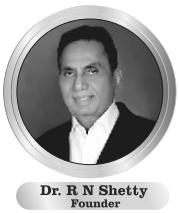
RN Shetty Trust®

RNS INSTITUTE OF TECHNOLOGY

(An autonomous Institution Affiliated to VTU, NAAC Accredited with 'A+' Grade)

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Dr. R N Shetty
Founder

Bachelor of Engineering (B.E.)

Scheme and Syllabus of I & II Semesters
(2024 Scheme)

1. B.E. in Computer Science & Engineering - CS
2. B.E. in CSE (Artificial Intelligence & Machine Learning) - CI
3. B.E. in CSE (Data Science) - CD
4. B.E. in CSE (Cyber Security) - CY
5. B.E. in Electronics & Communication Engineering - EC
6. B.E. in Electrical & Electronics Engineering - EE
7. B.E. in Mechanical Engineering - ME
8. B.E. in Civil Engineering - CV

About RNSIT

RNS Institute of Technology, familiar as RNSIT was established in the year 2001. It is the brainchild of Dr. R. N. Shetty, well known industrialist, and a great philanthropist. The institution was established with a sole purpose of imparting quality education in Engineering, Technology and Management. Being one of the premier engineering colleges in the country RNSIT is marching towards placing itself in the global map by excelling in academics, research and placements.

Lush green campus, state of the art infrastructure, well equipped laboratories, hundreds of activities, numerous new initiatives, consistent VTU ranks, path breaking placements, cultural extravaganza, Sports events, 4000 + students and 300 + faculty – with all these RNSIT has become dream destination for engineering aspirants across the country.

Founded by a great visionary Dr. R N Shetty, a renowned name in the industries viz construction, manufacturing, hotel, automobile, power & IT services, and education, RNSIT has been scripting history in the field of technical education. With 8 UG engineering branches, 2 PG courses and 11 R&D centres RNSIT is aiming towards becoming one of the premier engineering institutes in the world.

The institution has produced more than 12000 engineers, leaders and researchers who are contributing immensely to the field of technology and mankind. Our establishment takes immense pride in its accomplished alumni, scattered worldwide, occupying diverse and influential roles across the globe. May it be Army, Navy, Airforce, Public service, IT, Manufacturing Industry, Entrepreneurship, our alumni's global presence is a testame nt to the exceptional quality of education and opportunities our institution provides. Our alumni's remarkable achievements resonate across borders, embodying the impact and reach of our institution's influence.

RNSIT has a well-equipped Training and Placement Cell that enhances the employability of the students by conducting specialized training in mathematical ability, aptitude skills, analytical skills, language skills, technical skills in addition to, online placement mock test, which are key skill sets over and above the academic credentials. Special sponsored live projects from reputed industries are conducted in the college to enhance the industry exposures to the students. Apart from regular training, cell also invites reputed institutions who are in training students for CAT\GMAT\GRE\TOEFL\GATE etc,. It is our vision to establish a scenario for the smooth transition of students from academic to professional lives.

In today's University Research scenario, research integrates into 'teaching and learning' and one feeds into the other. It is extremely important for the faculty and the student community to explore ways of involving in research as an ongoing and sustainable pursuit. In this regard RNSIT research council has been established with a composition of RNSIT research faculty from across domains. With the aim of defining newer initiatives and directions towards establishing a highly dynamic research ambience on campus with well-defined outcomes, RNSIT Research Council has started the following initiatives: Undergraduate Research Forum, RNS Seed grants, Domain groups & publication incentives. The faculty team at RNSIT in collaboration with students and the industry partners, is geared up to take up challenging tasks and provide optimum solutions.

The Center of Excellence (COE) stands as a pinnacle of skill development, equipped with an array of offerings including global certifications like AWS, IBM, Google, Microsoft, UI Path, Cisco Networking Academy, Pearson Vue – IT Specialist, Intel, etc., comprehensive courses, cutting-edge

infrastructure, and a team of accomplished corporate trainers hailing from Ethnotech Academy Learning Solutions. Merging proficiency and innovation, COE has emerged as a dynamic Skill Development Lab, where knowledge is refined, and expertise is honed. The main object of COE lies in an unwavering commitment to excellence, underscored by its curated range of global certifications that provide learners with a tangible edge in today's competitive landscape. The carefully designed courses are geared to empower individuals with the practical skills demanded by industries worldwide.

There are many technical clubs like IEEE with its 14 sub-societies, IETE, CSI, Shwethashwa racing and other department clubs like V-Technohub, Google Coding Club etc. which provide a great opportunity for the students to be part of a global community and reap benefits like Scholarships, Internships, Industry interaction, participate in workshops, conferences and also networking globally.

Students also get an opportunity to participate in creative literary activities like writing both technical and non-technical articles, poetry, photography, drawing, painting etc. for their department and college magazine.

RNSIT Campus presents you a very lively environment that is so perfect to explore new dreams, ideas. The campus encourages the young minds to be creative, innovative and goal oriented. The life in canteen, playgrounds, basketball courts and hostel are filled with joy and makes their time spent memorable for life. The activities, fests, tournaments induce leadership skills and enhance the competence to work in teams. The institute has a very active NSS wing which organizes events which is very impactful to societal cause. regular Plantation of saplings, blood donation camps, vaccination drives during pandemic, visit to old age homes and distribution clothes, food packets, social awareness through walkathons, street plays, flashmobs.

Cultural activities make a campus very vibrant and RNSIT gets its energy from various cultural activities. May it be singing, dancing, acting, poetry, drawing RNSITians live their life to the fullest in these cultural extravaganzas. All these activities are coordinated through respective clubs such as Synapse and Natarang for dance, Dhwani for music, Aura for Fashion, Chiranuthana for Kannada to name a few. Enthusiasts can join these clubs through proper Auditions and interviews. Students will get a great exposure being in these clubs and emerge as competent team players.

RNSIT believes in team spirit, sportsmanship, and fitness. To cater these fundamental needs the institution encourages sports and games. The campus has huge play grounds for cricket, football, volleyball, basketball, kabaddi and for athletics. There are adequate facilities for indoor games such as table tennis and badminton. 5 state of the art indoor badminton courts are at the disposal of sports fanatics. RNS Premier League (RPL) is a star attraction in the campus and people eagerly wait for the upcoming seasons. The institution has been on winning streaks in basketball, table tennis, football and badminton tournaments held in state level. There are many students who represent VTU in inter university sports events.

ABBREVIATIONS

Sl. No.	Abbreviation	Meaning
1.	**CD**	Computer Science & Engineering – Data Science
2.	**CHE**	Chemistry
3.	**CI**	Computer Science & Engineering – Artificial Intelligence & Machine Learning
4.	**CS**	Computer Science & Engineering
5.	**CV**	Civil Engineering
6.	**CY**	Computer Science & Engineering – Cyber Security
7.	**EC**	Electronics & Communication Engineering
8.	**EE**	Electrical & Electronics Engineering
9.	**MA**	Mathematics
10.	**ME**	Mechanical Engineering
11.	**PHY**	Physics
12.	**ASC**	Applied Sciences Course
13.	**AEC/SDC**	Ability Enhancement Course/Skill Development Course
14.	**PCC**	Professional Core Course
15.	**ESC**	Engineering Science Course
16.	**PLC**	Programming Language Lab Course
17.	**ETC**	Emerging Technology Course
18.	**HSS**	Humanities and Social Sciences
19.	**CIE**	Continuous Internal Evaluation
20.	**SEE**	Semester End Examination
21.	**VTU**	Visvesvaraya Technological University
22.	**TD/BoS**	Teaching Department/Board of Studies
23.	**L:T:P**	Lecture Hours: Tutorials: Practicals (per week)

INDEX

I / II Semester			
Sl. No.	**Course Code**	**Course Title**	**Page No.**
APPLIED SCIENCE COURSES			
1.	**BMATC101**	Engineering Mathematics – I (CSE & allied branches)	22
2.	**BMATE101**	Engineering Mathematics – I (Mechanical Branch)	25
3.	**BMATM101**	Engineering Mathematics – I (EC / EE Branches)	28
4.	**BMATS101**	Engineering Mathematics – I (Civil Branch)	31
5 .	**BMATC201**	Engineering Mathematics – II (CSE & allied branches)	34
6.	**BMATE201**	Engineering Mathematics – II (EC / EE Branches)	37
7.	**BMATM201**	Engineering Mathematics – II (Mechanical Branch)	40
8.	**BMATS201**	Engineering Mathematics – II (Civil Branch)	44
9.	**BCHES102/202**	Applied Chemistry for CS stream.	47
10.	**BCHEE102/202**	Applied Chemistry for Electrical and Electronics Engineering stream	51
11.	**BCHEM102/202**	Applied Chemistry for Mechanical stream	55
12.	**BCHEC102/202**	Applied Chemistry for Civil Engineering Stream	59
13.	**BPHYS 102 / 202**	Applied Physics for Computer Science stream	63
14.	**BPHYE 102 / 202**	Applied Physics for EEE stream	67
15.	**BPHYM 102 / 202**	Applied Physics for ME stream	71
16.	**BPHYC 102 / 202**	Applied Physics for CIV Streams	75
PROFESSIONAL CORE COURSES			
17.	**BCIVC103/203**	Elements of Civil Engineering and Engineering Mechanics	80
18.	**BEEEE103/ 203**	Elements of Mechanical Engineering	83
19.	**BBEEC103/ 203**	Basic Electronics (For ECE Branch)	86
20.	**BEMEM103/203**	Elements of Electrical Engineering (For EEE Students)	90
21.	**BPOPS103/203**	Principles of Programming using C	93
COMMON PROFESSIONAL CORE COURSE			
22	**BCEDK103/203**	Computer Aided Engineering Drawing	98

		ENGINEERING SCIENCE COURSES (For Other Branch students)	
23.	**BESCK104A/204A**	Introduction to Civil Engineering	103
24.	**BESCK104B/204B**	Introduction to Electrical Engineering	106
25.	**BESCK104C/204C**	Introduction to Electronics & Communication	110
26.	**BESCK104D/204D**	Introduction to Mechanical Engineering	113
27.	**BESCK104E/204E**	Introduction to C Programming	116
		EMERGING TECHNOLOGY COURSES	
28.	**BETCK105A/205A**	Smart Materials & Systems	121
29.	**BETCK105B/205B**	Green Buildings	123
30.	**BETCK105C/205C**	Introduction to Nano Technology	126
31.	**BETC105D/205D**	Introduction to Sustainable Engineering	129
32.	**BETCK105E/205E**	Renewable Energy Sources	132
33.	**BETCK105F/205F**	Waste Management	135
34.	**BETCK105G/205G**	Emerging Applications of Biosensors	138
35.	**BETCK105H/205H**	Introduction to Internet of Things (IoT)	140
36.	**BETCK105I/205I**	Introduction to Cyber Security	143
37.	**BETCK205J/205J**	Introduction to Embedded Systems	146
38.	**BETCK105K/205K**	Digital Marketing	149
		PROGRAMMING LANGUAGE COURSES	
39.	**BPLCK105A**	Introduction to Web Programming	153
40.	**BPLCK105B**	Introduction to Python Programming	158
41.	**BPLCK105C**	Introduction to JAVA Programming	162
42.	**BPLCK105D**	Introduction to C++ Programming	165
		HUMANITIES AND SOCIAL SCIENCES COURSES	
43.	**BENGK106**	Communicative English	169
44.	**BPWSK206**	Professional Writing Skills in English	172
45.	**BICOK107/207**	Indian Constitution	175
46.	**BKSKK107/207**	Samskrutika Kannada	178
	BKBKK107/207	Balake Kannada	181
47.	**BIDTK158/258**	Innovation and Design Thinking	185
48.	**BSFHK158/258**	Scientific Foundations of Health	188

2024 FIRST YEAR SCHEME – CREDITS AND COMPONENTS

I SEMESTER: CHEMISTRY GROUP: CSE Stream													
Sl. No.	**Course Code**	**Course Title**	**TD/BoS**	**Teaching Hours/Week**				**Category**	**CIE marks**	**SEE**	**Max Marks SEE**	**Total marks**	**Credits**
				L	**T**	**P**	**Total**			**Duration (Hrs)**	**Theory**		
1	BMATS101	Engineering Mathematics – I (CSE & allied branches)	Mathematics	2	2	2	6	*ASC(IC)	50	3	50	100	4
2	BCHES102	Applied Chemistry for CS Stream	Chemistry	2	2	2	6	#ASC(IC)	50	3	50	100	4
3	BCEDK103	Computer-Aided Engineering Drawing	Mechanical department	2	0	2	4	ESC	50	3	50	100	3
4	BESCK104x	Engineering Science Course - I	Respective Engg Dept.	3	0	0	3	ESC-I	50	3	50	100	3
5	BPLCK105x	Programming Languages Course - I	Any Dept.	2	0	2	4	PLC	50	3	50	100	3
6	BENGK106	Communicative English	Humanities	1	0	0	1	AEC	50	2	50	100	1
7	BKSKK107 / BKBKK107	Samskrutika Kannada / Balake Kannada	Humanities	1	0	0	1	HSMC	50	2	50	100	1
8	BSFHK158	Scientific Foundations of Health	Any Dept.	1	0	0	1	AEC/SDC	50	2	50	100	1
	TOTAL			**14**	**4**	**8**	**26**		**400**		**400**	**800**	**20**

