Visvesvaraya Technological University, Belagavi
Scheme of Teaching and Examinations-2022
Outcome-Based Education (OBE)and Choice Based Credit System (CBCS)
(Effective from the academic year 2022-23)

I Semester (Civil Engineering Stream) **(Physic Group)**

Sl. No	Course and Course Code		CourseTitle	TD/PSB	Teaching Hours/Week				Examination				Credits
					Theory Lecture	Tutorial	Practical/ Drawing	SDA	Duration in hours	CIE Marks	SEE Marks	Total Marks	
					L	T	P	S					
1	*ASC(IC)	**BMATC101**	**Mathematics-I** for Civil Engg stream	Maths	2	2	2	0	03	50	50	100	04
2	#ASC(IC)	**BPHYC102**	**Applied Physics** for Civil Engineering Stream	PHY	2	2	2	0	03	50	50	100	04
3	ESC	**BCIVC103**	Engineering Mechanics	Civil Engineering Dept	2	2	0	0	03	50	50	100	03
4	ESC-I	**BESCK104x**	Engineering Science Course-I	Respective Engg dept	3	0	0	0	03	50	50	100	03
5	ETC-I	**BETCK105x**	Emerging Technology Course-I	Any Dept	3	0	0	0	03	50	50	100	03
	OR												
	PLC-I	**BPLCK105x**	Programming Language Course-I		2	0	2	0	03				
6	AEC AEC	**BENGK106**	Communicative English	Humanities	1	0	0	0	01	50	50	100	01
			OR										
		BPWSK106	Professional Writing Skills in English										
7	HSMC	**BKSKK107/ BKBKK107**	Samskrutika Kannada/ Balake Kannada	Humanities	1	0	0	0	01	50	50	100	01
			OR										
		BICOK107	Indian Constitution										
8	AEC/SDC	**BIDTK158**	Innovation and Design Thinking	Any Dept	1	0	0	0	01	50	50	100	01
			OR		OR								
		BSFHK158	Scientific Foundations of Health		1	0	0	0	01				
				TOTAL						**400**	**400**	**800**	**20**

SDA-Skill Development Activities, TD**/PSB**- Teaching Department / Paper Setting Board, **ASC**-Applied Science Course, **ESC**- Engineering Science Courses, **ETC**-Emerging Technology Course, **AEC**- Ability Enhancement Course, **HSMS**-Humanity and Social Science and management Course, **SDC**- Skill Development Course, **CIE** –Continuous Internal Evaluation, **SEE**- Semester End Examination, **IC** – Integrated Course (Theory Course Integrated with Practical Course)

Credit Definition: 1-hour Lecture **(L)** per week=**1Credit** 2-hoursTutorial**(T)** per week=**1Credit** 2-hours Practical / Drawing (**P**) per week=**1Credit** **2-**hous Skill Development Actives **(SDA)** per week = **1 Credit**	04-Credits courses are to be designed for 50 hours of Teaching-Learning Session 04-Credits (IC) are to be designed for 40 hours' theory and 12-14 hours of practical sessions 03-Credits courses are to be designed for 40 hours of Teaching-Learning Session 02- Credits courses are to be designed for 25 hours of Teaching-Learning Session 01-Credit courses are to be designed for 12-15 hours of Teaching-Learning sessions

Student's Induction Program: Motivating (Inspiring) Activities under the Induction program – The main aim of the induction program is to provide newly admitted students a broad understanding of society, relationships, and values. Along with the knowledge and skill of his/her study, students' character needs to be nurtured as an essential quality by which he/she would understand and fulfill the responsibility as an engineer. The following activities are to be covered in 21 days. Physical Activity, Creative Arts, Universal Human Values, Literary, Proficiency Modules, Lectures by Eminent People, Visits to Local areas, Familiarization with Department/Branch and Innovation, etc. For details, refer the ANNEXURE-I of Induction Programs notification of the University published at the beginning of the 1st semester.

AICTE Activity Points to be earned by students admitted to BE/ B.Tech., / B. Plan day college program (For more details refer to Chapter 6, AICTE Activity Point Program, Model Internship Guidelines): Over and above the academic grades, every regular student admitted to the 4 years Degree program and every student entering 4 years Degree programs through lateral entry, shall earn 100 and 75 Activity Points respectively for the award of degree through AICTE Activity Point Program. Students transferred from other Universities to the fifth semester are required to earn 50 Activity Points from the year of entry to VTU. The Activity Points earned shall be reflected on the student's eighth semester Grade Card. The activities can be spread over the years, any time during the semester weekends, and holidays, as per the liking and convenience of the student from the year of entry to the program. However, the minimum hour's requirement should be fulfilled. Activity Points (non-credit) do not affect SGPA/CGPA and shall not be considered for vertical progression. In case students fail to earn the prescribed activity Points, an Eighth Semester Grade Card shall be issued only after earning the required activity points. Students shall be admitted for the award of the degree only after the release of the Eighth semester Grade Card.

- BMATC101** Shall have the 03 hours of theory examination (SEE), however, practical sessions question shall be included in the theory question papers* The mathematics subject should be taught by a single faculty member per division, with no sharing of the course (subject)module-wise by different faculty members.**

#- BPHYC102 SEE shall have the 03 hours of theory examination and 02-03 hours of practical examination

ESC or ETC of 03 credits Courses shall have only a theory component (L:T :P:S=3:0:0:0) or if the nature theof course required practical learning then the syllabus shall be designed as an Integrated course (L:T:P:S= 2:0:2:0).

All 01 Credit- courses shall have the SEE of 01 hours duration and the pattern of the question paper shall be MCQ

(ESC-I) Engineering Science Courses-I					(ETC-I) Emerging Technology Courses-I				
Code	**Title**	**L**	**T**	**P**	**Code**	**Title**	**L**	**T**	**P**
BESCK104A	Introduction to Civil Engineering	3	0	0	**BETCK105A**	Smart Materials and Systems	3	0	0
BESCK104B	Introduction to Electrical Engineering	3	0	0	**BETCK105B**	Green Buildings	3	0	0
BESCK104C	Introduction to Electronics **Communication**	3	0	0	**BETCK105C**	Introduction to Nano Technology	3	0	0
BESCK104D	Introduction to Mechanical Engineering	3	0	0	**BETCK105D**	Introduction to Sustainable Engineering	3	0	0
BESCK104E	Introduction to C Programming	2	0	2	**BETCK105E**	Renewable Energy Sources	3	0	0
					BETCK105F	Waste Management	3	0	0
					BETCK105G	Emerging Applications of Biosensors	3	0	0
					BETCK105H	Introduction to Internet of Things (IOT)	3	0	0
					BETCK105I	Introduction to Cyber Security	3	0	0
					BETCK105J	Introduction to Embedded System	3	0	0
(PLC-I) Programming Language Courses-I									
Code	**Title**	**L**	**T**	**P**					
BPLCK105A	Introduction to Web Programming	2	0	2					
BPLCK105B	Introduction to Python Programming	2	0	2					
BPLCK105C	Basics of JAVA programming	2	0	2					
BPLCK105D	Introduction to C++ Programming	2	0	2					
The course BESC104E, Introduction to C Programming, and all courses under PLC and ETC groups can be taught by faculty of ANY DEPARTMENT									

- The student has to select one course from the ESC-I group.
- Civil Engineering Students shall opt for any one of the courses from the ESC-I group **except, BESCK**104A **Introduction to Civil Engineering**
- The students have to opt for the courses from ESC group without repeating the course either 1st or 2nd semester
- The students must select one course from either ETC-I or PLC-I group.
- If students study the subject from ETC-I in 1st semester he/she has to select the course from PLC-II in the 2nd semester and vice-versa

Visvesvaraya Technological University, Belagavi
Scheme of Teaching and Examinations-2022
Outcome-Based Education (OBE)and Choice Based Credit System(CBCS)
(Effective from the academic year 2022-23)

II Semester (Civil Engineering Stream) (for students who attended I semester under Physics Group)

Sl. No	Course and Course Code		Course Title	TD/PSB	Teaching Hours/Week				Examination				Credits
					Theory Lecture	Tutorial	Practical/ Drawing	SDA	Duration in hours	CIE Marks	SEE Marks	Total Marks	
					L	T	P	S					
1	*ASC(IC)	**BMATC201**	**Mathematics-II** for Civil Engg Stream	Maths	2	2	2	0	03	50	50	100	04
2	#ASC(IC)	**BCHEC202**	**Applied Chemistry** for Civil Engineering stream	Chemistry	2	2	2	0	03	50	50	100	04
3	ESC	**BCEDK203**	Computer-Aided Engineering Drawing	Civil/Mech Engg dept	2	0	2	0	03	50	50	100	03
4	ESC-II	**BESCK204x**	Engineering Science Course-II	Respective EnggDept	3	0	0	0	03	50	50	100	03
5	PLC-II	**BPLCK205x**	Programming Language Course-II	Any. Dept	2	0	2	0	03	50	50	100	03
	OR												
	ETC-II	**BETCK205x**	Emerging Technology Course-II		3	0	0	0	03				
6	AEC	**BPWSK206**	Professional Writing Skills in English	Humanities	1	0	0	0	01	50	50	100	01
			OR										
		BENGK206	Communicative English										
7	HSMS	**BICOK207**	Indian Constitution	Humanities	1	0	0	0	01	50	50	100	01
		OR											
		BKSKK207/ BKBKK207	Samskrutika Kannada/ Balake Kannada										
8	HSMS	**BSFHK258**	Scientific Foundations of Health	AnyDept	1	0	0	0	01	50	50	100	01
	OR				OR								
	HSMS	**BIDTK258**	Innovation and Design Thinking	Any	1	0	0	0	01	50	50	100	
				TOTAL						**400**	**400**	**800**	**20**

