or superficial	Student is able to Shows minimal or unclear understanding of the problem definition	Student is not able to understand the problem definition
Design and Implementation (3) [CO1, CO2] [PO3]	Student is capable of design and implementing with best suitable construct for the given problem definition	Student is capable of design and implementing with some construct for the given problem definition	Student is capable of design and implementing the core part of the construct for the given problem definition	Student is partially capable of design and implementing with some algorithm for the given problem definition	Student is not capable of design and implementing
Result & Analysis (2) [CO1, CO2] [PO4]	Student is able to run the program on various data inputs and compare the result with proper inference.	Student will be able to run the program on various data inputs and fair knowledge in comparing the result with proper inference	Student will be able to run the code for few data/datasets and analyze the output.	Student will be able to run the code for few data inputs but not analyze the output.	Student will be not able to run the program and not able to analyze the result.
Communication (Viva voce) (2) [CO3] [PO8, PO9]	Good Verbal & nonverbal communication skills with precise and correct terminologies/ answers.	Good verbal Communication skills with precise and correct terminologies/ answers.	Average Communication but with precise and correct terminologies/ answers.	Average Communication but with imprecise and incorrect terminologies/ answers	Poor Communication (Minimal interaction/answers)