II SEMESTER: PHYSICS GROUP - CSE Stream (For students attended 1st semester under Chemistry Group)													
Sl. No.	**Course Code**	**Course Title**	**TD/BoS**	**Teaching Hours/Week**				**Category**	**CIE marks**	**SEE**	**Max Marks SEE**	**Total marks**	**Credits**
				L	**T**		**Total**			**Duration (Hrs)**	**Theory**		
1	BMATS201	Engineering Mathematics – II (CSE & allied branches)	Mathematics	2	2	2	6	*ASC(IC)	50	3	50	100	4
2	BPHYS202	Applied Physics for CS Stream	Physics	2	2	2	6	#ASC(IC)	50	3	50	100	4
3	BPOPS203	Principles of Programming Using C	CSE	2	0	2	4	ESC	50	3	50	100	3
4	BESCK204x	Engineering Science Course - II	Respective Engg Dept.	3	0	0	3	ESC-I	50	3	50	100	3
5	BETCK205x	Emerging Technology Course - II	Any Dept.	3	0	0	3	PLC	50	3	50	100	3
6	BPWSK206	Professional Writing Skills in English	Humanities	1	0	0	1	AEC	50	2	50	100	1
7	BICOK207	Indian Constitution	Humanities	1	0	0	1	HSMC	50	2	50	100	1
8	BIDTK258	Innovation design & Thinking	Any Dept.	1	0	0	1	AEC/SDC	50	2	50	100	1
	TOTAL			**15**	**4**	**6**	**25**		**400**		**400**	**800**	**20**

(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 & Systems	3	0	0
BESCK104B	Introduction to Electrical Engineering	3	0	0	BETCK105B	Green Buildings	3	0	0
BESCK104C	Introduction to Electronics Engineering	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 Bio Sensors	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
					BETCK105K	Digital Marketing	3	0	0
(PLC-I) Programming Languages Course - 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: BPLCK105x / BETCK105x can be taught by ANY DEPARTMENT									

1. The student must select one course from the ESC-I group.
2. CSE/ISE and allied branches Students shall opt for any one of the courses from the ESC-I group except BESCK104E-Introduction to C Programming
3. The students must opt for the courses from ESC group without repeating the course in either 1st or 2nd semester
4. The students must select one course from either ETC-I or PLC-I group.
5. If students study the subject from ETC-I in 1st semester he/she must select the course from PLC-II in the 2nd semester and vice-versa

(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 & Systems	3	0	0
BESCK204B	Introduction to Electrical Engineering	3	0	0	BETCK205B	Green Buildings	3	0	0
BESCK204C	Introduction to Electronics Engineering	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 Bio Sensors	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
					BETCK205K	Digital Marketing	3	0	0
(PLC-I) Programming Languages Course - 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 BESCK204E (Introduction to C Programming) and all courses under PLC and ETC groups: BPLCK205x / BETCK205x can be taught by ANY DEPARTMENT									

1. The student has to select one course from the ESC-II group.
2. CSE/ISE and allied branches Students shall opt for any one of the courses from the ESC-II group except, BESCK204E-Introduction to C Programming
3. The students have to opt for the courses from ESC group without repeating the course in either 1st or 2nd semester
4. The students must select one course from either ETC-II or PLC-II group.
5. 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

FIRST YEAR 2024 SCHEME – CREDITS AND COMPONENTS

I SEMESTER: PHYSICS GROUP - (EEE Stream-Branches: ECE, EEE)													
Sl. No.	Course Code	Course Title	TD/BoS	Teaching Hours/Week				Category	CIE marks	SEE	Max Marks SEE	Total marks	Credits
				L	T	P	Total			Duration (Hrs)	Theory		
1	BMATE101	Engineering Mathematics – I (EE/EC branches)	Mathematics	2	2	2	6	*ASC(IC)	50	3	50	100	4
2	BPHYE102	Applied Physics for EEE Stream	Physics	2	2	2	6	#ASC(IC)	50	3	50	100	4
3	BEEEE103/ BBEEC103	Elements of Electrical Engg. **Or** Basic Electronics for EES streams	EEE/ECE Dept.	2	2	0	4	ESC	50	3	50	100	3
4	BESCK104x	Engineering Science Course - I	Respective Engg Dept.	3	0	0	3	ESC-I	50	3	50	100	3
5	BETCK105x	Emerging Technology Course - I	Any Dept.	3	0	0	3	ETC-I	50	3	50	100	3
6	BENGK106	Communicative English	Humanities	1	0	0	1	AEC	50	2	50	100	1
7	BICOK107	Indian Constitution	Humanities	1	0	0	1	HSMC	50	2	50	100	1
8	BIDTK158	Innovation design & Thinking	Any Dept.	1	0	0	1	AEC/SDC	50	2	50	100	1
	TOTAL			**16**	**4**	**4**	**25**		**400**		**400**	**800**	**20**

II SEMESTER: CHEMISTRY GROUP - (EEE Stream-Branches: ECE, EEE)													
Sl. No.	**Course Code**	**Course Title**	**TD/BoS**	**Teaching Hours/Week**				**Category**	**CIE marks**	**SEE**	**Max Marks SEE**	**Total marks**	**Credits**
				L	**T**	**P**	**Total**			**Duration (Hrs)**	**Theory**		
1	BMATE201	Engineering Mathematics – II (EE/EC branches)	Mathematics	2	2	2	6	*ASC(IC)	50	3	50	100	4
2	BCHEE202	Applied Chemistry for EEE Stream	Chemistry	2	2	2	6	#ASC(IC)	50	3	50	100	4
3	BCEDK203	Computer-Aided Engineering Drawing	ME dept.	2	0	2	4	ESC	50	3	50	100	3
4	BESCK204x	Engineering Science Course - II	Respective Engg Dept.	3	0	0	3	ESC-II	50	3	50	100	3
5	BETCK205x	Programming Language Course - II	Any Dept.	2	0	2	4	ETC-II	50	3	50	100	3
6	BPWSK206	Professional Writing Skills in English	Humanities	1	0	0	1	AEC	50	2	50	100	1
7	BKSKK107 / BKBKK107	Samskrutika Kannada / Balake Kannada	Humanities	1	0	0	1	HSMC	50	2	50	100	1
8	BSFHK158	Scientific Foundations of Health	Any Dept.	1	0	0	1	AEC/SDC	50	2	50	100	1
	TOTAL			**14**	**4**	**8**	**26**		**400**		**400**	**800**	**20**

(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 & Systems	3	0	0
BESCK104B	Introduction to Electrical Engineering	3	0	0	BETCK105B	Green Buildings	3	0	0
BESCK104C	Introduction to Electronics Engineering	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 Bio Sensors	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
					BETCK105K	Digital Marketing	3	0	0
(PLC-I) Programming Languages Course - 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: BPLCK105x / BETCK105x can be taught by ANY DEPARTMENT									

1. The student must select one course from the ESC-I group.
2. CSE/ISE and allied branches Students shall opt for any one of the courses from the ESC-I group except BESCK104E-Introduction to C Programming
3. The students must opt for the courses from ESC group without repeating the course in either 1st or 2nd semester
4. The students must select one course from either ETC-I or PLC-I group.
5. If students study the subject from ETC-I in 1st semester he/she must select the course from PLC-II in the 2nd semester and vice-versa

(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 Smart Materials & Systems	3	0	0
BESCK204B	Introduction to Electrical Engineering	3	0	0	BETCK205B	Green Buildings	3	0	0
BESCK204C	Introduction to Electronics Engineering	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 Bio Sensors	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
					BETCK205K	Digital Marketing	3	0	0
(PLC-I) Programming Languages Course - 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 BESCK204E (Introduction to C Programming) and all courses under PLC and ETC groups: BPLCK205x / BETCK205x can be taught by ANY DEPARTMENT									

1. The student has to select one course from the ESC-II group.
2. CSE/ISE and allied branches Students shall opt for any one of the courses from the ESC-II group except, BESCK204E-Introduction to C Programming
3. The students have to opt for the courses from ESC group without repeating the course in either 1st or 2nd semester
4. The students must select one course from either ETC-II or PLC-II group.
5. 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

FIRST YEAR 2024 SCHEME – CREDITS AND COMPONENTS

I SEMESTER: PHYSICS CYCLE (ME STREAM) Branch : ME

Sl. No.	Course Code	Course Title	TD/BoS	Teaching Hours/Week				Category	CIE marks	SEE	Max Marks SEE	Total marks	Credits
				L	T	P	Total			Duration (Hrs)	Theory		
1	BMATM101	Engineering Mathematics – I (Mechanical branches)	Mathematics	2	2	2	6	*ASC(IC)	50	3	50	100	4
2	BPHYM102	Applied Physics for ME Stream	Physics	2	2	2	6	#ASC(IC)	50	3	50	100	4
3	BEMEM103	Elements of Mechanical Engineering	Mechanical	2	2	0	4	ESC	50	3	50	100	3
4	BESCK104x	Engineering Science Course - I	Respective Engg Dept.	3	0	0	3	ESC-I	50	3	50	100	3
5	BETCK105x	Engineering Technology Course - I	Any Dept.	3	0	0	3	ETC-I	50	3	50	100	3
6	BENGK106	Communicative English	Humanities	1	0	0	1	AEC	50	2	50	100	1
7	BICOK107	Indian Constitution	Humanities	1	0	0	1	HSMC	50	2	50	100	1
8	BITDK158	Innovation and Design Thinking	Any Dept.	1	0	0	1	AEC/SDC	50	2	50	100	1
		TOTAL		**16**	**4**	**4**	**25**		**400**		**400**	**800**	**20**

II SEMESTER: CHEMISTRY CYCLE (ME STREAM) Branch: ME

Sl. No.	Course Code	Course Title	TD/BoS	Teaching Hours/Week				Category	CIE marks	SEE	Max Marks SEE	Total marks	Credits
				L	T	P	Total			Duration (Hrs)	Theory		
1	BMATM201	Engineering Mathematics – II (Mechanical Branch)	Mathematics	2	2	2	6	*ASC(IC)	50	3	50	100	4
2	BCHEM202	Applied Chemistry for ME Stream	Chemistry	2	2	2	6	#ASC(IC)	50	3	50	100	4
3	BCEDK203	Computer-Aided Engineering Drawing	Mech dept.	2	0	2	4	ESC	50	3	50	100	3
4	BESCK204x	Engineering Science Course - II	Respective Engg Dept.	3	0	0	3	ESC-II	50	3	50	100	3
5	BETCK205x	Programming Language Course-II	Any Dept.	2	0	2	4	ETC-II	50	3	50	100	3
6	BPWSK206	Professional Writing Skills in English	Humanities	1	0	0	1	AEC	50	2	50	100	1
7	BKSKK207/ BKBKK207	Samskrutika Kannada / Balake Kannada	Humanities	1	0	0	1	HSMC	50	2	50	100	1
8	BSFHK258	Scientific Foundations of Health	Any Dept.	1	0	0	1	AEC/SDC	50	2	50	100	1
		TOTAL		**14**	**4**	**8**	**26**		**400**		**400**	**800**	**20**

(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 & Systems	3	0	0
BESCK104B	Introduction to Electrical Engineering	3	0	0	BETCK105B	Green Buildings	3	0	0
BESCK104C	Introduction to Electronics Engineering	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 Bio Sensors	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
					BETCK105K	Digital Marketing	3	0	0
(PLC-I) Programming Languages Course - 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: BPLCK105x / BETCK105x can be taught by ANY DEPARTMENT									

1. The student must select one course from the ESC-I group.
2. CSE/ISE and allied branches Students shall opt for any one of the courses from the ESC-I group except BESCK104E-Introduction to C Programming
3. The students must opt for the courses from ESC group without repeating the course in either 1st or 2nd semester
4. The students must select one course from either ETC-I or PLC-I group.
5. If students study the subject from ETC-I in 1st semester he/she must select the course from PLC-II in the 2nd semester and vice-versa

(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 & Systems	3	0	0
BESCK204B	Introduction to Electrical Engineering	3	0	0	BETCK205B	Green Buildings	3	0	0
BESCK204C	Introduction to Electronics Engineering	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 Bio Sensors	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
					BETCK205K	Digital Marketing	3	0	0
(PLC-I) Programming Languages Course - 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 BESCK204E (Introduction to C Programming) and all courses under PLC and ETC groups: BPLCK205x / BETCK205x can be taught by ANY DEPARTMENT									

1. The student has to select one course from the ESC-II group.
2. CSE/ISE and allied branches Students shall opt for any one of the courses from the ESC-II group except, BESCK204E-Introduction to C Programming
3. The students have to opt for the courses from ESC group without repeating the course in either 1st or 2nd semester
4. The students must select one course from either ETC-II or PLC-II group.
5. 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