SDA-Skill Development Activities, **TD/PSB**- Teaching Department / Paper Setting Board, **ASC**-Applied Science Course, **ESC**- Engineering Science Courses, **ETC**-Emerging Technology Course, **AEC**- Ability Enhancement Course, **HSMS**-Humanity and Social Science and management Course, **SDC**- Skill Development Course, **CIE** -Continuous Internal Evaluation, **SEE**- Semester End Examination, **IC** – Integrated Course (Theory Course Integrated with Practical Course)

Credit Definition: 1-hour Lecture **(L)** per week=**1Credit** 2-hoursTutorial**(T)** per week=**1Credit** 2-hours Practical / Drawing (**P**) per week=**1Credit** **2-**hous Skill Development Actives **(SDA)** per week = **1 Credit**	04-Credits courses are to be designed for 50 hours of Teaching-Learning Session 04-Credits (IC) are to be designed for 40 hours' theory and 12-14 hours of practical sessions 03-Credits courses are to be designed for 40 hours of Teaching-Learning Session 02- Credits courses are to be designed for 25 hours of Teaching-Learning Session 01-Credit courses are to be designed for 12-15 hours of Teaching-Learning sessions

***- BMATC201** Shall have the 03 hours of theory examination(SEE), however, practical sessions question shall be included in the theory question papers. ** **The mathematics subject should be taught bysingle faculty member per division, with no sharing of the course(subject)module-wise by different faculty members.**

#- BCHEC202 SEE shall have the 03 hours of theory examination and 02-03 hours of practical examination

ESC or ETC of 03 credits Courses shall have only a theory component (L:T :P:S=3:0:0:0) or if the nature the of course required practical learning syllabus shall be designed as an Integrated course (L:T:P:S= 2:0:2:0).

All 01 Credit- courses shall have the SEE of 01 hours duration and the pattern of the question paper shall be MCQ

(ESC-II) Engineering Science Courses-II					(ETC-II) Emerging Technology Courses-II				
Code	**Title**	**L**	**T**	**P**	**Code**	**Title**	**L**	**T**	**P**
BESCK204A	Introduction to Civil Engineering	3	0	0	**BETCK205A**	Smart materials and Systems	3	0	0
BESCK204B	Introduction to Electrical Engineering	3	0	0	**BETCK205B**	Green Buildings	3	0	0
BESCK204C	Introduction to Electronics **Communication**	3	0	0	**BETCK205C**	Introduction to Nano Technology	3	0	0
BESCK204D	Introduction to Mechanical Engineering	3	0	0	**BETCK205D**	Introduction to Sustainable Engineering	3	0	0
BESCK204E	Introduction to C Programming	2	0	2	**BETCK205E**	Renewable Energy Sources	3	0	0
					BETCK205F	Waste Management	3	0	0
					BETCK205G	Emerging Applications of Biosensors	3	0	0
					BETCK205H	Introduction to Internet of Things(IoT)	3	0	0
					BETCK205I	Introduction to Cyber Security	3	0	0
					BETCK205J	Introduction to Embedded System	3	0	0
(PLC-II) Programming Language Courses-II									
Code	**Title**	**L**	**T**	**P**					
BPLCK205A	Introduction to Web Programming	2	0	2					
BPLCK205B	Introduction to Python Programming	2	0	2					
BPLCK205C	Basics of JAVA programming	2	0	2					
BPLCK205D	Introduction to C++ Programming	2	0	2					
The course BESC204E, Introduction to C Programming, and all courses under PLC and ETC groups can be taught by faculty of ANY DEPARTMENT									

- The student has to select one course from the ESC-II group.
- Civil Engineering Students shall opt for any one of the courses from the ESC-II group **except,** BESCK204A **-Introduction to Civil Engineering**
- The students have to opt for the courses from ESC group without repeating the course in either 1st or 2nd semester
- The students must select one course from either ETC-II or PLC-II group.
- If students study the subject from ETC-I in 1st semester he/she has to select the course from PLC-II in the 2nd semester and vice-versa

Visvesvaraya Technological University, Belagavi
Scheme of Teaching and Examinations-2022
Outcome-Based Education (OBE)and Choice Based Credit System(CBCS)
(Effective from the academic year 2022-23)

I Semester (Civil Engineering Stream) (Chemistry Group)

Sl. No	Course and Course Code		Course Title	TD/PSB	Teaching Hours/Week				Examination				Credits
					Theory Lecture	Tutorial	Practical/ Drawing	SDA	Duration in hours	CIE Marks	SEE Marks	Total Marks	
					L	T	P	S					
1	*ASC(IC)	**BMATC101**	**Mathematics-I** for Civil Engg Stream	Maths	2	2	2	0	03	50	50	100	04
2	#ASC(IC)	**BCHEC102**	**Applied Chemistry** for Civil Engg Stream	Chemistry	2	2	2	0	03	50	50	100	04
3	ESC	**BCEDK103**	Computer-aided engineering Drawing	Civil/Mech Engg dept	2	0	2	0	03	50	50	100	03
4	ESC-I	**BESCK104x**	Engineering Science Course-I	Respective Dept	3	0	0	0	03	50	50	100	03
5	ETC-I	**BETCK105x**	Emerging Technology Course-I	Any Dept	3	0	0	0	03	50	50	100	03
	OR												
	PLC-I	**BPLCK105x**	Programming Language Course-I		2	0	2	0	03				
6	AEC	**BPWSK106**	Professional Writing Skills in English	Humanities	1	0	0	0	01	50	50	100	01
			OR										
		BENGK106	Communicative English										
7	HSMS	**BICOK107**	Indian Constitution	Humanities	1	0	0	0	01	50	50	100	01
			OR										
		BKSK107/ BKBK107	Samskrutika Kannada/ Balake Kannada										
8	HSMS	**BSFHK158**	Scientific Foundations of Health	AnyDept	1	0	0	0	01	50	50	100	01
	OR												
	HSMS	**BITDK158**	Innovation and Design Thinking	Any Dept	1	0	0	0	01				
				TOTAL	**15**	**06**	**10**	00	**27**	**400**	**400**	**800**	**20**

SDA-Skill Development Activities, **TD/PSB**- Teaching Department / Paper Setting Board, **ASC**-Applied Science Course, **ESC**- Engineering Science Courses, **ETC**-Emerging Technology Course, **AEC**- Ability Enhancement Course, **HSMS**-Humanity and Social Science and management Course, **SDC**- Skill Development Course, **CIE** -Continuous Internal Evaluation, **SEE**- Semester End Examination, **IC** – Integrated Course (Theory Course Integrated with Practical Course)

- BMATC101** Shall have the 03 hours of theory examination(SEE), however, practical sessions question shall be included in the theory question papers. * The mathematics subject should be taught by single faculty member per division, with no sharing of the course(subject)module-wise by different faculty members.**

#- BCHEC102- SEE shall have the 03 hours of theory examination and 02-03 hours of practical examination

ESC or ETC of 03 credits Courses shall have only a theory component (L:T :P:S=3:0:0:0) or if the nature the of course required practical learning syllabus shall be designed as an Integrated course (L:T:P:S= 2:0:2:0).

All 01 Credit- courses shall have the SEE of 01 hours duration and the pattern of the question paper shall be MCQ

Credit Definition:	
1-hour Lecture **(L)** per week=**1Credit**	04-Credits courses are to be designed for 50 hours of Teaching-Learning Session
2-hoursTutorial**(T)** per week=**1Credit**	04-Credits (IC) are to be designed for 40 hours' theory and 12-14 hours of practical sessions
2-hours Practical / Drawing (**P**) per week=**1Credit**	03-Credits courses are to be designed for 40 hours of Teaching-Learning Session
2-hous Skill Development Actives **(SDA)** per week = **1 Credit**	02- Credits courses are to be designed for 25 hours of Teaching-Learning Session
	01-Credit courses are to be designed for 12-15 hours of Teaching-Learning sessions

Student's Induction Program: Motivating (Inspiring) Activities under the Induction program – The main aim of the induction program is to provide newly admitted students a broad understanding of society, relationships, and values. Along with the knowledge and skill of his/her study, students' character needs to be nurtured as an essential quality by which he/she would understand and fulfill the responsibility as an engineer. The following activities are to be covered in 21 days. Physical Activity, Creative Arts, Universal Human Values, Literary, Proficiency Modules, Lectures by Eminent People, Visits to Local areas, Familiarization with Department/Branch and Innovation, etc. For details, refer the ANNEXURE-I of Induction Programs notification of the University published at the beginning of the 1st semester.

AICTE Activity Points to be earned by students admitted to BE/ B.Tech., / B. Plan day college program (For more details refer to Chapter 6, AICTE Activity Point Program, Model Internship Guidelines): Over and above the academic grades, every regular student admitted to the 4 years Degree program and every student entering 4 years Degree programs through lateral entry, shall earn 100 and 75 Activity Points respectively for the award of degree through AICTE Activity Point Program. Students transferred from other Universities to the fifth semester are required to earn 50 Activity Points from the year of entry to VTU. The Activity Points earned shall be reflected on the student's eighth semester Grade Card. The activities can be spread over the years, any time during the semester weekends, and holidays, as per the liking and convenience of the student from the year of entry to the program. However, the minimum hour's requirement should be fulfilled. Activity Points (non-credit) do not affect SGPA/CGPA and shall not be considered for vertical progression. In case students fail to earn the prescribed activity Points, an Eighth Semester Grade Card shall be issued only after earning the required activity points. Students shall be admitted for the award of the degree only after the release of the Eighth semester Grade Card.

(ESC-I) Engineering Science Courses-I					(ETC-I) Emerging Technology Courses-I				
Code	**Title**	**L**	**T**	**P**	**Code**	**Title**	**L**	**T**	**P**
BESCK104A	Introduction to Civil Engineering	3	0	0	**BETCK105A**	Smart Materials and Systems	3	0	0
BESCK104B	Introduction to Electrical Engineering	3	0	0	**BETCK105B**	Green Buildings	3	0	0
BESCK104C	Introduction to Electronics **Communication**	3	0	0	**BETCK105C**	Introduction to Nano Technology	3	0	0
BESCK104D	Introduction to Mechanical Engineering	3	0	0	**BETCK105D**	Introduction to Sustainable Engineering	3	0	0
BESCK104E	Introduction to C Programming	2	0	2	**BETCK105E**	Renewable Energy Sources	3	0	0
					BETCK105F	Waste Management	3	0	0
					BETCK105G	Emerging Applications of Biosensors	3	0	0
					BETCK105H	Introduction to Internet of Things (IOT)	3	0	0
					BETCK105I	Introduction to Cyber Security	3	0	0
					BETCK105J	Introduction to Embedded System	3	0	0
(PLC-I) Programming Language Courses-I									
Code	**Title**	**L**	**T**	**P**					
BPLCK105A	Introduction to Web Programming	2	0	2					
BPLCK105B	Introduction to Python Programming	2	0	2					
BPLCK105C	Basics of JAVA programming	2	0	2					
BPLCK105D	Introduction to C++ Programming	2	0	2					
The course BESCK104E**, Introduction to C Programming, and all courses under PLC and ETC groups can be taught by faculty of ANY DEPARTMENT**									

- The student has to select one course from the ESC-I group.
- Civil Engineering Students shall opt for any one of the courses from the ESC-I group **except,** BESCK104A **–Introduction to Civil Engineering**
- The students have to opt for the courses from ESC group without repeating the course in either 1st or 2nd semester
- The students must select one course from either ETC-I or PLC-I group.
- If students study the subject from ETC-I in 1st semester he/she has to select the course from PLC-II in the 2nd semester and vice-versa

Visvesvaraya Technological University, Belagavi
Scheme of Teaching and Examinations-2022
Outcome-Based Education (OBE)and Choice Based Credit System (CBCS)
(Effective from the academic year 2022-23)

II Semester (Civil Engineering Stream) **(For the students who attended I semester under Chemistry Group)**

Sl. No	Course and Course Code		Course Title	TD/PSB	Teaching Hours/Week				Examination				Credits
					Theory Lecture	Tutorial	Practical/ Drawing	SDA	Duration in hours	CIE Marks	SEE Marks	Total Marks	
					L	T	P	S					
1	*ASC (IC)	**BMATC201**	**Mathematics-II** for Civil Engineering	Maths	2	2	2	0	03	50	50	100	04
2	#ASC (IC)	**BPHYC202**	**Applied Physics** for Civil Engineering	PHY	2	2	2	0	03	50	50	100	04
3	ESC	**BCIVC203**	Engineering Mechanics	Civil Engineering Dept	2	2	0	0	03	50	50	100	03
4	ESC-II	**BESCK204x**	Engineering Science Course-II	Respective Engg Dept	3	0	0	0	03	50	50	100	03
5	PLC-II	**BPLCK205x**	Programming Language Course-II	Any Dept	2	0	2	0	03	50	50	100	03
	OR												
	ETC-II	**BETCK205x**	Emerging Technology Course-II		3	0	0	0	03				
6	AEC	**BENGK206**	Communicative English	Humanities	1	0	0	0	01	50	50	100	01
			OR										
		BPWSK206	Professional Writing Skills in English										
7	HSMC	**BKSKK207 BKBKK207**	Samskrutika Kannada/ Balake Kannada	Humanities	1	0	0	0	01	50	50	100	01
		OR											
		BICOK207	Indian Constitution										
8	AEC/SDC	**BIDTK258**	Innovation and Design Thinking	Any Dept	1	0	0	0	01	50	50	100	01
	OR												
		BSFHK258	Scientific Foundations of Health		1	0	0	0					
			TOTAL							**400**	**400**	**800**	**20**

SDA-Skill Development Activities, **TD/PSB**- Teaching Department / Paper Setting Board, **ASC**-Applied Science Course, **ESC**- Engineering Science Courses, **ETC**-Emerging Technology Course, **AEC**- Ability Enhancement Course, **HSMS**-Humanity and Social Science and management Course, **SDC**- Skill Development Course,

CIE –Continuous Internal Evaluation, **SEE**- Semester End Examination, **IC** – Integrated Course (Theory Course Integrated with Practical Course)

BMATC201 Shall have the 03 hours of theory examination(SEE), however, practical sessions question shall be included in the theory question papers. **** The mathematics subject should be taught by a single faculty member per division, with no sharing of the course(subject)module-wise by different faculty members.**

#- BPHYC202 SEE shall have the 03 hours of theory examination and 02-03 hours of practical examination

ESC or ETC of 03 credits Courses shall have only a theory component (L:T :P:S=3:0:0:0) or **if the nature the of course required experimental learning then the syllabus shall be designed as an Integrated course (L:T:P:S= 2:0:2:0). However, there is no SEE for the practical component.**

All 01 Credit- courses shall have the SEE of 01 hours duration and the pattern of the question paper shall be MCQ

(ESC-II) Engineering Science Courses-II					**(ETC-II) Emerging Technology Courses-II**				
Code	**Title**	**L**	**T**	**P**	**Code**	**Title**	**L**	**T**	**P**
BESCK204A	Introduction to Civil Engineering	3	0	0	**BETCK205A**	Smart materials and Systems	3	0	0
BESCK204B	Introduction to Electrical Engineering	3	0	0	**BETCK205B**	Green Buildings	3	0	0
BESCK204C	Introduction to Electronics **Communication**	3	0	0	**BETCK205C**	Introduction to Nano Technology	3	0	0
BESCK204D	Introduction to Mechanical Engineering	3	0	0	**BETCK205D**	Introduction to Sustainable Engineering	3	0	0
BESCK204E	Introduction to C Programming	2	0	2	**BETCK205E**	Renewable Energy Sources	3	0	0
					BETCK205F	Waste Management	3	0	0
					BETCK205G	Emerging Applications of Biosensors	3	0	0
					BETCK205H	Introduction to Internet of Things(IoT)	3	0	0
					BETCK205I	Introduction to Cyber Security	3	0	0
					BETCK205J	Introduction to Embedded System	3	0	0
(PLC-II) Programming Language Courses-II									
Code	**Title**	**L**	**T**	**P**					
BPLCK205A	Introduction to Web Programming	2	0	2					
BPLCK205B	Introduction to Python Programming	2	0	2					
BPLCK205C	Basics of JAVA programming	2	0	2					
BPLCK205D	Introduction to C++ Programming	2	0	2					

The course BESCK245E**, Introduction to C Programming, and all courses under PLC and ETC groups can be taught by faculty of ANY DEPARTMENT**

- The student has to select one course from the ESC-II group.
- Civil Engineering Students shall opt for any one of the courses from the ESC-II group **except,** BESCK241A **-** Introduction to **Civil Engineering**
- The students have to opt for the courses from ESC group without repeating the course in either 1st or 2nd semester
- The students must select one course from either ETC-II or PLC-II group.
- If students study the subject from ETC-I in 1st semester he/she has to select the course from PLC-II in the 2nd semester and vice-versa

I Semester

Course Title:	**Mathematics-I for Civil Engineering stream**		
Course Code:	**BMATC101**	CIE Marks	50
Course Type (Theory/Practical/Integrated)	Integrated	SEE Marks	50
		Total Marks	100
Teaching Hours/Week (L:T:P: S)	2:2:2:0	Exam Hours	03
Total Hours of Pedagogy	40 hours Theory + 10 to12 Lab slots	Credits	04

Course objectives: The goal of the course **Mathematics-I for Civil Engineering stream**(**22MATC11**) is to

- **Familiarize** the importance of calculus associated with onevariable and two variables for Civil engineering.
- **Analyze** Civil engineering problems applying Ordinary Differential Equations.
- **Develop** the knowledge of Linear Algebra referring to matrices.