FIRST YEAR 2024 SCHEME – CREDITS AND COMPONENTS

I SEMESTER: PHYSICS CYCLE (CV STREAM) Branch: CV

Sl. No.	Course Code	Course Title	TD/BoS	Teaching Hours/Week				Category	CIE marks	SEE	Max Marks SEE	Total marks	Credits
				L	T	P	Total			Duration (Hrs)	Theory		
1	BMATC101	Engineering Mathematics – I (Civil branch)	Mathematics	2	2	2	6	*ASC(IC)	50	3	50	100	4
2	BPHYC102	Applied Physics for Civil Stream	Physics	2	2	2	6	#ASC(IC)	50	3	50	100	4
3	BCIVC103	Elements of Civil Engineering and Engineering Mechanics	Civil	2	2	0	4	ESC	50	3	50	100	3
4	BESCK104x	Engineering Science Course - I	Respective Engg Dept.	3	0	0	3	ESC-I	50	3	50	100	3
5	BETCK105x	Engineering Technology Course - I	Any Dept.	3	0	0	3	ETC-I	50	3	50	100	3
6	BENGK106	Communicative English	Humanities	1	0	0	1	AEC	50	2	50	100	1
7	BICOK107	Indian Constitution	Humanities	1	0	0	1	HSMC	50	2	50	100	1
8	BITDK158	Innovation and Design Thinking	Any Dept.	1	0	0	1	AEC/SDC	50	2	50	100	1
		TOTAL		**16**	**4**	**4**	**25**		**400**		**400**	**800**	**20**

II SEMESTER: CHEMSITRY CYCLE (CV STREAM) Branch: CV

Sl. No.	Course Code	Course Title	TD/BoS	Teaching Hours/Week				Category	CIE marks	SEE	Max Marks SEE	Total marks	Credits
				L	T	P	Total			Duration (Hrs)	Theory		
1	BMATC201	Engineering Mathematics – II (Civil branch)	Mathematics	2	2	2	6	*ASC(IC)	50	3	50	100	4
2	BCHEC202	Applied Chemistry for Civil Stream	Chemistry	2	2	2	6	#ASC(IC)	50	3	50	100	4
3	BCEDK203	Computer-Aided Engineering Drawing	Mechanical department	2	0	2	4	ESC	50	3	50	100	3
4	BESCK204x	Engineering Science Course - II	Respective Engg Dept.	3	0	0	3	ESC-II	50	3	50	100	3
5	BETCK205x	Programming language Course - II	Any Dept.	2	0	2	4	ETC-II	50	3	50	100	3
6	BPWSK206	Professional Writing Skills in English	Humanities	1	0	0	1	AEC	50	2	50	100	1
7	BKSKK207/ BKBKK207	Samskrutika Kannada / Balake Kannada	Humanities	1	0	0	1	HSMC	50	2	50	100	1
8	BSFHK258	Scientific Foundations of Health	Any Dept.	1	0	0	1	AEC/SDC	50	2	50	100	1
		TOTAL		**14**	**4**	**8**	**26**		**400**		**400**	**800**	**20**

(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 & Systems	3	0	0
BESCK104B	Introduction to Electrical Engineering	3	0	0	BETCK105B	Green Buildings	3	0	0
BESCK104C	Introduction to Electronics Engineering	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 Bio Sensors	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
					BETCK105K	Digital Marketing	3	0	0
(PLC-I) Programming Languages Course - 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: BPLCK105x / BETCK105x can be taught by ANY DEPARTMENT									

1. The student must select one course from the ESC-I group.
2. CSE/ISE and allied branches Students shall opt for any one of the courses from the ESC-I group except BESCK104E-Introduction to C Programming
3. The students must opt for the courses from ESC group without repeating the course in either 1st or 2nd semester
4. The students must select one course from either ETC-I or PLC-I group.
5. If students study the subject from ETC-I in 1st semester he/she must select the course from PLC-II in the 2nd semester and vice-versa

(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 & Systems	3	0	0
BESCK204B	Introduction to Electrical Engineering	3	0	0	BETCK205B	Green Buildings	3	0	0
BESCK204B	Introduction to Electronics Engineering	3	0	0	BETCK205C	Introduction to Nano Technology	3	0	0
BESCK204C	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 Bio Sensors	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
					BETCK205K	Digital Marketing	3	0	0
(PLC-I) Programming Languages Course - 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 BESCK204E (Introduction to C Programming) and all courses under PLC and ETC groups: BPLCK205x / BETCK205x can be taught by ANY DEPARTMENT									

1. The student has to select one course from the ESC-II group.
2. CSE/ISE and allied branches Students shall opt for any one of the courses from the ESC-II group except, BESCK204E-Introduction to C Programming
3. The students have to opt for the courses from ESC group without repeating the course in either 1st or 2nd semester
4. The students must select one course from either ETC-II or PLC-II group.
5. 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

Applied Science Courses

Engineering Mathematics – I (CSE & allied branches) (BMATS101)
Engineering Mathematics – I (Mechanical Branch) (BMATM101)
Engineering Mathematics – I (EE/EC branches) (BMATE101)
Engineering Mathematics – I (Civil Branch) ((BMATC101)
Engineering Mathematics – II (CSE & allied branches) (BMATS201)
Engineering Mathematics – II (Mechanical Branch) (BMATM201)
Engineering Mathematics – II (EE/EC branches) (BMATE201)
Engineering Mathematics – II (Civil Branch) (BMATC201)

CHEMISTRY FOR CS STREAM (BCHES102/202)
CHEMISTRY FOR ELECTRIAL AND ELECTRONICS ENGINEERING STREAM (BCHEE102/202)
CHEMISTRY FOR MECHANICAL STREAM (BCHEM102/202)
CHEMISTRY FOR CIVIL ENGINEERING STREAM (BCHEC102/202)

APPLIED PHYSICS FOR CSE STREAM (BPHYS102/202)
APPLIED PHYSICS FOR EEE STREAM (BPHYE102/202)
APPLIED PHYSICS FOR ME STREAM (BPHYM102/202)
APPLIED PHYSICS FOR CV STREAM (BPHYC102/202)

B.E. (Common to all CSE streams) Outcome Based Education (OBE) and Choice Based Credit System (CBCS) SEMESTER – I			
Course Title:	**Engineering Mathematics – I (CSE & allied branches)**		
Course Code:	**BMATS101**	**CIE MARKS**	**50**
L : T : P	**2:2:2**	**SEE MARKS**	**50**
Credits:	**4**	**EXAM HOURS**	**3**
Total hours of Pedagogy	**40 hours Theory + 10 to 12 Lab slots**		

COURSE LEARNING OBJECTIVES: The purpose of the course is to facilitate the learner to:

- **Familiarize** the importance of calculus associated with one variable and two variables for engineering.
- **Analyze** engineering problems by applying statistical methods.
- **Apply** the knowledge of modular arithmetic to computer algorithms.
- **Develop** the knowledge of Linear Algebra to solve system of equations.

Module-1: Differential Calculus **(8 hours)**

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

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

Taylor's and Maclaurin's series expansion for one variable (statement only) – problems.

Partial differentiation, total derivative - differentiation of composite functions, Jacobian, Maxima and minima for a function of two variables, Method of Lagrange's undetermined multipliers. Problems

Module-3: Elementary statistics **(8 hours)**

Curve fitting by the method of least squares, in the forms, y=ax+b, y= ax^2+bx+c and y=ax^b.

Correlation, Karl Pearson's coefficient of correlation, problems. lines of regression, Angle between regression lines, rank correlation.

Module-4: Congruences and its Applications: **(8 hours)**

Finding GCD, Solving Polynomials, Introduction to Congruences, Linear Congruences, The Chinese Remainder theorem, Linear Diophantine Equation, Euler's Theorem, Wilson Theorem and Fermat's little theorem, RSA algorithm.

Module-5: Linear Algebra **(8 hours)**

Elementary row transformation of a matrix, Rank of a matrix. Consistency and Solution of a system of linear equations - Gauss-elimination method, Gauss-Jordan method and Gauss-Seidel method.
Eigenvalues and eigenvectors of a square matrix (definitions only), Rayleigh's power method to find the dominant Eigenvalue and Eigenvector.

PRACTICAL COMPONENT OF IPCC

Weekly: 1 Session (2 hours)
Batch Strength: 30-34 students
Number of Labs: 12 (10 Sessions + 1 Repetition+ 1 Lab Assessments)
Suggested software: Python/ Scilab/ Matlab

List of Laboratory Programs

1	Introduction to Python: Installation of packages, Variables, Conditional statements and looping statements.
2	2D plots of cartesian and polar curves
3	Angle between two polar curves
4	Radius of curvature of a given curve in Cartesian and polar forms.
5	Maclaurin Series
6	Partial derivatives
7	Jacobians
8	Test for consistency for system of linear equations,
9	Gauss Seidel Method
10	Rayleigh power method.

COURSE OUTCOMES:
After successfully completing 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	Make of use of correlation and regression analysis to fit a suitable mathematical model for statistical data.
CO4	Get acquainted and to apply modular arithmetic to computer algorithms.
CO5	Make use of matrix theory for solving the system of linear equations and compute eigenvalues and eigenvectors.

ASSESSMENT DETAILS (Both CIE and SEE)

Assessment Type	Maximum Marks	Minimum Passing Marks	Evaluation Details
CIE- IA Tests (A)	20	8	Average of Three Internal Assessment Tests each of 50 marks, scaled down to 20 marks.
Alternate Assessment (B)	10	4	Any one Assessment methods as per 24RNBE4.2 scaled to 10 marks.
Total CIE Theory (A+B)	**30**	**12**	**Marks of Tests and Assignments awarded for a maximum of 30.**
CIE Practical	12	5	Marks awarded for Weekly Conduction of Experiments and Submission of Laboratory records, scaled to 12 marks.
CIE Practical Test	8	3	Average of marks of Two tests, each conducted for 100 marks covering all experiments, scaled to 8.
Total CIE Practical (C)	**20**	**8**	**Marks of Experiments, Record and Test awarded for a maximum of 20 marks.**

CIE: Theory + Practical (A + B + C)	**50**	**20**	**CIE Evaluation is done for a maximum of 50 marks.**
SEE (D)	**50**	**18**	**SEE is a theory exam, conducted for 100 marks and scaled down to 50 marks. Exam duration shall be for 3 hours.**
CIE+SEE (A+B+C+D)	**100**	**40**	**Final marks shall be the sum of marks scored in Components A, B, C and D**

- The minimum marks to be secured in CIE is 20 out of allotted 50 marks to appear for SEE, with minimum 40 % scored in every component of CIE. The laboratory component of the IPCC shall be for CIE only. However, in SEE, the questions from the laboratory component shall be included in their respective modules only.

Question paper for SEE for IPCC

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

1. The question paper will have ten questions with a choice between every pair of questions set for each module. Each question is set for 20 marks.
2. 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.
3. The students have to answer 5 full questions, selecting one full question from each module.
4. Marks scored by the student shall be proportionally scaled down to 50 Marks
5. The number question papers set shall be four, of which two shall be from Internal and remaining two from external examiners.

The theory portion of the IPCC shall be for both CIE and SEE.

Suggested Learning Resources:

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

Text Books

B. S. Grewal: "Higher Engineering Mathematics", Khanna Publishers, 44th Ed., 2021.

E. Kreyszig: "Advanced Engineering Mathematics", John Wiley & Sons, 10th Ed., 2018.

Reference Books

1. **B. V. Ramana:** "Higher Engineering Mathematics" McGraw-Hill Education, 11th Ed., 2017
2. **Srimanta Pal & Subodh C. Bhunia**: "Engineering Mathematics" Oxford University Press, 3rd Ed., 2016.
3. **N.P Bali and Manish Goyal**: "A Textbook of Engineering Mathematics" Laxmi Publications, 10th Ed., 2022
4. **C. Ray Wylie, Louis C. Barrett:** "Advanced Engineering Mathematics" McGraw – Hill Book Co., New York, 6th Ed., 2017.
5. **Gupta C.B, Sing S.R and Mukesh Kumar:** "Engineering Mathematic for Semester I and II", Mc-Graw Hill Education (India) Pvt. Ltd 2015.
6. **James Stewart: "**Calculus" Cengage Publications, 7th Ed., 2019.
7. **David C Lay:** "Linear Algebra and its Applications", Pearson Publishers, 4th Ed., 2018.
8. **Gareth Williams:** "Linear Algebra with applications", Jones Bartlett Publishers Inc., 6th Ed., 2017.
9. **William Stallings:** "Cryptography and Network Security" Pearson Prentice Hall, 6th Ed., 2013.

Outcome Based Education (OBE) and Choice Based Credit System (CBCS) SEMESTER – I			
Course Title:	**Engineering Mathematics-I (Mechanical Branch)**		
Course Code:	**BMATM101**	**CIE MARKS**	**50**
L : T : P:	**2-2-2**	**SEE MARKS**	**50**
Credits:	**4**	**EXAM HOURS**	**3**
Total hours of Pedagogy	**40 hours Theory + 10 to 12 Lab slots**		

COURSE LEARNING OBJECTIVES: The purpose of the course is to facilitate the learner to:

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

Module-1: Differential Calculus	**(8 hours)**
Polar coordinates, Polar curves, angle between the radius vector and the tangent, angle between two curves. Pedal equations. Curvature and Radius of curvature - Cartesian, Parametric, Polar and Pedal forms. Problems.	
Module-2: Series expansion and Multivariable Calculus	**(8 hours)**
Taylor's and Maclaurin's series expansion for one variable (statement only) – problems. Partial differentiation, total derivative - differentiation of composite functions, Jacobian, Maxima and minima for a function of two variables, Method of Lagrange's undetermined multipliers. Problems.	
Module-3: Ordinary Differential Equations (ODEs) of First Order	**(8 hours)**
Linear and Bernoulli's differential equations. Exact and reducible to exact differential equations – Integrating factors on $\frac{1}{M}(\frac{\partial M}{\partial y}-\frac{\partial N}{\partial x})$ and $\frac{1}{N}(\frac{\partial M}{\partial y}-\frac{\partial N}{\partial x})$. Orthogonal trajectories and Newton's law of cooling - Problems. Introduction to general and singular solutions, Solvable for p only, Clairaut's equations, reducible to Clairaut's equations - Problems**.**	
Module-4: Elementary Statistics	**(8 hours)**
Curve fitting by the method of least squares in the form y=ax+b, $y=ax^2+bx+c$, $y=ax^b$. Correlation, Karl Pearson's Coefficient of correlation, Lines of regression, Angle between regression lines, Rank correlation.	
Module-5: Linear Algebra	**(8 hours)**
Elementary row transformation of a matrix, Rank of a matrix. Consistency and solution of a system of linear equations - Gauss-elimination method, Gauss-Jordan method and Gauss-Seidel method. Eigenvalues and Eigenvectors of a square matrix (definition only), Rayleigh's power method to find the dominant Eigenvalue and Eigenvector.	