Teaching-Learning Process

Pedagogy (General Instructions):

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

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

Module-1:Calculus (8 hours)

Introduction to polar coordinates and curvature relating to Civil engineering.

Polar coordinates, Polar curves, angle between the radius vector and the tangent, and angle between two curves. Pedal equations. Curvature and Radius of curvature - Cartesian, Parametric, Polar and Pedal forms. Problems.

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

Applications: Structural design and paths, Strength of materials, Elasticity.

(RBT Levels: L1, L2 and L3)

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

Introduction to series expansion and partial differentiation in the field of Civil engineering applications.

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

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

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

Applications: Computation of stress and strain, Errors and approximations, Estimating the critical points and extreme values.

(RBT Levels: L1, L2 and L3)

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

Introduction to first-order ordinary differential equations pertaining to the applications for Civil engineering.

Linear and Bernoulli's differential equations. Exact and reducible to exact differential equations - Integrating factors on $\frac{1}{N}\left(\frac{\partial M}{\partial y}-\frac{\partial N}{\partial x}\right)$ *and* $\frac{1}{M}\left(\frac{\partial N}{\partial x}-\frac{\partial M}{\partial y}\right)$. Orthogonal trajectories and Newton's law of cooling.

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

Self-Study: Applications of ODEs in Civil Engineering problems like bending of the beam, whirling of shaft,solution of non-linear ODE by the method of solvable for x and y.

Applications: Rate of Growth or Decay, Conduction of heat.

(RBT Levels: L1, L2 and L3)

Module-4:Ordinary Differential Equations of Higher Order(8 hours)

Importance of higher-order ordinary differential equations in Civil engineering applications.

Higher-order linear ODEs with constant coefficients - Inverse differential operator, method of variation of parameters, Cauchy's and Legendre's homogeneous differential equations -Problems.

Self-Study: Formulation and solution of Cantilever beam. Finding the solution by the method of undetermined coefficients.

Applications: Oscillations of a spring, Transmission lines, Highway engineering.

(RBT Levels: L1, L2 and L3)

Module-5: Linear Algebra (8 hours)

Introduction of linear algebra related to Civil engineering applications.

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

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

Applications: Structural Analysis, Balancing equations.

(RBT Levels: L1, L2 and L3)

List of Laboratory experiments (2 hours/week per batch/ batch strength 15)

10 lab sessions + 1 repetition class + 1 Lab Assessment

1	2D plots for Cartesian and polar curves
2	Finding angle between polar curves, curvature and radius of curvature of a given curve
3	Finding partial derivatives and Jacobian
4	Applications to Maxima and Minima of two variables
5	Solution of first-order ordinary differential equation and plotting the solution curves
6	Solutions of Second-order ordinary differential equations with initial/boundary conditions
7	Solution of a differential equation of oscillations of a spring/deflection of a beam with different loads
8	Numerical solution of system of linear equations, test for consistency and graphical representation
9	Solution of system of linear equations using Gauss-Seidel iteration
10	Compute eigenvalues and eigenvectors and find the largest and smallest eigenvalue by the Rayleigh power method.

Suggested software: Mathematica/MatLab/Python/Scilab

Course outcome (Course Skill Set)

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

CO1	apply the knowledge of calculus to solve problems related to polar curves.
CO2	learn the notion of partial differentiation to compute rate of change of multivariate functions.
CO3	analyze the solution of linear and nonlinear ordinary differential equations.
CO4	make use of matrix theory for solving the system of linear equations and compute eigenvalues and eigenvectors.
CO5	familiarize with modern mathematical tools namely MATHEMATICA/ MATLAB/ PYTHON/SCILAB

Assessment Details (both CIE and SEE)

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

Continuous Internal Evaluation(CIE):

The CIE marks for the theory component of the IC shall be **30 marks** and for the laboratory component **20 Marks**.

CIE for the theory component of the IC

- Three Tests each of 20 Marks**;** after the completion of the syllabus of 35-40%, 65-70%, and 90-100% respectively.
- Two Assignments/two quizzes/ seminars/one field survey and report presentation/one-course project totalling 20 marks.

Total Marks scored (test + assignments) out of 80 shall be scaled down to **30 marks.**

CIE for the practical component of the IC

- On completion of every experiment/program in the laboratory, the students shall be evaluated and marks shall be awarded on the same day. The **15 marks** are for conducting the experiment and preparation of the laboratory record, the other **05 marks shall be for the test** conducted at the end of the semester.
- The CIE marks awarded in the case of the Practical component shall be based on the continuous evaluation of the laboratory report. Each experiment report can be evaluated for 10 marks. Marks of all experiments' write-ups are added and scaled down to 15 marks.
- The laboratory test **(duration 03 hours)** at the end of the 15th week of the semester/after completion of all the experiments (whichever is early) shall be conducted for 50 marks and scaled down to **05 marks.**

Scaled-down marks of write-up evaluations and tests added will be CIE marks for the laboratory component of IC/IPCC for **20 marks**.

- The minimum marks to be secured in CIE to appear for SEE shall be 12 (40% of maximum marks) in the theory component and 08 (40% of maximum marks) in the practical component. The laboratory component of the IC/IPCC shall be for CIE only. However, in SEE, the questions from the laboratory component shall be included**.** The maximum of 05 questions is to be set from the practical component of IC/IPCC, the total marks of all questions should not be more than 25 marks.

The theory component of the IC shall be for both CIE and SEE.

Semester End Examination(SEE):

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

- The question paper shall be set for 100 marks. The medium of the question paper shall be English/Kannada). The duration of SEE is 03 hours.
- The question paper will have 10 questions. Two questions per module. Each question is set for 20 marks. The students have to answer 5 full questions, selecting one full question from each module. The student has to answer for 100 marks and **marks scored out of 100 shall be proportionally reduced to 50 marks**.
- There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), **should have a mix of topics** under that module.

Suggested Learning Resources:

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

Text Books

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

Reference Books

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6. **H. K. Dass and Er. Rajnish Verma:** "Higher Engineering Mathematics" S. Chand Publication, 3rd Ed., 2014.
7. **James Stewart: "**Calculus" Cengage Publications, 7thEd., 2019.
8. **David C Lay:** "Linear Algebra and its Applications", Pearson Publishers, 4th Ed., 2018.
9. **Gareth Williams:** "Linear Algebra with Applications", Jones Bartlett Publishers Inc., 6th Ed., 2017.
10. **Gilbert Strang:** "Linear Algebra and its Applications", Cengage Publications, 4th Ed., 2022.

Web links and Video Lectures (e-Resources):

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

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

- Quizzes
- Assignments
- Seminar

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

COs	POs						
	1	2	3	4	5	6	7
CO1							
CO2							
CO3							
CO4							
CO5							

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

II Semester

Course Title:	**Mathematics-II for Civil Engineering stream**		
Course Code:	**BMATC201**	CIE Marks	50
Course Type (Theory/Practical/Integrated)	Integrated	SEE Marks	50
		Total Marks	100
Teaching Hours/Week (L:T:P: S)	2:2:2:0	Exam Hours	03
Total Hours of Pedagogy	40 hours Theory + 10 to 12 Lab slots	Credits	04

Course objectives: The goal of the course**Mathematics-II for Civil Engineering stream** (**22MATC21**) is to

- **Familiarize** the importance of Integral calculus and Vector calculus essential for civil engineering.
- **Analyze** Civil engineering problems by applying Partial Differential Equations.
- **Develop** the knowledge of solving civil engineering problems numerically.

Teaching-Learning Process

Pedagogy (General Instructions):

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

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

Module-1:Integral Calculus (8 hours)

Introduction to Integral Calculus in Civil Engineering applications.

Multiple Integrals: Evaluation of double and triple integrals, evaluation of double integrals by change of order of integration, changing into polar coordinates. Applications to find Area and Volume by double integral.Problems.

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

Self-Study: Volume by triple integration, Center of gravity.

Applications: Applications to mathematical quantities (Area, Surface area, Volume), Analysis of probabilistic models.

(RBT Levels: L1, L2 and L3)

Module-2:Vector Calculus(8 hours)

Introduction to Vector Calculus in Civil Engineering applications.

Vector Differentiation: Scalar and vector fields. Gradient, directional derivative, curl and divergence - physical interpretation, solenoidal and irrotational vector fields. Problems.