PRACTICAL COMPONENT OF IPCC

Weekly: 1 Session (2 hours)
Batch Strength : 30-34 students
Number of Labs: 12 (10 Sessions + 1 Repetition+ 1 Lab Assessments)
Suggested software: Python/ Scilab/ Matlab

List of Laboratory Programs

1	Introduction to Python: Installation of packages, Variables, Conditional statements and looping statements.
2	2D plots of cartesian and polar curves
3	Angle between two polar curves

4	Radius of curvature of a given curve in Cartesian and polar forms.
5	Maclaurin Series
6	Partial derivatives
7	Jacobians
8	Test for consistency for system of linear equations,
9	Gauss Seidel Method
10	Rayleigh power method.

COURSE OUTCOMES:

After successfully completing 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	Analyse the solution of linear and nonlinear ordinary differential equations.
CO4	Make use of correlation and regression analysis to fit a suitable mathematical model for statistical data.
CO5	Make use of matrix theory for solving the system of linear equations and compute eigenvalues and eigenvectors

ASSESSMENT DETAILS (Both CIE and SEE)

Assessment Type	Maximum Marks	Minimum Passing Marks	Evaluation Details
CIE- IA Tests (A)	20	8	Average of Three Internal Assessment Tests each of 50 marks, scaled down to 20 marks.
Alternate Assessment (B)	10	4	Any one Assessment methods as per 24RNBE4.2 scaled to 10 marks.
Total CIE Theory (A+B)	**30**	**12**	**Marks of Tests and Assignments awarded for a maximum of 30.**
CIE Practical	12	5	Marks awarded for Weekly Conduction of Experiments and Submission of Laboratory records, scaled to 12 marks.
CIE Practical Test	8	3	Average of marks of Two tests, each conducted for 100 marks covering all experiments, scaled to 8.
Total CIE Practical (C)	**20**	**8**	**Marks of Experiments, Record and Test awarded for a maximum of 20 marks.**
CIE: Theory + Practical (A + B + C)	**50**	**20**	**CIE Evaluation is done for a maximum of 50 marks.**

SEE (D)	**50**	**18**	**SEE is a theory exam, conducted for 100 marks and scaled down to 50 marks. Exam duration shall be for 3 hours.**
CIE+SEE (A+B+C+D)	**100**	**40**	**Final marks shall be the sum of marks scored in Components A, B, C and D**
• The minimum marks to be secured in CIE is 20 out of allotted 50 marks to appear for SEE, with minimum 40 % scored in every component of CIE. The laboratory component of the IPCC shall be for CIE only. However, in SEE, the questions from the laboratory component shall be included in their respective modules only.			

Question paper for SEE for IPCC

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

1. The question paper will have ten questions with a choice between every pair of questions set for each module. Each question is set for 20 marks.
2. 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.
3. The students have to answer 5 full questions, selecting one full question from each module.
4. Marks scored by the student shall be proportionally scaled down to 50 Marks
5. The number question papers set shall be four, of which two shall be from Internal and remaining two from external examiners.

The theory portion of the IPCC shall be for both CIE and SEE.

Suggested Learning Resources:
Books (Title of the Book/Name of the author/Name of the publisher/Edition and Year)

Text Books

B. S. Grewal: "Higher Engineering Mathematics", Khanna Publishers, 44th Ed., 2021.
E. Kreyszig: "Advanced Engineering Mathematics", John Wiley & Sons, 10th Ed., 2018.

Reference Books

B .V. Ramana: "Higher Engineering Mathematics" McGraw-Hill Education, 11th Ed., 2017
Srimanta Pal & Subodh C. Bhunia: "Engineering Mathematics" Oxford University Press, 3rd Ed., 2016.
N.P Bali and Manish Goyal: "A Textbook of Engineering Mathematics" Laxmi Publications, 10th Ed., 2022
C. Ray Wylie, Louis C. Barrett: "Advanced Engineering Mathematics" McGraw – Hill Book Co., New York, 6th Ed., 2017.
Gupta C.B, Sing S.R and Mukesh Kumar: "Engineering Mathematic for Semester I and II", Mc-Graw Hill Education (India) Pvt. Ltd 2015.
H. K. Dass and Er. Rajnish Verma: "Higher Engineering Mathematics" S. Chand Publication, 3rd Ed., 2014.

B.E. (EC / EE BRANCH)
Outcome Based Education (OBE) and Choice Based Credit System (CBCS)
SEMESTER – I

Course Title	**Engineering Mathematics – I (EC / EE Branches)**		
Course Code	**BMATE101**	**CIE MARKS**	**50**
L : T : P	**2: 2: 2**	**SEE MARKS**	**50**
Credits	**4**	**EXAM HOURS**	**3**
Total Hours of Pedagogy	**40 hours Theory + 10 to 12 Lab slots**		

COURSE LEARNING OBJECTIVES: The objectives of the course are to facilitate the learners to

- **Familiarize** the importance of calculus associated with one variable and multivariable for Electrical and Electronics engineering.
- **Analyse** Electrical and Electronics engineering problems by applying Ordinary Differential Equations.
- **Familiarize** the important tools in Integral Calculus that are essential in Electrical and Electronics engineering.
- **Develop** the knowledge of Linear Algebra to solve the system of equations.

MODULE – 1 : Differential Calculus **(8 hours)**

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

MODULE – 2 : Series expansion and Multivariable Calculus **(8 hours)**

Taylor's and Maclaurin's series expansion for one variable (Statement only), Partial differentiation, Total derivative - differentiation of composite functions, Jacobian Maxima and minima for a function of two variables, Method of Lagrange's undetermined multipliers. Problems.

MODULE – 3 : Ordinary Differential Equations of First Order **(8 hours)**

Linear and Bernoulli's differential equations, Exact and reducible to exact differential equations - Integrating factors on $\frac{1}{M}(\frac{\partial M}{\partial y}-\frac{\partial N}{\partial x})$ and $\frac{1}{N}(\frac{\partial M}{\partial y}-\frac{\partial N}{\partial x})$. Orthogonal trajectories, L-R and C-R circuits. Problems.
Introduction to general and singular solutions, Solvable for p only, Clairaut's equations, reducible to Clairaut's equations. Problems.

MODULE – 4 : Multiple Integrals and Special functions **(8 hours)**

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.

MODULE – 5: Linear Algebra **(8 hours)**

Elementary row transformations of a matrix, Rank of a matrix. Consistency and Solution of system of linear equations - Gauss-Jordan method and Gauss-Seidel method.
Eigenvalues and Eigenvectors of a square matrix (definition only), Rayleigh's power method to find the dominant Eigenvalue and Eigenvector of a square matrix. Diagonalization of a square matrix (P^{-1}AP method)

PRACTICAL COMPONENT OF IPCC

Weekly: 1 Session (2 hours)
Batch Strength: 30-34 students
Number of Labs: 12 (10 Sessions + 1 Repetition+ 1 Lab Assessments)

Suggested software: Python / Scilab / MatLab **List of Laboratory Programs**	
1	Introduction to Python: Installation of packages, Variables, conditional statements, looping statements
2	2-D plots of cartesian and polar curves
3	Angle between 2 polar curves
4	Radius of curvature of a given curve – Cartesian and Polar forms
5	Maclaurin Series
6	Partial derivatives
7	Jacobians
8	Test for consistency of system of linear equations
9	Gauss Seidel method
10	Rayleigh power method.

COURSE OUTCOMES:
After successfully completing 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	Analyse the solution of linear and nonlinear ordinary differential equations
CO4	Apply the concept of change of order of integration and variables to evaluate multiple integrals and their usage in computing area and volume
CO5	Make use of matrix theory for solving the system of linear equations and compute eigenvalues and eigenvectors

ASSESSMENT DETAILS (Both CIE and SEE)

Assessment Type	**Maximum Marks**	**Minimum Passing Marks**	**Evaluation Details**
CIE- IA Tests (A)	20	8	Average of Three Internal Assessment Tests each of 50 marks, scaled down to 20 marks.
Alternate Assessment (B)	10	4	Any one Assessment methods as per 24RNBE4.2 scaled to 10 marks.
Total CIE Theory (A+B)	**30**	**12**	**Marks of Tests and Assignments awarded for a maximum of 30.**
CIE Practical	12	5	Marks awarded for Weekly Conduction of Experiments and Submission of Laboratory records, scaled to 12 marks.

CIE Practical Test	8	3	Average of marks of Two tests, each conducted for 100 marks covering all experiments, scaled to 8.
Total CIE Practical (C)	**20**	**8**	**Marks of Experiments, Record and Test awarded for a maximum of 20 marks.**
CIE: Theory + Practical (A + B + C)	**50**	**20**	**CIE Evaluation is done for a maximum of 50 marks.**
SEE (D)	**50**	**18**	**SEE is a theory exam, conducted for 100 marks and scaled down to 50 marks. Exam duration shall be for 3 hours.**
CIE+SEE (A+B+C+D)	**100**	**40**	**Final marks shall be the sum of marks scored in Components A, B, C and D**
• The minimum marks to be secured in CIE is 20 out of allotted 50 marks to appear for SEE, with minimum 40 % scored in every component of CIE. The laboratory component of the IPCC shall be for CIE only. However, in SEE, the questions from the laboratory component shall be included in their respective modules only.			

Question paper for SEE for IPCC

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

1. The question paper will have ten questions with a choice between every pair of questions set for each module. Each question is set for 20 marks.
2. 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.
3. The students have to answer 5 full questions, selecting one full question from each module.
4. Marks scored by the student shall be proportionally scaled down to 50 Marks
5. The number question papers set shall be four, of which two shall be from Internal and remaining two from external examiners.

The theory portion of the IPCC shall be for both CIE and SEE.

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, 44th Ed., 2021.
2. **E. Kreyszig**: "Advanced Engineering Mathematics", John Wiley & Sons, 10th Ed., 2018.

Reference Books

1. **B. V. Ramana:** "Higher Engineering Mathematics" McGraw-Hill Education, 11th Ed., 2017
2. **Srimanta Pal & Subodh C. Bhunia**: "Engineering Mathematics" Oxford University Press, 3rd Ed., 2016.
3. **N.P Bali and Manish Goyal**: "A Textbook of Engineering Mathematics" Laxmi Publications, 10th Ed., 2022
4. **C. Ray Wylie, Louis C. Barrett:** "Advanced Engineering Mathematics" McGraw – Hill Book Co., New York, 6th Ed., 2017.
5. **Gupta C.B, Sing S.R and Mukesh Kumar:** "Engineering Mathematic for Semester I and II", Mc-Graw Hill Education (India) Pvt. Ltd 2015.
6. **H. K. Dass and Er. Rajnish Verma:** "Higher Engineering Mathematics" S. Chand Publication, 3rd Ed.,

B.E. (CV BRANCH)
Outcome Based Education (OBE) and Choice Based Credit System (CBCS)
SEMESTER – I

Course Title:	**Engineering Mathematics-I (Civil Branch)**		
Course Code:	**BMATC101**	**CIE MARKS**	**50**
L : T : P:	**2-2-2**	**SEE MARKS**	**50**
Credits:	**4**	**EXAM HOURS**	**3**
Total hours of Pedagogy	**40 hours Theory + 10 to 12 Lab slots**		

COURSE LEARNING OBJECTIVES: The purpose of the course is to facilitate the learner to:

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

Module-1: Differential Calculus **(8 hours)**

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

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

Taylor's and Maclaurin's series expansion for one variable (statement only) – problems.

Partial differentiation, total derivative - differentiation of composite functions, Jacobian, Maxima and minima for a function of two variables, Method of Lagrange's undetermined multipliers. Problems

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

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

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

Module-4: Elementary Statistics **(8 hours)**

Curve fitting by the method of least squares in the form y=ax+b, y=ax^2+bx+c, y=ax^b. Correlation, Karl Pearson's Coefficient of correlation, Lines of regression, Angle between regression lines, Rank correlation .