Vector Integration: Line integrals, Surface integrals. Applications to work done by a force and flux. Statement of Green's theorem and Stoke's theorem. Problems.

Self-Study: Volume integral and Gauss divergence theorem.

Applications: Heat and mass transfer, oil refinery problems, environmental engineering. Analysis of streamlines, velocity and acceleration of a moving particle.

(RBT Levels: L1, L2 and L3)

Module-3:Partial Differential Equations (PDEs)(8 hours)

Importance of partial differential equations for Civil Engineering applications

Formation of PDE's by elimination of arbitrary constants and functions. Solution of non-homogeneous PDE by direct integration. Homogeneous PDEs involving derivatives with respect to one independent variable only. Solution of Lagrange's linear PDE.Derivation of one-dimensional heat equation and wave equation.

Self-Study: Solution of one-dimensional heat equation and wave equation by the method of separation of variables.

Applications: Design of structures (vibration of rod/membrane)

(RBT Levels: L1, L2 and L3)

Module-4:Numerical Methods -1(8 hours)

Importance of numerical methods for discrete data in the field of Civil Engineering.

Solution of algebraic and transcendental equations: Regula-Falsi and Newton-Raphson methods (only formulae). Problems.

Finite differences, Interpolation using Newton's forward and backward difference formulae, Newton's divided difference formula and Lagrange's interpolation formula (All formulae without proof). Problems.

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

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

Applications: Estimating the approximate roots, extremum values, area, volume, and surface area. Finding approximate solutions to civil engineering problems.

(RBT Levels: L1, L2 and L3)

Module-5:Numerical Methods -2(8 hours)

Introduction to various numerical techniques for handling Civil Engineering applications.

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

Self-Study: Adam-Bashforth method.

Applications: Finding approximate solutions to ODE related to civil engineering fields.

(RBT Levels: L1, L2 and L3)

List of Laboratory experiments (2 hours/week per batch/ batch strength 15)

10 lab sessions + 1 repetition class + 1 Lab Assessment

1	Program to compute surface area, volume and centre of gravity
2	Evaluation of improper integrals
3	Finding gradient, divergent, curl and their geometrical interpretation
4	Verification of Green's theorem
5	Solution of one-dimensional heat equation and wave equation
6	Solution of algebraic and transcendental equations by Regula-Falsi and Newton-Raphson method
7	Interpolation/Extrapolation using Newton's forward and backward difference formula
8	Computation of area under the curve using Trapezoidal, Simpson's $(1/3)^{rd}$ and $(3/8)^{th}$ rule
9	Solution of ODE of first order and first degree by Taylor's series and Modified Euler's method
10	Solution of ODE of first order and first degree by Runge-Kutta 4^{th} order and Milne's predictor-corrector method

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

Course outcome (Course Skill Set)

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

CO1	Apply the knowledge of multiple integrals to compute area and volume.
CO2	Understand the applications of vector calculus refer to solenoidal, irrotational vectors, line integral and surface integral.
CO3	Demonstrate partial differential equations and their solutions for physical interpretations.
CO4	Apply the knowledge of numerical methods in solving physical and engineering phenomena.
CO5	Get familiarize with modern mathematical tools namely MATHEMATICA/MATLAB/PYTHON/SCILAB

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- VTU EDUSAT Program

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

- Quizzes
- Assignments
- Seminar

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

COs	POs						
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CO1							
CO2							
CO3							
CO4							
CO5							

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

Course Title:	**Applied Physics for CV Stream**		
Course Code:	**BPHYC102/202**	CIE Marks	50
Course Type (Theory/Practical/Integrated)	Integrated	SEE Marks	50
		Total Marks	100
Teaching Hours/Week (L:T:P: S)	2:2:2:0	Exam Hours	03
Total Hours of Pedagogy	40 hours Theory + 10-12 Lab slots	Credits	04

Course objectives

- To understand the types of oscillation, shock waves & its generation, and applications.
- To Study the elastic properties of materials and failures of engineering materials
- To Study the acoustics buildings and the essentials of radiometry and photometry.
- To understand the principles photonic devices and their application relevant to civil engineering.
- To understand the various natural disaster and safety

Teaching-Learning Process

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

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

Module-1 (8 Hours)

Module -I: Oscillations and Shock waves:

Oscillations: Simple Harmonic motion (SHM), Differential equation for SHM (No derivation), Sprigs: Stiffness Factor and its Physical Significance, Series and Parallel combination of springs (Derivation), Types of Springs and their applications. Theory of Damped oscillations (Qualitative), Types of Damping (Graphical Approach). Engineering applications of Damped oscillations, Theory of Forced oscillations (Qualitative), Resonance, Sharpness of resonance. Numerical Problems.

Shock waves: Mach number and Mach Angle, Mach Regimes, Definition and Characteristics of Shock waves, Construction and working of Reddy Shock tube, Applications of Shock Waves, Numerical problems.

Pre-requisites: Basics of Oscillations

Self-learning: Simple Harmonic motion, Differential equation for SHM

Module-2 (8 Hours)

Elasticity

Stress-Strain Curve, Stress hardening and softening. Elastic Moduli, Poisson's ratio, Relation between Y, n and σ (with derivation), mention relation between K, Y and σ, limiting values of Poisson's ratio. Beams, Bending moment and derivation of expression, Cantilever and I section girder and their Engineering Applications, Elastic materials (qualitative). Failures of engineering materials - Ductile fracture, Brittle fracture, Stress concentration, Fatigue and factors affecting fatigue (only qualitative explanation), Numerical problems.

Pre requisites: Elasticity,Stress & Strain

Self-learning: Stress-Strain Curve

Module-3 (8 Hours)

Acoustics,RadiometryandPhotometry:

Acoustics: Introduction to Acoustics, Types of Acoustics, Reverberation and reverberation time, Absorption power andAbsorption coefficient, Requisites for acoustics in auditorium, Sabine's formula (derivation), Measurement of absorptioncoefficient, Factors affecting the acoustics and remedial measures, Sound Insulation and itsmeasurements. Noise and its Measurements, Impact of Noise in Multi-storied buildings.

Radiometry and Photometry: Radiation Quantities, Spectral Quantities, Relation between luminance and Radiantquantities, Reflectanceand Transmittance, Photometry (cosinelaw and inverse square law).

Prerequisites:BasicsofSound,Waves&lightproperties.
Self-learning:Introductiontoacoustics.

Module-4 (8 Hours)

Photonics:
LASER
Properties of a LASER Beam, Interaction of Radiation with Matter, LASER action, Population Inversion, MetastableState,Requisites of a LASER System, Semiconductor LASER, LASER Range Finder, LIDAR, Road Profiling, BridgeDeflection, SpeedChecker, NumericalProblems.
OpticalFiber
Principle and Construction of Optical Fibers, Acceptance angle and Numerical Aperture (NA), Expression for NA, Modes of Propagation,Attenuation and Fiber Losses, Fiber Optic Displacement Sensor, Fiber Optic Temperature Sensor, Numerical Problems

Pre requisite: Propertiesof light.
Self-learning: Total Internal Reflection.

Module-5 (8 Hours)

NaturalhazardsandSafety
Introduction, Earthquake, (general characteristics, Physics of earthquake, Richter scale of measurement and earthquakeresistant measures), Tsunami (causes for tsunami, characteristics, adverse effects, risk reduction measures, engineeringstructures to withstand tsunami), Landslide (causes such as excess rain fall, geological structure, human excavation etc.,types of land slide, adverse effects, engineering solution for landslides). Forest Fires and detection using remote sensing.Firehazardsandfireprotection,fire-proofingmaterials,firesafetyregulationsandfirefightingequipment-Preventionandsafety measures.NumericalProblems.

Pre requisite: Oscillations.
Self-learning:Richterscale.

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

CO1	**Elucidate** the concepts in oscillations, waves, elasticity and material failures
CO2	**Summarize** concepts of acoustics in buildings and explain the concepts in radiation and photometry
CO3	**Discuss** the principles photonic devices and their application relevant to civil engineering.
CO4	**Describe** the various natural hazards and safety precautions.
CO5	**Practice** working in groups to conduct experiments in physics and **perform** precise and honest measurements.

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

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Total Marks scored (test + assignments) out of 80 shall be scaled down to **30 marks**

CIE for the practical component of the IC

- On completion of every experiment/program in the laboratory, the students shall be evaluated and marks shall be

awarded on the same day. The **15 marks** are for conducting the experiment and preparation of the laboratory record, the other **05 marks shall be for the test** conducted at the end of the semester.

- The CIE marks awarded in the case of the Practical component shall be based on the continuous evaluation of the laboratory report. Each experiment report can be evaluated for 10 marks. Marks of all experiments' write-ups are added and scaled down to 15 marks.
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There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), **should have a mix of topics** under that module.