Module-5: Linear Algebra **(8 hours)**

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

PRACTICAL COMPONENT OF IPCC

Weekly: 1 Session (2 hours)
Batch Strength: 30-34 students
Number of Labs: 12 (10 Sessions + 1 Repetition+ 1 Lab Assessments)
Suggested software: Python/ Scilab/ Matlab

List of Laboratory Programs	
1	Introduction to Python: Installation of packages, Variables, Conditional statements and looping statements.
2	2D plots of cartesian and polar curves
3	Angle between two polar curves
4	Radius of curvature of a given curve in Cartesian and polar forms.
5	Maclaurin Series
6	Partial derivatives
7	Jacobians
8	Test for consistency for system of linear equations,
9	Gauss Seidel Method
10	Rayleigh power method.

COURSE OUTCOMES:

After successfully completing 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	Analyse the solution of linear and nonlinear ordinary differential equations.
CO4	Make use of correlation and regression analysis to fit a suitable mathematical model for statistical data.
CO5	Make use of matrix theory for solving the system of linear equations and compute eigenvalues and eigenvectors

ASSESSMENT DETAILS (Both CIE and SEE)

Assessment Type	Maximum Marks	Minimum Passing Marks	Evaluation Details
CIE- IA Tests (A)	20	8	Average of Three Internal Assessment Tests each of 50 marks, scaled down to 20 marks.
Alternate Assessment (B)	10	4	Any one Assessment methods as per 24RNBE4.2 scaled to 10 marks.
Total CIE Theory (A+B)	**30**	**12**	**Marks of Tests and Assignments awarded for a maximum of 30.**
CIE Practical	12	5	Marks awarded for Weekly Conduction of Experiments and Submission of Laboratory records, scaled to 12 marks.
CIE Practical Test	8	3	Average of marks of Two tests, each conducted for 100 marks covering all experiments, scaled to 8.

Total CIE Practical (C)	**20**	**8**	**Marks of Experiments, Record and Test awarded for a maximum of 20 marks.**
CIE: Theory + Practical (A + B + C)	**50**	**20**	**CIE Evaluation is done for a maximum of 50 marks.**
SEE (D)	**50**	**18**	**SEE is a theory exam, conducted for 100 marks and scaled down to 50 marks. Exam duration shall be for 3 hours.**
CIE+SEE (A+B+C+D)	**100**	**40**	**Final marks shall be the sum of marks scored in Components A, B, C and D**

- The minimum marks to be secured in CIE is 20 out of allotted 50 marks to appear for SEE, with minimum 40 % scored in every component of CIE. The laboratory component of the IPCC shall be for CIE only. However, in SEE, the questions from the laboratory component shall be included in their respective modules only.

Question paper for SEE for IPCC

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

1. The question paper will have ten questions with a choice between every pair of questions set for each module. Each question is set for 20 marks.
2. 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.
3. The students have to answer 5 full questions, selecting one full question from each module.
4. Marks scored by the student shall be proportionally scaled down to 50 Marks
5. The number question papers set shall be four, of which two shall be from Internal and remaining two from external examiners.

The theory portion of the IPCC shall be for both CIE and SEE.

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, 44th Ed., 2021.
2. **E. Kreyszig**: "Advanced Engineering Mathematics", John Wiley & Sons, 10th Ed., 2018.

Reference Books

1. **B .V. Ramana:** "Higher Engineering Mathematics" McGraw-Hill Education, 11th Ed., 2017
2. **Srimanta Pal & Subodh C. Bhunia**: "Engineering Mathematics" Oxford University Press, 3rd Ed., 2016.
3. **N.P Bali and Manish Goyal**: "A Textbook of Engineering Mathematics" Laxmi Publications, 10th Ed., 2022
4. **C. Ray Wylie, Louis C. Barrett:** "Advanced Engineering Mathematics" McGraw – Hill Book Co., New York, 6th Ed., 2017.
5. **Gupta C.B, Sing S.R and Mukesh Kumar:** "Engineering Mathematic for Semester I and II", Mc-Graw Hill Education (India) Pvt. Ltd 2015.
6. **H. K. Dass and Er. Rajnish Verma:** "Higher Engineering Mathematics" S. Chand Publication, 3rd Ed., 2014.

B.E. (Common to all CSE streams) Outcome Based Education (OBE) and Choice Based Credit System (CBCS) SEMESTER – II			
Course Title:	**Engineering Mathematics – II (CS & allied branches)**		
Course Code:	**BMATS201**	**CIE MARKS**	**50**
L : T : P	**2:2:2**	**SEE MARKS**	**50**
Credits:	**4**	**EXAM HOURS**	**3**
Total hours of Pedagogy	**40 hours Theory + 10 to 12 Lab slots**		

COURSE LEARNING OBJECTIVES: The objectives of the course are to facilitate the learners to

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

Module-1: Vector Calculus **(8 hours)**

Scalar and vector fields. Gradient, Normal vector to the surface, Directional derivative, divergence and curl of vector fields – physical interpretation, solenoidal and irrotational vectors.
Orthogonal Curvilinear coordinates**:** Scale factors, base vectors, transformation between cartesian and curvilinear systems, Cylindrical polar coordinates, Spherical polar coordinates.

Module – 2: Vector Space and Linear Transformations **(8 hours)**

Definition and examples of vector space, subspace, linear span, linear independent and dependent sets, Basis and dimension.
Definition and examples of Linear transformations, Matrix of a linear transformation, rank-nullity theorem (without proof). Inner product space and orthogonality.

Module-3: Numerical Methods **(8 hours)**

Solution of algebraic and transcendental equations: Regula-Falsi and Newton-Raphson methods (only formulae). Problems. Finite differences, Interpolation using Newton's forward and backward difference formulae, Newton's divided difference formula and Lagrange's interpolation formula (All formulae without proof). Problems.
Numerical integration- Trapezoidal, Simpson's (1/3)rd and (3/8)th rules (without proof). Problems.

Module-4: Numerical solution of ordinary differential equations(ODEs) of the first order and first degree **(8 hours)**

Numerical solution of - Taylor's series method, Modified Eulers method, Runge-Kutta method of fourth order, and Milne's predictor-corrector method. (No derivations of formulae) Problems.

Module-5: Probability Distributions **(8 hours)**

Review of basic probability theory. Random variables (discrete and continuous), probability mass and density functions. Mathematical expectation, mean, and variance.
Binomial, Poisson, Exponential, and normal distributions - problems (derivations for mean and standard deviation for Binomial and Poisson distributions only).

PRACTICAL COMPONENT OF IPCC

Weekly: 1 Session (2 hours)
Batch Strength: 30-34 students
Number of Labs: 12 (10 Sessions + 1 Repetition+ 1 Lab Assessments)
Suggested software: Python/ Scilab / Matlab

List of Laboratory Programs

1	Gradient, divergent, curl.

2	Solenoidal and irrotational vector fields
3	Regula-Falsi and Newton-Raphson method.
4	Newton's forward and backward interpolation
5	Lagrange's interpolation
6	Numerical integration
7	Taylor's Series
8	Modified Euler's method.
9	Runge-Kutta method of fourth order
10	Milne's predictor-corrector method.

COURSE OUTCOMES:
After successfully completing the course, the student will be able to:

CO1	Understand the applications of vector calculus refer to solenoidal, and irrotational vectors. Orthogonal curvilinear coordinates.
CO2	Demonstrate the idea of Linear dependence and independence of sets in the vector space, and linear transformation.
CO3	Apply the knowledge of numerical methods in solving various physical and engineering phenomena.
CO4	Solve first-order ordinary differential equations arising in engineering problems using single-step and multi-step numerical methods.
CO5	Explain the basic concepts of probability, random variables, and probability distribution.

ASSESSMENT DETAILS (Both CIE and SEE)

Assessment Type	Maximum Marks	Minimum Passing Marks	Evaluation Details
CIE- IA Tests (A)	20	8	Average of Three Internal Assessment Tests each of 50 marks, scaled down to 20 marks.
Alternate Assessment (B)	10	4	Any one Assessment methods as per 24RNBE4.2 scaled to 10 marks.
Total CIE Theory (A+B)	**30**	**12**	**Marks of Tests and Assignments awarded for a maximum of 30.**
CIE Practical	12	5	Marks awarded for Weekly Conduction of Experiments and Submission of Laboratory records, scaled to 12 marks.
CIE Practical Test	8	3	Average of marks of Two tests, each conducted for 100 marks covering all experiments, scaled to 8.

Total CIE Practical (C)	**20**	**8**	**Marks of Experiments, Record and Test awarded for a maximum of 20 marks.**
CIE: Theory + Practical (A + B + C)	**50**	**20**	**CIE Evaluation is done for a maximum of 50 marks.**
SEE (D)	**50**	**18**	**SEE is a theory exam, conducted for 100 marks and scaled down to 50 marks. Exam duration shall be for 3 hours.**
CIE+SEE (A+B+C+D)	**100**	**40**	**Final marks shall be the sum of marks scored in Components A, B, C and D**
• The minimum marks to be secured in CIE is 20 out of allotted 50 marks to appear for SEE, with minimum 40 % scored in every component of CIE. The laboratory component of the IPCC shall be for CIE only. However, in SEE, the questions from the laboratory component shall be included in their respective modules only.			

Question paper for SEE for IPCC

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

1. The question paper will have ten questions with a choice between every pair of questions set for each module. Each question is set for 20 marks.
2. 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.
3. The students have to answer 5 full questions, selecting one full question from each module.
4. Marks scored by the student shall be proportionally scaled down to 50 Marks
5. The number question papers set shall be four, of which two shall be from Internal and remaining two from external examiners.

The theory portion of the IPCC shall be for both CIE and SEE.

Suggested Learning Resources:

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

Text Books

B. S. Grewal: "Higher Engineering Mathematics", Khanna Publishers, 44th Ed., 2021.

E. Kreyszig: "Advanced Engineering Mathematics", John Wiley & Sons, 10th Ed., 2018.

Reference Books

1. **B. V. Ramana:** "Higher Engineering Mathematics" McGraw-Hill Education, 11th Ed., 2017
2. **Srimanta Pal & Subodh C. Bhunia**: "Engineering Mathematics" Oxford University Press, 3rd Ed., 2016.
3. **N.P Bali and Manish Goyal**: "A Textbook of Engineering Mathematics" Laxmi Publications, 10th Ed., 2022
4. **C. Ray Wylie, Louis C. Barrett:** "Advanced Engineering Mathematics" McGraw – Hill Book Co., New York, 6th Ed., 2017.
5. **Gupta C.B, Sing S.R and Mukesh Kumar:** "Engineering Mathematic for Semester I and II", Mc-Graw Hill Education (India) Pvt. Ltd 2015.
6. **James Stewart: "**Calculus" Cengage Publications, 7th Ed., 2019.
7. **David C Lay:** "Linear Algebra and its Applications", Pearson Publishers, 4th Ed., 2018.
8. **Gareth Williams:** "Linear Algebra with applications", Jones Bartlett Publishers Inc., 6th Ed., 2017.
9. **William Stallings:** "Cryptography and Network Security" Pearson Prentice Hall, 6th Ed., 2013.

B.E. (ME BRANCH) Outcome Based Education (OBE) and Choice Based Credit System (CBCS) SEMESTER – II			
Course Title:	**Engineering Mathematics-II (Mechanical Branch)**		
Course Code:	**BMATM201**	**CIE MARKS**	**50**
L : T : P:	**2-2-2**	**SEE MARKS**	**50**
Credits:	**4**	**EXAM HOURS**	**3**
Total hours of Pedagogy	**40 hours Theory + 10 to 12 Lab slots**		

COURSE LEARNING OBJECTIVES: The purpose of the course is to facilitate the learner to:

- **Familiarize** the importance of Probability distribution and Vector calculus essential for mechanical engineering.
- **Analyze** Engineering problems by applying Partial Differential Equations.
- **Develop** the knowledge of solving engineering problems numerically.

Module-1: Probability Distributions **(8 hours)**

Review of basic probability theory. Random variables (discrete and continuous), probability mass and density functions. Mathematical expectation, mean and variance.
Binomial, Poisson, Exponential and normal distributions- problems (derivations for mean and standard deviation for Binomial and Poisson distributions only).

Module-2: Vector Calculus **(8 hours)**

Scalar and vector fields. Gradient, Normal vector to the surface, directional derivative, scalar potential. Divergence and curl of a vector field- physical interpretations, Solenoidal and irrotational fields, problems.
Line integrals, Surface integrals, Statement of Green's theorem and Stokes theorem.

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

Formation of PDE's by elimination of arbitrary constants and functions. Solution of non- homogeneous PDE by direct integration. Homogeneous PDEs. Solution of Lagrange's linear PDE. Derivation of one-dimensional heat equation and wave equation. Solution of one-dimensional heat equation and wave equation by the method of separation of variables.

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

Solution of algebraic and transcendental equations: Regula-Falsi and Newton-Raphson methods (only formulae). Problems. Finite differences, Interpolation using Newton's forward and backward difference formulae, Newton's divided difference formula and Lagrange's interpolation formula (All formulae without proof). Problems.
Numerical integration- Trapezoidal, Simpson's (1/3)rd and (3/8)th rules (without proof). Problems.

Module-5: Numerical Solution of Ordinary Differential Equations (ODEs) of first order and first degree (8 hours)

Taylor's series method, Modified Euler's method, Runge-Kutta method of fourth order and Milne's predictor-corrector method (No derivations of formulae). Problems.

PRACTICAL COMPONENT OF IPCC

List of Laboratory Programs **Weekly: 1 Session (2 hours)** **Batch Strength : 30-34 students** **Number of Labs: 12 (10 Sessions + 1 Repetition+ 1 Lab Assessments)** **Suggested software: Python/ Scilab / Matlab**	
1	Gradient, divergent, curl.
2	Solenoidal and irrotational vector fields

3	Regula-Falsi and Newton-Raphson method.
4	Newton's forward and backward interpolation
5	Lagrange's interpolation
6	Numerical integration
7	Taylor's Series
8	Modified Euler's method.
9	Runge-Kutta method of fourth order
10	Milne's predictor-corrector method.

COURSE OUTCOMES:

After successfully completing the course, the student will be able to:

CO1	Explain the basic concepts of probability, random variables and probability distributions.
CO2	Understand the applications of vector calculus refer to solenoidal and irrotational vectors.
CO3	Demonstrate partial differential equations and their solutions for physical interpretations
CO4	Apply the knowledge of numerical methods in solving various physical and engineering phenomena.
CO5	Solve first order ordinary differential equations arising in engineering problems using single step and multi-step numerical methods.

ASSESSMENT DETAILS (Both CIE and SEE)

Assessment Type	Maximum Marks	Minimum Passing Marks	Evaluation Details
CIE- IA Tests (A)	20	8	Average of Three Internal Assessment Tests each of 50 marks, scaled down to 20 marks.
Alternate Assessment (B)	10	4	Any one Assessment methods as per 24RNBE4.2 scaled to 10 marks.
Total CIE Theory (A+B)	**30**	**12**	**Marks of Tests and Assignments awarded for a maximum of 30.**
CIE Practical	12	5	Marks awarded for Weekly Conduction of Experiments and Submission of Laboratory records, scaled to 12 marks.
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CIE: Theory + Practical (A + B + C)	**50**	**20**	**CIE Evaluation is done for a maximum of 50 marks.**
SEE (D)	**50**	**18**	**SEE is a theory exam, conducted for 100 marks and scaled down to 50 marks. Exam duration shall be for 3 hours.**
CIE+SEE (A+B+C+D)	**100**	**40**	**Final marks shall be the sum of marks scored in Components A, B, C and D**

- The minimum marks to be secured in CIE is 20 out of allotted 50 marks to appear for SEE, with minimum 40 % scored in every component of CIE. The laboratory component of the IPCC shall be for CIE only. However, in SEE, the questions from the laboratory component shall be included in their respective modules only.

Question paper for SEE for IPCC

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

1. The question paper will have ten questions with a choice between every pair of questions set for each module. Each question is set for 20 marks.
2. 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.
3. The students have to answer 5 full questions, selecting one full question from each module.
4. Marks scored by the student shall be proportionally scaled down to 50 Marks
5. The number question papers set shall be four, of which two shall be from Internal and remaining two from external examiners.

The theory portion of the IPCC shall be for both CIE and SEE.

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, 44th Ed., 2021.

2.**E. Kreyszig**: "Advanced Engineering Mathematics", John Wiley & Sons, 10th Ed., 2018.

Reference Books

1. **B .V. Ramana:** "Higher Engineering Mathematics" McGraw-Hill Education, 11th Ed., 2017

2. **Srimanta Pal & Subodh C. Bhunia**: "Engineering Mathematics" Oxford University Press, 3rd Ed., 2016.

3.**N.P Bali and Manish Goyal**: "A Textbook of Engineering Mathematics" Laxmi Publications, 10th Ed., 2022

4.**C. Ray Wylie, Louis C. Barrett:** "Advanced Engineering Mathematics" McGraw – Hill Book Co., New York, 6th Ed., 2017.

5.**Gupta C.B, Sing S.R and Mukesh Kumar:** "Engineering Mathematic for Semester I and II",Mc-Graw Hill Education (India) Pvt. Ltd 2015.

6. **H. K. Dass and Er. Rajnish Verma:** "Higher Engineering Mathematics" S. Chand Publication, 3rd Ed., 2014.

B.E. (ECE / EEE BRANCH)
Outcome Based Education (OBE) and Choice Based Credit System (CBCS)
SEMESTER – II

Course Title	**Engineering Mathematics – II (EC / EE Branchs)**		
Course Code	**BMATE201**	**CIE MARKS**	**50**
L : T : P	**2: 2 : 2**	**SEE MARKS**	**50**
Credits	**4**	**EXAM HOURS**	**3**
Total Hours of Pedagogy	**40 hours Theory + 10 to 12 Lab slots**		

COURSE LEARNING OBJECTIVES: The objectives of the course are to facilitate the learners to
· **Familiarize** the importance of Vector calculus, Vector Space and Linear transformation for electronics and electrical engineering.
· **Have an insight** into solving ordinary differential equations by using Laplace transform techniques.
· **Develop** the knowledge of solving electronics and electrical engineering problems numerically.

MODULE – 1 : Vector Calculus **(8 hours)**

Scalar and vector fields. Gradient, Normal vector to the surface, directional derivative, divergence and curl - physical interpretation, solenoidal and irrotational vector fields. Problems.
Line integrals, Surface integrals. Applications to work are done by force and flux. Problems. Statement of Green's theorem and Stokes theorem.

MODULE – 2: Vector spaces and Linear transformation **(8 hours)**

Definition and examples of vector spaces, subspace, linear span, linearly independent and dependent sets, Basis and dimension.
Definition and examples of Linear transformations, Matrix of a linear transformation, Rank-Nullity theorem (without proof). Inner product spaces and orthogonality. Visualization using Angles and Projections - Rotation, reflection (statement only).

MODULE – 3 : Laplace Transform **(8 hours)**

Existence and Uniqueness of Laplace transform (LT), LT of elementary functions, Properties–Linearity, Scaling, shifting, division by t, LT of Periodic functions, Unit impulse function, Unit step function.
Definition and properties of Inverse Laplace Transforms, evaluation using partial fractions,
Convolution theorem (statement only) and applications to solve ordinary differential equations.

MODULE – 4: Numerical Methods **(8 hours)**

Solution of algebraic and transcendental equations - Regula-Falsi and Newton-Raphson methods (only formulae). Problems.
Finite differences, Interpolation using Newton's forward and backward difference formulae, Newton's divided difference formula and Lagrange's interpolation formula (All formulae without proof). Problems.
Numerical integration - Trapezoidal rule, Simpson's (1/3) rd and (3/8) th (without proof). Problems.

MODULE – 5 : Numerical Solution of Ordinary Differential Equations (ODEs) of first order and first degree - **(8 hours)**

Taylor's series method, Modified Euler's method, Runge-Kutta method of fourth order and Milne's predictor corrector method. (No derivations of formulae). Problems.

PRACTICAL COMPONENT OF IPCC

Weekly: 1 Session (2 hours) **Batch Strength : 30-34 students** **Number of Labs: 12 (10 Sessions + 1 Repetition+ 1 Lab Assessments)** **Suggested software:** Python / Scilab / MatLab **List of Laboratory Programs Proposed**	
1	Gradient, divergence, curl
2	Solenoidal and irrotational vector fields
3	Regula falsi method and Newton-Raphson method
4	Newton's forward and backward interpolation
5	Lagrange's interpolation
6	Numerical integration
7	Taylor's series method
8	Modified Euler's method
9	Runge Kutta Method of fourth order
10	Milne's predictor corrector method

COURSE OUTCOMES:
After successfully completing the course, the student will be able to:

CO1	Understand the applications of vector calculus refer to solenoidal, irrotational vectors, line integral and surface integral.
CO2	Demonstrate the idea of Linear dependence and independence of sets in the vector space, and linear transformation
CO3	Understand the concept of Laplace transform to solve initial value problems.
CO4	Apply the knowledge of numerical methods in solving various physical and engineering phenomena.
CO5	Solve first order ordinary differential equations arising in engineering problems using single step and multistep numerical methods.

ASSESSMENT DETAILS (Both CIE and SEE)

Assessment Type	Maximum Marks	Minimum Passing Marks	Evaluation Details
CIE- IA Tests (A)	20	8	Average of Three Internal Assessment Tests each of 50 marks, scaled down to 20 marks.

Alternate Assessment (B)	10	4	Any one Assessment methods as per 24RNBE4.2 scaled to 10 marks.
Total CIE Theory (A+B)	**30**	**12**	**Marks of Tests and Assignments awarded for a maximum of 30.**
CIE Practical	12	5	Marks awarded for Weekly Conduction of Experiments and Submission of Laboratory records, scaled to 12 marks.
CIE Practical Test	8	3	Average of marks of Two tests, each conducted for 100 marks covering all experiments, scaled to 8.
Total CIE Practical (C)	**20**	**8**	**Marks of Experiments, Record and Test awarded for a maximum of 20 marks.**
CIE: Theory + Practical (A + B + C)	**50**	**20**	**CIE Evaluation is done for a maximum of 50 marks.**
SEE (D)	**50**	**18**	**SEE is a theory exam, conducted for 100 marks and scaled down to 50 marks. Exam duration shall be for 3 hours.**
CIE+SEE (A+B+C+D)	**100**	**40**	**Final marks shall be the sum of marks scored in Components A, B, C and D**

- The minimum marks to be secured in CIE is 20 out of allotted 50 marks to appear for SEE, with minimum 40 % scored in every component of CIE. The laboratory component of the IPCC shall be for CIE only. However, in SEE, the questions from the laboratory component shall be included in their respective modules only.

Question paper for SEE for IPCC

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

1. The question paper will have ten questions with a choice between every pair of questions set for each module. Each question is set for 20 marks.
2. 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.
3. The students have to answer 5 full questions, selecting one full question from each module.
4. Marks scored by the student shall be proportionally scaled down to 50 Marks
5. The number question papers set shall be four, of which two shall be from Internal and remaining two from external examiners.

The theory portion of the IPCC shall be for both CIE and SEE.

Suggested Learning Resources:
Books (Title of the Book/Name of the author/Name of the publisher/Edition and Year)

Text Books

B. S. Grewal: "Higher Engineering Mathematics", Khanna Publishers, 44th Ed., 2021.
E. Kreyszig: "Advanced Engineering Mathematics", John Wiley & Sons, 10th Ed., 2018.

Reference Books

B. V. Ramana: "Higher Engineering Mathematics" McGraw-Hill Education, 11th Ed., 2017
Srimanta Pal & Subodh C. Bhunia: "Engineering Mathematics" Oxford University Press, 3rd Ed., 2016.
N.P Bali and Manish Goyal: "A Textbook of Engineering Mathematics" Laxmi Publications, 10th Ed., 2022
C. Ray Wylie, Louis C. Barrett: "Advanced Engineering Mathematics" McGraw – Hill Book Co., New York, 6th Ed., 2017.
Gupta C.B, Sing S.R and Mukesh Kumar: "Engineering Mathematic for Semester I and II", Mc-Graw Hill Education (India) Pvt. Ltd 2015.
H. K. Dass and Er. Rajnish Verma: "Higher Engineering Mathematics" S. Chand Publication, 3rd Ed., 2014.

B.E. (CV BRANCH) Outcome Based Education (OBE) and Choice Based Credit System(CBCS) SEMESTER – II			
Course Title:	**Engineering Mathematics-II (Civil Branch)**		
Course Code:	**BMATC201**	**CIE MARKS**	**50**
L : T : P:	**2-2-2**	**SEE MARKS**	**50**
Credits:	**4**	**EXAM HOURS**	**3**
Total hours of Pedagogy	**40 hours Theory + 10 to 12 Lab slots**		

COURSE LEARNING OBJECTIVES: The purpose of the course is to facilitate the learner to:

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

Module-1: Probability Distributions **(8 hours)**
Review of basic probability theory. Random variables (discrete and continuous), probability mass and density functions. Mathematical expectation, mean and variance. Binomial, Poisson, Exponential and normal distributions- problems (derivations for mean and standard deviation for Binomial and Poisson distributions only).
Module-2: Vector Calculus **(8 hours)**
Scalar and vector fields. Gradient, Normal vector to the surface, directional derivative, scalar potential. Divergence and curl of a vector field- physical interpretations, Solenoidal and irrotational fields, problems. Line integrals, Surface integrals, Statement of Green's theorem and Stokes theorem.
Module-3: Partial Differential Equations (PDEs) **(8 hours)**
Formation of PDE's by elimination of arbitrary constants and functions. Solution of non- homogeneous PDE by direct integration. Homogeneous PDEs. Solution of Lagrange's linear PDE. Derivation of one-dimensional heat equation and wave equation. Solution of one-dimensional heat equation and wave equation by the method of separation of variables.
Module-4: Numerical Methods **(8 hours)**
Solution of algebraic and transcendental equations: Regula-Falsi and Newton-Raphson methods (only formulae). Problems. Finite differences, Interpolation using Newton's forward and backward difference formulae, Newton's divided difference formula and Lagrange's interpolation formula (All formulae without proof). Problems. Numerical integration- Trapezoidal, Simpson's (1/3)rd and (3/8)th rules (without proof). Problems.
Module-5: Numerical Solution of Ordinary Differential Equations (ODEs) of first order and first degree **(8 hours)**
Taylor's series method, Modified Euler's method, Runge-Kutta method of fourth order and Milne's predictor-corrector method (No derivations of formulae). Problems.