Suggested Learning Resources:

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

1. Materials Science and Engineering by R Balasubramaniam, second edition, Wiley India Pvt. Ltd. Ansari Road, Daryaganj, New Delhi-110002.
2. A Textbook of Engineering Physics by M .N. Avadhanulu, P G. Kshirsagar and T V S Arun Murthy, Eleventh edition, S Chand and Company Ltd. New Delhi-110055.
3. Engineering Physics by R. K. Gaur and S. L. Gupta, 2010 edition, Dhanpat Rai Publications Ltd., New Delhi-110002,
4. Building Science: Lighting and Accoustics, B. P. Singh and Devaraj Singh, Dhanpat Rai Publications (P) Ltc.,
5. Building Acoustics : Tor Eric Vigran, Taylor and Francis, 2008 Edition.
6. Photometry Radiometry and Measurements of Optical Losses, Micheal Bukshtab, Springer, 2nd edition.
7. Materials Science for Engineers by James F. Shackelford and Madanapalli K Muralidhara, sixth edition, Pearson Education Asia Pvt. Ltd., New Delhi.
8. Lasers and Non Linear Optics, B B Loud, New Age Internationals, 2011 edition
9. Shock waves made simple by Chintoo S Kumar, K Takayama and K P J Reddy: Willey India Pvt. Ltd, Delhi 2014.
10. An Introduction to Disaster Management, Natural Disastr & Man Made Hazards, S. Vaidyanathan, IKON Books P
11. Natural Hazards, Edward Bryant, Cambridge University, Press, 2nd Edition
12. Natural Hazards by Ramesh .P. Singh, CRC Press, Taylor and Francis group.
13. Disaster Education and Management, Rajendra Kumar Bhandari, Springer, India 2014
14. Principles of Fire Safety Engineering Understanding Fire & Fire Protection, Akhil Kumar Das, PHI Learning , II Edition.

Web links and Video Lectures (e-Resources):

Web links:

Simple Harmonic motion:https://www.youtube.com/watch?v=k2FvSzWeVxQ

Shock waves:https://physics.info/shock/

Shock waves and its applications:https://www.youtube.com/watch?v=tz_3M3v3kxk

Stress-strain curves:https://web.mit.edu/course/3/3.11/www/modules/ss.pdf

Stress curves:https://www.youtube.com/watch?v=f08Y39UiC-o

Oscillations and waves :https://openstax.org › books › college-physics-2e

Earthquakes:www.asc-india.org

Earthquakes and Hazards:http://quake.usgs.gov/tsunami

Landslide hazards:http://landslides.usgs.gov

Acoustics:https://www.youtube.com/watch?v=fHBPvMDFyO8

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

http://nptel.ac.in

https://swayam.gov.in

https://virtuallabs.merlot.org/vl_physics.html

https://phet.colorado.edu

https://www.myphysicslab.com

Laboratory Component:

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

Note: The experiments have to be classified into

a) Exercise

b) Demonstration

c) Structured Inquiry

d) Open Ended

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

List of Experiments

1. Determination of Young's modulus of the material of the given bar Uniform Bending.
2. Determination of Rigidity modulus of the Material of the wire using Torsional Pendulum.
3. Study of Forced Mechanical Oscillations and Resonance.
4. Study of the frequency response of Series & Parallel LCR circuits.
5. Determination of Fermi Energy of the given Conductor.
6. Determination of Resistivity by Four Probe Method.
7. Determination of effective spring constant of the given springs in series and parallel combinations.
8. Determination of Young's modlus of the material of the given bar Single Cantilever.
9. Determination of the the Moment of Inertia of the given irregular body using torsional pendulum.
10. Determination of Wavelength of Laser using Diffraction Grating.
11. Determination of Acceptance angle and Numerical Aperture of the given Optical Fiber.
12. Determination of the Radius of Curvature of the given Plano Convex Lens by setting Newton's Rings.
13. Step Interactive Physical Simulations.
14. Study of motion using spread Sheets
15. Application of Statistics using Spread Sheets.
16. PHET Interactive Simulations : (https://phet.colorado.edu/en/simulations/filter?subjects=physics&type=html,prototype)

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

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

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

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

Civil Engineering and Allied branches(Chemistry group)

Course Title:	Applied Chemistry for Civil Engineering stream		
Course Code:	BCHEC202 /202	CIE Marks	50
Course Type(Theory/Practical/Integrated)	Integrated	SEE Marks	50
		Total Marks	100
TeachingHours/Week(L:T:P:S)[1]	2:2:2:0	Exam Hours	03
TotalHoursofPedagogy	40hoursTheory+10to12Labslots	Credits	04

Course objectives

- Toenablestudentstoacquireknowledgeonprinciplesofchemistryforengineeringapplications.
- Todevelopanintuitiveunderstandingofchemistrybyemphasizingtherelatedbranchesofengineering.
- Toprovidestudentswithasolidfoundationinanalyticalreasoningrequiredtosolvesocietal problems.

Teaching-LearningProcess

Thesearesamplestrategies,whichteachercanusetoacceleratetheattainmentofthevariouscourseoutcomesandmakeTeaching–Learningmoreeffective

- Tutorial&remedialclassesforneedystudents(notregularT/R)
- ConductingMakeupclasses/Bridgecoursesforneedystudents
- Demonstrationofconceptseitherbybuildingmodelsorbyindustryvisit
- Experimentsinlaboratoriesshallbeexecutedinblendedmode(conventionalornon–conventionalmethods)
- UseofICT–Onlinevideos,onlinecourses
- Useofonlineplatformsforassignments/Notes/Quizzes(Ex.Googleclassroom)

Module-1:StructuralMaterials(8hr)

MetalsandAlloys: Introduction,PropertiesandapplicationofIronanditsalloys,Aluminiumanditsalloys

Cement: Introduction,composition,properties,classification,manufacturingprocessofcement, process of setting and hardening of cement, additives for cement and testing ofcement.

Refractories: Introduction, classification based on chemical composition, properties andapplicationofrefractorymaterials.

Glass: Introduction, Composition, Types, Preparation of Soda-lime glass, properties andapplicationsofglass.

Self-learning: Chemistryofreinforcedconcretefromvarioussourcesofwater(seawater, groundwater,treatedwater).

Module-2:EnergyConversionandStorage,Corrosion(8hr)

Energyconversion: Introduction,construction,working,andapplicationsofPhotovoltaiccells, methanol-oxygenfuelcell.

Storagedevices: Introduction,constructionandworkingofLi-ionbattery.

1.NOTE:Whereverthecontact hoursisnotsufficient,tutorialhourcanbeconvertedto theoryhours

Corrosion: Introduction, electrochemical corrosion of steel in concrete, types (differentialmetalandaeration),Stresscorrosionincivilstructures,corrosioncontrol(designandselectionofmaterials,galvanization, anodizationandsacrificialanodemethod).
Self-learning: Corrosioninhibitors

Module-3:WaterTechnologyandNanotechnology(8hr)

Water technology: Introduction, water parameters, hardness of water, determination oftemporary, permanent and total hardness by EDTA method, numerical problems, softeningof water by ion exchange method, desalination of water by electrodialysis, determination ofCOD,numericalproblems.Forwardosmosis: Introduction, Processandapplications.
Nanotechnology: Introduction, size dependent properties of nanomaterial (surface areaandcatalytic),Synthesisofnanomaterialbysol-gelmethodandco-precipitationmethod.
Nanomaterials: Introduction,propertiesandengineeringapplicationsofcarbonnanotubes, grapheneandnanomaterialsforwatertreatment(Metaloxide).
Self-learning: Sewagetreatment(Primary,secondaryandtertiary)

Module-4:PolymerandComposites(8hr)

Polymer: Introduction,methodsofpolymerization,molecularweightofpolymers,numerical problems. Synthesis, properties and engineering applications of polyethylene(PE)and Chloropolyvinylchloride(CPVC).
Fibers:Synthesis,propertiesandapplicationsofnylonfibers.
Polymercomposites:Introduction,propertiesandapplicationsoffiberreinforcedpolymerscomposites(FRPC),
Geopolymerconcrete:Introduction,synthesis,constituents,propertiesandapplications.
Adhesives:Introduction,propertiesandapplicationsofepoxyresin.
Biodegradablepolymers:Synthesisofpolylacticacid(PLA)andtheirapplications.
Self-learning:Biopolymer:Introduction,structuralproperties,andapplicationsofcelluloseandlignin.

Module-5:PhaseRuleandAnalyticalTechniques(8hr)

Phase rule: Introduction, Definition of terms: phase, components, degree of freedom, phaseruleequation.Phase diagram:Twocomponent-lead-silversystem.
Analytical techniques: Introduction, principle, instrumentation of potentiometric sensorsand its application in the estimation of iron, conductometric sensors and its application inthe estimation of acid mixture, pH-sensorsanditsapplicationinthedeterminationofsoilsample.
Self-learning: Chromatographictechnique,applicationofchromatography(columnand thin-layeredchromatography)intheseparationofcomponents.

PRACTICALMODULE

A–Demonstration(anytwo)offline/virtual:

A1.Synthesisofpolyurethane
A2. Quantitative estimation of Aluminium by precipitation methodA3.Synthesisofironoxidenanoparticles
A4.DeterminationofchloridecontentinthegivenwatersamplebyArgentometricmethod

B–Exercise(compulsorilyany4tobe conducted):

B1.Conductometricestimationofacidmixture
B2.PotentiometricestimationofFASusing$K_2Cr_2O_7$

B3.DeterminationofpKaofvinegarusingpHsensor(Glasselectrode)
B4.Determinationofrateofcorrosionofmildsteelbyweightlossmethod B5.Estimation oftotalhardnessofwaterbyEDTAmethod

C–StructuredEnquiry (compulsorilyany4tobeconducted):

C1. Estimation of Copper present in electroplating effluent by optical sensor (colorimetry) C2.DeterminationofViscositycoefficientoflubricant(Ostwald'sviscometer)
C3. Estimation of iron in TMT bar by diphenyl amine/external indicator methodC4.EstimationofSodiumpresentinsoil/effluentsampleusingflamephotometr y
C5.DeterminationofChemicalOxygenDemand(COD)ofindustrialwastewatersample

D–OpenEndedExperiments(anytwo):

D1. Gravimetric estimation of gypsum in Portland cementD2.Electroplatingofdesiredmetalonsubstrate
D3.Estimationofmanganesedioxideinpyrolusite
D4.Analysisofcementforits components

Courseoutcome(CourseSkillSet)

Attheendofthecourse thestudentwillbeableto:

CO1.	Identify the terms processes involved in scientific and engineering andapplications
CO2.	Explainthephenomenaofchemistrytodescribethemethodsofengineeringprocesses
CO3.	Solvefortheproblemsinchemistrythatarepertinentinengineeringapplications
CO4.	Applythebasicconceptsofchemistrytoexplainthechemicalpropertiesandprocesses
CO5.	Analyze processes associated withchemical substances in propertiesandmu ltidisciplinarysituations

AssessmentDetails(bothCIEandSEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is50%. 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). Astudentshallbedeemedtohavesatisfiedtheacademicrequirementsandearnedthecreditsallotted to each subject/ course if the student secures not less than 35% (18 Marks out of 50) in thesemester-end examination(SEE), and a minimum of 40% (40 marks out of 100) in the sum total oftheCIE(ContinuousInternalEvaluation)andSEE(SemesterEndExamination)takentogether.

ContinuousInternalEvaluation(CIE):

The CIE marks for the theory component of the IC shall be **30 marks** and for the laboratory component **20 Marks**.

CIE for the theory component of the IC

- Three Tests each of 20 Marks**;** after the completion of the syllabus of 35-40%, 65-70%, and 90-100% respectively.
- Two Assignments/two quizzes/ seminars/one field survey and report presentation/one-course project totalling 20 marks.

Total Marks scored (test + assignments) out of 80 shall be scaled down to **30 marks**

CIE for the practical component of the IC

- On completion of every experiment/program in the laboratory, the students shall be evaluated and marks shall be awarded on the same day. The **15 marks** are for conducting the experiment and preparation of the laboratory record, the other **05 marks shall be for the test** conducted at the end of the semester.

- The CIE marks awarded in the case of the Practical component shall be based on the continuous evaluation of the laboratory report. Each experiment report can be evaluated for 10 marks. Marks of all experiments' write-ups are added and scaled down to 15 marks.
- The laboratory test **(duration 03 hours)** at the end of the 15th week of the semester/after completion of all the experiments (whichever is early) shall be conducted for 50 marks and scaled down to **05 marks.**

Scaled-down marks of write-up evaluations and tests added will be CIE marks for the laboratory component of IC/IPCC for **20 marks**.

- The minimum marks to be secured in CIE to appear for SEE shall be 12 (40% of maximum marks) in the theory component and 08 (40% of maximum marks) in the practical component. The laboratory component of the IC/IPCC shall be for CIE only. However, in SEE, the questions from the laboratory component shall be included**.** The maximum of 05 questions is to be set from the practical component of IC/IPCC, the total marks of all questions should not be more than 25 marks.

The theory component of the IC shall be for both CIE and SEE.

Semester End Examination(SEE):

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

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

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

SuggestedLearningResources:

Books(TitleoftheBook/Nameoftheauthor/Nameofthepublisher/EditionandYear)

1. WileyEngineeringChemistry,WileyIndiaPvt.Ltd.NewDelhi,2013-2nd Edition.
2. EngineeringChemistry,Satyaprakash&ManishaAgrawal,KhannaBookPublishing,Delhi
3. ATextBookofEngg.Chemistry,ShashiChawla,DhanpatRai&Co.(P)Ltd.
4. EssentialsofPhysicalChemistry,Bahl&Tuli,S.ChandPublishing
5. AppliedChemistry,SunitaRattan,Kataria5.EngineeringChemistry,Baskar,Wiley
6. EngineeringChemistry–I,D.GrourKrishana,VikasPublishing
7. ATextbookofEngineeringChemistry,SSDara&Dr.SSUmare,SChand&CompanyLtd.,12th Edition,2011.
8. ATextBookofEngineeringChemistry,R.V.GadagandNityanandaShetty,I.K.International Publishinghouse.2nd Edition,2016.
9. TextBookofPolymerScience,F.W.Billmeyer,JohnWiley&Sons,4th Edition,1999.
10. NanotechnologyAChemicalApproachtoNanomaterials,G.A.Ozin&A.C.Arsenault,RSCPublishing,2005.
11. CorrosionEngineering,M.G.Fontana,N.D.Greene,McGrawHillPublications,NewYork,3rd Edition, 1996.
12. Linden'sHandbookofBatteries,KirbyW.Beard,FifthEdition,McGrawHill,2019.
13. OLEDDisplayFundamentalsandApplications,Takatoshi Tsujimura,Wiley–Blackwell,2012
14. Supercapacitors: Materials, Systems,andApplications, MaxLu, Francois Beguin,Elzbieta Frackowiak,Wiley-VCH;1st edition,2013.
15. "HandbookonElectroplatingwithManufactureofElectrochemicals",ASIAPACIFICBUSINESSPRESS Inc.,2017.Dr. H.Panda.
16. ExpandingtheVisionofSensorMaterials.NationalResearchCouncil1995,Washington,DC:TheNationalAcademies Press. doi:10.17226/4782.
17. EngineeringChemistry,EditedbyDr.MaheshBandDr.RoopashreeB,SunstarPublisher,Bengaluru,

ISBN978-93-85155-70-3, 2022.
18. HighPerformanceMetallicMaterialsforCostSensitiveApplications,F.H.Froes,etal.JohnWiley&Sons, 2010.
19. InstrumentalMethodsofAnalysis,Dr. K.R.Mahadik andDr.L.Sathiyanarayanan,NiraliPrakashan,2020.
20. PrinciplesofInstrumentalAnalysis,DouglasA.Skoog,F.JamesHoller,StanleyR.CrouchSeventhEdition,CengageLearning, 2020.
21. PolymerScience,VRGowariker,NVViswanathan,Jayadev,Sreedhar,NewageInt.Publishers,4thEdition, 2021
22. EngineeringChemistry,PCJain&MonicaJain,DhanpatRaiPublication,2015-16thEdition.
23. Nanostructuredmaterialsandnanotechnology,Hari Singh, Nalwa,academicpress, 1stEdition,2002.
24. NanotechnologyPrinciplesandPractices,SulabhaKKulkarni,CapitalPublishingCompany,3rdEdition2014
25. Principlesofnanotechnology,Phanikumar,Scitechpublications,2ndEdition,2010.
26. Chemistryfor EngineeringStudents,B.S.JaiPrakash,R.Venugopal, Sivakumaraiah&PushpaIyengar.,SubashPublications,5thEdition, 2014
27. "EngineeringChemistry",O.G.Palanna,TataMcGrawHillEducationPvt.Ltd.NewDelhi,FourthReprint,2015.
28. ChemistryofEngineeringmaterials,MaliniS,KSAnanthaRaju,CBSpublishersPvtLtd.,
29. LaboratoryManualEngg.Chemistry,AnupmaRajput,DhanpatRai&Co.