PRACTICAL COMPONENT OF IPCC

List of Laboratory Programs **Weekly: 1 Session (2 hours)** **Batch Strength : 30-34 students** **Number of Labs: 12 (10 Sessions + 1 Repetition+ 1 Lab Assessments)** **Suggested software:** Python/ Scilab / Matlab	
1	Gradient, divergent, curl.
2	Solenoidal and irrotational vector fields
3	Regula-Falsi and Newton-Raphson method.
4	Newton's forward and backward interpolation
5	Lagrange's interpolation

6	Numerical integration
7	Taylor's Series
8	Modified Euler's method.
9	Runge-Kutta method of fourth order
10	Milne's predictor-corrector method.

COURSE OUTCOMES:

After successfully completing the course, the student will be able to:

CO1	Explain the basic concepts of probability, random variables and probability distributions.
CO2	Understand the applications of vector calculus refer to solenoidal and irrotational vectors.
CO3	Demonstrate partial differential equations and their solutions for physical interpretations
CO4	Apply the knowledge of numerical methods in solving various physical and engineering phenomena.
CO5	Solve first order ordinary differential equations arising in engineering problems using single step and multi-step numerical methods.

ASSESSMENT DETAILS (Both CIE and SEE)

Assessment Type	Maximum Marks	Minimum Passing Marks	Evaluation Details
CIE- IA Tests (A)	20	8	Average of Three Internal Assessment Tests each of 50 marks, scaled down to 20 marks.
Alternate Assessment (B)	10	4	Any one Assessment methods as per 24RNBE4.2 scaled to 10 marks.
Total CIE Theory (A+B)	**30**	**12**	**Marks of Tests and Assignments awarded for a maximum of 30.**
CIE Practical	12	5	Marks awarded for Weekly Conduction of Experiments and Submission of Laboratory records, scaled to 12 marks.
CIE Practical Test	8	3	Average of marks of Two tests, each conducted for 100 marks covering all experiments, scaled to 8.
Total CIE Practical (C)	**20**	**8**	**Marks of Experiments, Record and Test awarded for a maximum of 20 marks.**
CIE: Theory + Practical (A + B + C)	**50**	**20**	**CIE Evaluation is done for a maximum of 50 marks.**

SEE (D)	**50**	**18**	**SEE is a theory exam, conducted for 100 marks and scaled down to 50 marks. Exam duration shall be for 3 hours.**
CIE+SEE **(A+B+C+D)**	**100**	**40**	**Final marks shall be the sum of marks scored in Components A, B, C and D**

- The minimum marks to be secured in CIE is 20 out of allotted 50 marks to appear for SEE, with minimum 40 % scored in every component of CIE. The laboratory component of the IPCC shall be for CIE only. However, in SEE, the questions from the laboratory component shall be included in their respective modules only.

Question paper for SEE for IPCC

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

1. The question paper will have ten questions with a choice between every pair of questions set for each module. Each question is set for 20 marks.
2. 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.
3. The students have to answer 5 full questions, selecting one full question from each module.
4. Marks scored by the student shall be proportionally scaled down to 50 Marks
5. The number question papers set shall be four, of which two shall be from Internal and remaining two from external examiners.

The theory portion of the IPCC shall be for both CIE and SEE.

Suggested Learning Resources:
Books (Title of the Book/Name of the author/Name of the publisher/Edition and Year)

Text Books

B. S. Grewal: "Higher Engineering Mathematics", Khanna Publishers, 44th Ed., 2021.

E. Kreyszig: "Advanced Engineering Mathematics", John Wiley & Sons, 10th Ed., 2018.

Reference Books

B .V. Ramana: "Higher Engineering Mathematics" McGraw-Hill Education, 11th Ed., 2017

Srimanta Pal & Subodh C. Bhunia: "Engineering Mathematics" Oxford University Press, 3rd Ed., 2016.

N.P Bali and Manish Goyal: "A Textbook of Engineering Mathematics" Laxmi Publications, 10th Ed., 2022

C. Ray Wylie, Louis C. Barrett: "Advanced Engineering Mathematics" McGraw – Hill Book Co., New York, 6th Ed., 2017.

Gupta C.B, Sing S.R and Mukesh Kumar: "Engineering Mathematic for Semester I and II", Mc-Graw Hill Education (India) Pvt. Ltd 2015.

H. K. Dass and Er. Rajnish Verma: "Higher Engineering Mathematics" S. Chand Publication, 3rd Ed., 2014.

B.E. (Common to All Branches) Outcome Based Education (OBE) and Choice Based Credit System (CBCS) SEMESTER – I / II			
Course Title:	**Applied Chemistry (CSE & allied branches)**		
Course Code:	**BCHES102/202**	**CIE MARKS**	**50 Marks**
L: T: P:	**2:2:2**	**SEE MARKS**	**50 Marks**
Credits:	**4**	**EXAM HOURS**	**3**
Total hours of Pedagogy	**40 hrs + 10 (Lab Slots of 2hr each)**		

COURSE LEARNING OBJECTIVES: The purpose of the course is to facilitate the learner to:

- To enable students to acquire knowledge on principles of chemistry for engineering applications.
- To develop an intuitive understanding of chemistry by emphasizing the related branches of engineering.
- To provide students with a solid foundation in analytical reasoning required to solve societal problems.

MODULE-1 ELECTROCHEMISTRY AND ENERGY STORAGE SYSTEMS (8 hrs)

ELECTROCHEMISTRY: Basic concepts of electrochemistry, Derivation of Nernst equation for Single Electrode Potential and Numerical problems. Types of electrodes. Reference electrodes- Introduction, Construction, working and applications of Calomel Electrode. Concentration cell– Definition, Construction, Working and Numerical problems. Ion selective electrode – definition, construction, working and applications of glass electrode. Determination of pH using glass electrode.

ENERGY STORAGE SYSTEMS: Introduction, Classification of batteries with examples. Construction, Working and Applications of Modern Batteries: Li-Ion battery, Na-Ion battery, Vanadium redox flow battery.

MODULE – 2 CORROSION AND ENERGY CONVERSION (8 hrs)

CORROSION: Introduction, Electrochemical theory of corrosion, Types of corrosion: Differential Metal, Differential Aeration (Ex: Pitting and Waterline Corrosion). Corrosion control- Galvanization, Anodization and Sacrificial Anode Method. Corrosion Penetration Rate (CPR) – Introduction, formula and Numerical problems.

GREEN FUELS: Green hydrogen, Properties and production by alkaline electrolysis, Solar Photovoltaic cells – Introduction, Construction, Working, Applications and its advantages. Quantum Dot Sensitized Solar Cells (QDSSC's). Principle, Properties and Applications.

FUEL CELLS: Introduction, Construction, Working and Applications of Methanol–Oxygen fuel cell.

MODULE – 3 POLYMER AND E-WASTE MANAGEMENT (8 hrs)

POLYMERS: Introduction, Molecular weight - Number average, Weight average Molecular mass and Numerical problems. Conducting polymers – Synthesis, Conducting Mechanism of Polyacetylene and its applications. Synthesis, Properties and Commercial applications of Graphene oxide.

Polymer composites: Synthesis, properties and applications of Kevlar.

E-WASTE: Introduction, Sources and Composition of E-waste and need for E-waste management, toxic materials used in manufacturing electronic and electrical products, Effects of E-waste on environment and human health. Methods of Disposal, Recycling & Recovery, Hydrometallurgical extraction. Extraction of Gold and Copper from E-waste. Role of stakeholders in the environmental management of E-waste.

MODULE – 4 SENSORS AND ANALYTICAL TECHNIQUES (8 hrs)

SENSORS: Introduction - Definition and terminologies of Transducer, Actuators and Sensors. Working principle and Applications of Electrochemical Sensor. Electrochemical Sensor for the measurement of Dissolved Oxygen (DO), and SO_x - NO_x gas.

Disposable Sensors (DS); Definition, advantages of DS over Classical sensors. Detection of biomolecules; Example-Ascorbic acid (AA), Pesticides; example-Glyphosate.

INSTRUMENTAL METHODS OF ANALYSIS: Theory, Instrumentation and applications of Colorimetry, Potentiometry, Conductometry (Strong acid with a strong base, weak acid with a strong base, mixture of strong acid and a weak acid with a strong base).

MODULE – 5 MATERIALS FOR MEMORY AND DISPLAY SYSTEMS (8 hrs)

MEMORY DEVICES: Introduction, Basic concepts of electronic memory, Classification of electronic memory devices (Transistor-Type, Capacitor-Type, Resistor-Type and Charge transfer type Electronic Memory devices) types of organic memory devices; Organic molecules (p-type semiconductor–ex., Pentacene; n-type ex., Perfluoropentacene used as memory materials) types of organic memory devices; polymeric material (Polyimide as an example with Donor-Triphenylamine; Acceptor–phthalimide).

DISPLAY SYSTEMS: Photoactive and electroactive materials - Definition and principle for photoactive and electroactive. Optoelectronic devices: Definition, working principle. Classification of LC working principle of LED Organic Light Emitting Diodes (OLED's) and Quantum Light Emitting Diodes (QLED's) – Mention any four Properties and applications.

PRACTICAL COMPONENT OF IPCC *(May cover all / major modules)*

Experiments (10-12 Lab slots)

A– Demonstration (any two) offline/virtual:

A1. Synthesis of polyurethane
A2. Determination of strength of an acid in Pb-acid battery
A3. Synthesis of iron oxide nanoparticles
A4. Electroplating of copper on metallic objects

B–Exercise (compulsorily any 4 to be conducted):

B1. Conductometric estimation of acid mixture
B2. Potentiometric estimation of FAS using K2Cr2O7
B3. Determination of pKa of vinegar using pH sensor (Glass electrode)
B4. Determination of rate of corrosion of mild steel by weight loss method
B5. Estimation of total hardness of water by EDTA method

C–Structured Enquiry (compulsorily any 4 to be conducted):

C1. Estimation of Copper present in electroplating effluent by optical sensor (colorimetry)
C2. Determination of Viscosity coefficient of lubricant (Ostwald's viscometer)
C3. Estimation of iron in TMT bar by diphenyl amine/external indicator method.
C4. Estimation of Sodium present in soil/effluent sample using flame photometry
C5. Determination of Chemical Oxygen Demand (COD)of industrial waste water sample

D– Open Ended Experiments (any two):

D1. Estimation of metal in e-waste by optical sensors
D2. Electroless plating of Nickle on Copper
D3. Determination of glucose by electrochemical sensors
D4. Synthesis of polyaniline and its conductivity measurement.

COURSE OUTCOMES:
After successfully completing the course, the student will be able to:

CO1	Identify the terms processes involved in scientific and engineering and applications
CO2	Explain the phenomena a of chemistry to describe the methods of engineering processes
CO3	Solve the problems in chemistry that are pertinent in engineering applications
CO4	Apply the basic concepts of chemistry to explain the chemical properties and processes
CO5	Analyse the properties and processes associated with chemical substances in multi-disciplinary approach

ASSESSMENT DETAILS (Both CIE and SEE)

The detailed split up of CIE and SEE for 4-Credit Lab Integrated Theory Courses (IPCC)

Assessment Type	Maximum Marks	Minimum Passing Marks	Evaluation Details
CIE- IA Tests (A)	20	8	Average of Three Internal Assessment Tests each of 50 marks, scaled down to 20 marks.
Alternate Assessment (B)	10	4	Any one Assessment methods as per 24RNBE4.2 scaled to 10 marks.
Total CIE Theory (A+B)	**30**	**12**	**Marks of Tests and Assignments awarded for a maximum of 30.**
CIE Practical	12	5	Marks awarded for Weekly Conduction of Experiments and Submission of Laboratory records, scaled to 12 marks.
CIE Practical Test	8	3	Average of marks of Two tests, each conducted for 100 marks covering all experiments, scaled to 8.
Total CIE Practical (C)	**20**	**8**	**Marks of Experiments, Record and Test awarded for a maximum of 20 marks.**
CIE: Theory + Practical (A + B + C)	**50**	**20**	**CIE Evaluation is done for a maximum of 50 marks.**
SEE (D)	**50**	**18**	**SEE is a theory exam, conducted for 100 marks and scaled down to 50 marks. Exam duration shall be for 3 hours.**
CIE+SEE (A+B+C+D)	**100**	**40**	**Final marks shall be the sum of marks scored in Components A, B, C and D**
• The minimum marks to be secured in CIE is 20 out of allotted 50 marks to appear for SEE, with minimum 40 % scored in every component of CIE. The laboratory component of the IPCC shall be for CIE only. However, in SEE, the questions from the laboratory component shall be included in their respective modules only.			

Question paper for SEE for IPCC

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

1. The question paper will have ten questions with a choice between every pair of questions set for each module. Each question is set for 20 marks.
2. 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.
3. The students have to answer 5 full questions, selecting one full question from each module.
4. Marks scored by the student shall be proportionally scaled down to 50 Marks
5. The number question papers set shall be four, of which two shall be from Internal and remaining two from external examiners.

The theory portion of the IPCC shall be for both CIE and SEE.