WeblinksandVideoLectures(e-Resources):

- http://libgen.rs/
- https://nptel.ac.in/downloads/122101001/
- https://nptel.ac.in/courses/104/103/104103019/
- https://ndl.iitkgp.ac.in/
- https://www.youtube.com/watch?v=faESCxAWR9k
- https://www.youtube.com/watch?v=TBqXMWaxZYM&list=PLyhmwFtznRhuz8L1bb3X-9IbHrDMjHWWh
- https://www.youtube.com/watch?v=j5Hml6KN4TI
- https://www.youtube.com/watch?v=X9GHBdyYcyo
- https://www.youtube.com/watch?v=1xWBPZnEJk8
- https://www.youtube.com/watch?v=wRAo-M8xBHM

ActivityBasedLearning(SuggestedActivitiesinClass)/PracticalBasedlearning

- https://www.vlab.co.in/broad-area-chemical-sciences
- https://demonstrations.wolfram.com/topics.php
- https://interestingengineering.com/science

COsandPOsMapping(Individualteacherhastofillup)

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

16-2-2023

Course Title:	ENGINEERING MECHANICS		
Course Code:	BCIVC103/203	CIE Marks	50
Course Type (Theory/Practical/Integrated)	Theory	SEE Marks	50
		Total Marks	100
Teaching Hours/Week (L:T:P: S)	2:2:0:0	Exam Hours	03
Total Hours of Pedagogy	25 hrs Lecture+25 hrs Tutorial = 50 hrs	Credits	03

Course objectives

- To develop students' ability to analyze the problems involving forces, moments with their applications.
- To analyse the member forces in trusses
- To make students to learn the effect of friction on different planes
- To develop the student's ability to find out the centre of gravity and moment of inertia and their applications.
- To make the students learn about kinematics and kinetics and their applications.

Teaching-Learning Process

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

1. Lecture method (L) does not mean only the traditional lecture method, but a different type of teaching method may be adopted to develop the outcomes.
2. Show Video/animation films to explain the infrastructures and the mechanism involved in the principle.
3. Encourage collaborative (Group) Learning in the class.
4. Ask at least three HOT (Higher-order Thinking) questions in the class, which promotes critical thinking.
5. Adopt Problem Based Learning (PBL), which fosters students' Analytical skills, develop thinking skills such as the ability to evaluate, generalize, and analyze information rather than simply recall it.
6. Topics will be introduced in multiple representations.
7. Show the different ways to solve the same problem and encourage the students to come up with their own creative ways to solve them.
8. Discuss how every concept can be applied to the real world - and when that's possible, it helps improve the students' understanding.
9. Individual teachers can device innovative pedagogy to improve teaching-learning.

Module-1 (10)

Resultant of coplanar force system: Basic dimensions and units, Idealisations, Classification of force system, principle of transmissibility of a force, composition of forces, resolution of a force, Free body diagrams, moment, Principle of moments, couple, Resultant of coplanar concurrent force system, Resultant of coplanar non-concurrent force system, Numerical examples.

Module-2 (10)

Equilibrium of coplanar force system: Equilibrium of coplanar concurrent force system, Lami's theorem, Equilibrium of coplanar parallel force system, types of beams, types of loadings, types of supports, Equilibrium of coplanar non-concurrent force system, support reactions of statically determinate beams subjected to various types of loads, Numerical examples.

Module-3(10)

Analysis of Trusses: Introduction, Classification of trusses, analysis of plane perfect trusses by the method of joints and method of sections, Numerical examples.

Friction: Introduction, laws of Coulomb friction, equilibrium of blocks on horizontal plane, equilibrium of blocks on inclined plane, ladder friction, wedge friction Numerical examples.

Module-4(10)

Centroid of Plane areas: Introduction,Locating the centroid of rectangle, triangle, circle, semicircle, quadrant andsector of a circle using method of integration, centroid of composite areas and simple built up sections, Numerical examples.

Moment of inertia of plane areas: Introduction, Rectangular moment of inertia, polar moment of inertia, product of inertia, radius of gyration, parallel axes theorem, perpendicular axis theorem, moment of inertia of rectangular, triangular and circular areas from the method of integration, moment of inertia of composite areas and simple built up sections,, Numerical examples.

Module-5 (10)

Kinematics:

Linear motion: Introduction, Displacement, speed, velocity, acceleration, acceleration due to gravity, Numerical examples on linear motion

Projectiles: Introduction, numerical examples on projectiles.

Kinetics: Introduction, D 'Alembert's principle of dynamic equilibrium and its application in-plane motionand connected bodies including pulleys, Numerical examples.

Course outcome (Course Skill Set)

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

CO1	Compute the resultant of a force system and resolution of a force
CO2	Comprehend the action for forces, moments, and other types of loads on rigid bodies and compute the reactive forces
CO3	Analyse the frictional resistance offered by different planes
CO4	Locate the centroid and compute the moment of inertia of sections
CO5	Analyze the bodies in motion

Assessment Details (both CIE and SEE)

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

Continuous Internal Evaluation(CIE):

Three Tests each of 20 Marks**;**

- 1st, 2nd, and 3rd tests shall be conducted after completion of the syllabus of 30-35%, 70-75%, and 90-100% of the course/s respectively.
- Assignments/Seminar/quiz/group discussion /field survey & report presentation/ course project/Skill development activities, suitably planned to attain the COs and POs for a total of 40 Marks.

  If the nature of the courses requires assignments/Seminars/Quizzes/group discussion two evaluation components shall be conducted. If course project/field survey/skill development activities etc then the evaluation method shall be one.

Total CIE marks (out of 100 marks) shall be scaled down to 50 marks

The teacher has to plan the assignments and get them completed by the students well before the closing of the term so that marks entry in the examination portal shall be done in time.Formative (Successive) Assessments include Assignments/Quizzes/Seminars/ Course projects/Field surveys/ Case studies/ Hands-on practice (experiments)/Group Discussions/ others. The Teachers shall choose the types of assessment depending on the requirement of the course and plan to attain the COs and POs. (to have a less stressed CIE, the portion of the syllabus should not be common /repeated for any of the methods of the CIE. Each method of CIE should have a different syllabus portion of the course). CIE methods /test question paper is designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.

Semester End Examination(SEE):

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

- The question paper shall be set for 100 marks. The medium of the question paper shall be English). The duration of SEE is 03 hours.
- The question paper will have 10 questions. Two questions per module. Each question is set for 20 marks.The students have to answer 5 full questions, selecting one full question from each module. The student has to answer for 100 marks and **marks scored out of 100 shall be proportionally reduced to 50 marks**.
- There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), **should have a mix of topics** under that module.

Suggested Learning Resources:

Text Books

1. Bansal R. K., Rakesh Ranjan Beohar and Ahmad Ali Khan, Basic Civil Engineering and Engineering Mechanics, 2015,Laxmi Publications.

2. Kolhapure B K, Elements of Civil Engineering and Engineering Mechanics, 2014, EBPB

Reference Books:

1. Beer F.P. and Johnston E. R., Mechanics for Engineers, Statics and Dynamics, 1987, McGraw Hill.

2. Irving H. Shames, Engineering Mechanics, 2019, Prentice-Hall.

3. Hibbler R. C., Engineering Mechanics: Principles of Statics and Dynamics, 2017, Pearson Press.

4. Timoshenko S, Young D. H., Rao J. V., Engineering Mechanics, 5th Edition, 2017, Pearson Press.

5. Bhavikatti S S, Engineering Mechanics, 2019, New Age International

6. Reddy Vijaykumar K and Suresh Kumar K, Engineering Mechanics, 2011, BS publication

Web links and Video Lectures (e-Resources):

- https://www.youtube.com/watch?v=nGfVTNfNwnk&list=PLOSWwFV98rfKXq2KBphJz95rao7q8PpwT
- https://www.youtube.com/watch?v=nkg7VNW9UCc&list=PLOSWwFV98rfKXq2KBphJz95rao7q8PpwT&index=2
- https://www.youtube.com/watch?v=ljDIIMvxeg&list=PLOSWwFV98rfKXq2KBphJz95rao7q8PpwT&index=5
- https://www.youtube.com/watch?v=VQRcChR9IkU&list=PLOSWwFV98rfKXq2KBphJz95rao7q8PpwT&index=18
- https://www.youtube.com/watch?v=3YBXteL-qY4
- https://www.youtube.com/watch?v=z95UW4wwzSc&list=PLOSWwFV98rfKXq2KBphJz95rao7q8PpwT&index=10
- https://www.youtube.com/watch?v=lheoBL2QaqU&list=PLOSWwFV98rfKXq2KBphJz95rao7q8PpwT&index=7
- https://www.youtube.com/watch?v=atoP5_DeTPE
- https://www.youtube.com/watch?v=ksmsp9OzAsI
- https://www.youtube.com/watch?v=x1ef048b3CE
- https://www.youtube.com/watch?v=l_Nck-X49qc
- https://play.google.com/store/apps/details?id=appinventor.ai_jgarc322.Resultant_Force
- https://www.youtube.com/watch?v=RIBeeW1DSZg
- https://www.youtube.com/watch?v=R8wKV0UQtlo
- https://www.youtube.com/watch?v=0RZHHgL8m_A
- https://www.youtube.com/watch?v=Bls5KnQOWkY

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

- https://www.youtube.com/watch?v=Zrc_gB1YYS0
- https://play.google.com/store/apps/details?id=vn.edu.best4u.com.bieudonoiluc
- https://www.youtube.com/watch?v=Hn_iozUo9m4
- https://play.google.com/store/apps/details?id=com.teobou
- https://www.youtube.com/watch?v=WOHRp3V-QA0

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

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

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

Note: Depending on the assessment tool used, higher order POs can be identified by the concerned course instructor.