Suggested Learning Resources:

Text Books

1. A Text Book of Engineering Chemistry, R.V. Gadag and Nityananda Shetty, I.K. International Publishing house, latest Edition.
2. Chemistry for engineering students for 1st BE, B S Jai Prakash, R Venugopal, Pushpa Iyengar, Subhash Publications, New Edition 2018.
3. Wiley Engineering Chemistry, Wiley India Pvt. Ltd. New Delhi, 2013- 2nd Edition.
4. Polymer Science, V R Gowariker, N V Viswanathan, Jayadev, Sreedhar, New age Int. Publishers,4th Edition, 2021

Reference Books:

1. Corrosion Engineering, M. G. Fontana, N. D. Greene, McGraw Hill Publications, New York, 3rd Edition, 1996.
2. Linden's Handbook of Batteries, Kirby W. Beard, Fifth Edition, McGraw Hill, 2019.
3. Laboratory Manual Engg. Chemistry, Anupma Rajput, Dhanpat Rai & Co.
4. Nanotechnology A Chemical Approach to Nanomaterials, G. A. Ozan & A. C. Arsenault, RSC Publishing,2005.

B.E. (Common to EEE/ECE) Outcome Based Education (OBE) and Choice Based Credit System (CBCS) SEMESTER – I / II			
Course Title:	**Applied Chemistry (EEE & allied branches)**		
Course Code:	**BCHEE102/202**	**CIE MARKS**	**50**
L: T: P	**2:2:2**	**SEE MARKS**	**50**
Credits:	**04**	**EXAM HOURS**	**03**
Total hours of Pedagogy	**40 hours Theory + 10 to 12 Lab slots(Lab Slots of 2hr each)**		

COURSE LEARNING OBJECTIVES: The purpose of the course is to facilitate the learner to:

- To enable students to acquire knowledge on principles of chemistry for engineering applications.
- To develop an intuitive understanding of chemistry by emphasizing the related branches of engineering.
- To provide students with a solid foundation in analytical reasoning required to solve societal problems.

MODULE-1 ELECTROCHEMISTRY AND ENERGY STORAGE SYSTEMS (8 hrs)

ELECTROCHEMISTRY: Basic concepts of electrochemistry, Derivation of Nernst equation for Single Electrode Potential and Numerical problems. Types of electrodes. Reference electrodes- Introduction, Construction, working and applications of Calomel Electrode. Concentration cell– Definition, Construction, Working and Numerical problems. Ion selective electrode – definition, construction, working and applications of glass electrode. Determination of pH using glass electrode.

ENERGY STORAGE SYSTEMS: Introduction, Classification of batteries with examples. Construction, Working and Applications of Modern Batteries: Li-Ion battery, Na-Ion battery, Vanadium redox flow battery.

MODULE – 2 CORROSION AND ENERGY CONVERSION (8 hrs)

CORROSION: Introduction, Electrochemical theory of corrosion, Types of corrosion: Differential Metal, Differential Aeration (Ex: Pitting and Waterline Corrosion). Corrosion control- Galvanization, Anodization and Sacrificial Anode Method. Corrosion Penetration Rate (CPR) – Introduction, formula and Numerical problems.

GREEN FUELS: Green hydrogen, Properties and production by alkaline electrolysis, Solar Photovoltaic cells – Introduction, Construction, Working, Applications and its advantages. Quantum Dot Sensitized Solar Cells (QDSSC's). Principle, Properties and Applications.
FUEL CELLS: Introduction, Construction, Working and Applications of Methanol–Oxygen fuel cell.

MODULE – 3 POLYMER AND E-WASTE MANAGEMENT (8 hrs)

POLYMERS: Introduction, Molecular weight - Number average, Weight average Molecular mass and Numerical problems. Conducting polymers – Synthesis, Conducting Mechanism of Polyacetylene and its applications. Synthesis, Properties and Commercial applications of Graphene oxide.
POLYMER COMPOSITES: Synthesis, properties and applications of Kevlar.

E-WASTE: Introduction, Sources and Composition of E-waste and need for E-waste management, toxic materials used in manufacturing electronic and electrical products, Effects of E-waste on environment and human health. Methods of Disposal, Recycling & Recovery, Hydrometallurgical extraction. Extraction of Gold and Copper from E-waste. Role of stakeholders in the environmental management of E-waste.

MODULE – 4 CHEMISTRY OF ELECTRONIC MATERIALS (8 hrs)

CONDUCTORS, SEMICONDUCTORS AND INSULATORS: Introduction, Principle with examples.

SEMICONDUCTING MATERIALS: Introduction, production of Solar grade silicon, electronic grade silicon Czochralski process (CZ) and Float Zone (FZ) methods.
DISPLAY SYSTEMS: Introduction, Liquid crystals (LCD)-Introduction, Classification, Properties and Application. Working principle of Light Emitting Diode, Organic Light Emitting Diodes (OLED) and Quantum Light Emitting Diodes (QLED), Properties, Application of OLED and QLED.

MODULE – 5 NANOMATERIALS, SENSOR AND ANALYTICAL TECHNIQUES (8 hrs)

NANOMATERIALS: Introduction, Size Dependent Properties of Nanomaterials (Surface Area, Catalytic, Electrical), Preparation of Nanomaterials by Sol-Gel Method, Hydrothermal Process And Chemical Vapor Deposition Method. Carbon Nanomaterials: Types, properties, and applications of CNT.
SENSORS: Introduction, Terminology, Working Principle and Application of Electrochemical sensors & Conductometric sensors.
ANALYTICAL TECHNIQUES: Introduction, Principle and Instrumentation of Colorimetric sensors; its application in the estimation of copper, Principle and Instrumentation of Potentiometric sensors.

PRACTICAL COMPONENT OF IPCC *(May cover all / major modules)*

Experiments (10-12 Lab slots)

A– Demonstration (any two) offline/virtual:
A1. Synthesis of polyurethane
A2. Determination of strength of an acid in Pb-acid battery
A3. Synthesis of iron oxide nanoparticles
A4. Electroplating of copper on metallic objects

B–Exercise (compulsorily any 4 to be conducted):
B1. Conductometric estimation of acid mixture
B2. Potentiometric estimation of FAS using K2Cr2O7
B3. Determination of pKa of vinegar using pH sensor (Glass electrode)
B4. Determination of rate of corrosion of mild steel by weight loss method
B5. Estimation of total hardness of water by EDTA method

C–Structured Enquiry (compulsorily any 4 to be conducted):
C1. Estimation of Copper present in electroplating effluent by optical sensor (colorimetry)
C2. Determination of Viscosity coefficient of lubricant (Ostwald's viscometer)
C3. Estimation of iron in TMT bar by diphenyl amine/external indicator method.
C4. Estimation of Sodium present in soil/effluent sample using flame photometry
C5. Determination of Chemical Oxygen Demand (COD)of industrial waste water sample

D– Open Ended Experiments (any two):
D1. Estimation of metal in e-waste by optical sensors
D2. Electroless plating of Nickle on Copper
D3. Determination of glucose by electrochemical sensors
D4. Synthesis of polyaniline and its conductivity measurement.

COURSE OUTCOMES:
After successfully completing the course, the student will be able to:

CO1	Outline the processes involved in science, engineering, and applications.
CO2	Explain the phenomena a of chemistry to describe the methods of engineering processes.
CO3	Solve the problems in chemistry that are pertinent in engineering applications.
CO4	Applythebasicconceptsofchemistrytoexplainthechemicalpropertiesandprocesses.

CO5	Analyse the properties and processes associated with chemical substances in multi-disciplinary approach

ASSESSMENT DETAILS (Both CIE and SEE)

The detailed split up of CIE and SEE for 4-Credit Lab Integrated Theory Courses (IPCC)

Assessment Type	Maximum Marks	Minimum Passing Marks	Evaluation Details
CIE- IA Tests (A)	20	8	Average of Three Internal Assessment Tests each of 50 marks, scaled down to 20 marks.
Alternate Assessment (B)	10	4	Any one Assessment methods as per 24RNBE4.2 scaled to 10 marks.
Total CIE Theory (A+B)	**30**	**12**	**Marks of Tests and Assignments awarded for a maximum of 30.**
CIE Practical	12	5	Marks awarded for Weekly Conduction of Experiments and Submission of Laboratory records, scaled to 12 marks.
CIE Practical Test	8	3	Average of marks of Two tests, each conducted for 100 marks covering all experiments, scaled to 8.
Total CIE Practical (C)	**20**	**8**	**Marks of Experiments, Record and Test awarded for a maximum of 20 marks.**
CIE: Theory + Practical (A + B + C)	**50**	**20**	**CIE Evaluation is done for a maximum of 50 marks.**
SEE (D)	**50**	**18**	**SEE is a theory exam, conducted for 100 marks and scaled down to 50 marks. Exam duration shall be for 3 hours.**
CIE+SEE (A+B+C+D)	**100**	**40**	**Final marks shall be the sum of marks scored in Components A, B, C and D**
• The minimum marks to be secured in CIE is 20 out of allotted 50 marks to appear for SEE, with minimum 40 % scored in every component of CIE. The laboratory component of the IPCC shall be for CIE only. However, in SEE, the questions from the laboratory component shall be included in their respective modules only.			

Question paper for SEE for IPCC

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

1. The question paper will have ten questions with a choice between every pair of questions set for each module. Each question is set for 20 marks.
2. 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.
3. The students have to answer 5 full questions, selecting one full question from each module.
4. Marks scored by the student shall be proportionally scaled down to 50 Marks
5. The number question papers set shall be four, of which two shall be from Internal and remaining two from external examiners.

The theory portion of the IPCC shall be for both CIE and SEE.

Suggested Learning Resources:

Text Books

1. A Text Book of Engineering Chemistry, R.V. Gadag and Nityananda Shetty, I.K. International Publishing house, latest Edition.
2. Chemistry for engineering students for 1st BE, B S Jai Prakash, R Venugopal, Pushpa Iyengar, Subhash Publications, New Edition 2018.
3. Wiley Engineering Chemistry, Wiley India Pvt. Ltd. New Delhi, 2013- 2nd Edition.
4. Polymer Science, V R Gowariker, N V Viswanathan, Jayadev, Sreedhar, New age Int. Publishers,4th Edition, 2021

Reference Books:

1. Corrosion Engineering, M. G. Fontana, N. D. Greene, McGraw Hill Publications, New York, 3rd Edition, 1996.
2. Linden's Handbook of Batteries, Kirby W. Beard, Fifth Edition, McGraw Hill, 2019.
3. Laboratory Manual Engg. Chemistry, Anupama Rajput, Dhanpat Rai & Co.
4. Nanotechnology A Chemical Approach to Nanomaterials, G. A. Ozan & A. C. Arsenault, RSC Publishing,2005.

B.E. (for Mechanical and allied branches) Outcome Based Education (OBE) and Choice Based Credit System (CBCS) SEMESTER – I / II			
Course Title:	**Applied Chemistry (ME branch)**		
Course Code:	**BCHEM102/202**	**CIE MARKS**	**50**
L: T: P:	**2:2:2 40 hrs + 10 (Lab Slots of 2hr each)**	**SEE MARKS**	**50**
Credits:	**04**	**EXAM HOURS**	**03**
Total hours of Pedagogy	**40 hours Theory + 10 to 12 Lab slots**		

COURSE LEARNING OBJECTIVES: The purpose of the course is to facilitate the learner to:

- To enable students to acquire knowledge on principles of chemistry for engineering applications.
- To develop an intuitive understanding of chemistry by emphasizing the related branches of engineering.
- To provide students with a solid foundation in analytical reasoning required to solve societal problems

MODULE-1 ELECTROCHEMISTRY AND ENERGY STORAGE SYSTEMS (8 hrs)

ELECTROCHEMISTRY: Basic concepts of electrochemistry, Derivation of Nernst equation for Single Electrode Potential and Numerical problems. Types of electrodes. Reference electrodes- Introduction, Construction, working and applications of Calomel Electrode. Concentration cell– Definition, Construction, Working and Numerical problems. Ion selective electrode – definition, construction, working and applications of glass electrode. Determination of pH using glass electrode.

ENERGY STORAGE SYSTEMS: Introduction, Classification of batteries with examples. Construction, Working and Applications of Modern Batteries: Li-Ion battery, Na-Ion battery, Vanadium redox flow battery.

MODULE – 2 CORROSION AND ENERGY CONVERSION (8 hrs)

CORROSION: Introduction, Electrochemical theory of corrosion, Types of corrosion: Differential Metal, Differential Aeration (Ex: Pitting and Waterline Corrosion). Corrosion control- Galvanization, Anodization and Sacrificial Anode Method. Corrosion Penetration Rate (CPR) – Introduction, formula and Numerical problems.

GREEN FUELS: Green hydrogen, Properties and production by alkaline electrolysis, Solar Photovoltaic cells – Introduction, Construction, Working, Applications and its advantages. Quantum Dot Sensitized Solar Cells (QDSSC's). Principle, Properties and Applications.

FUEL CELLS: Introduction, Construction, Working and Applications of Methanol–Oxygen fuel cell.

MODULE –3 POLYMERS FOR ENGINEERING APPLICATIONS (8 hrs)

POLYMER: Introduction, methods of polymerization, molecular weight of polymers, numerical problems. Synthesis, properties and engineering applications of polyethylene (PE), PMMA, Teflon and Chloro poly vinyl chloride (CPVC).

FIBERS: Synthesis, properties and applications of Kevlar.

POLYMER COMPOSITES: Introduction, properties and applications of fibre reinforced polymers composites (FRPC),

GEO POLYMER CONCRETE: Introduction, synthesis, constituents, properties and applications.

ADHESIVES: Introduction, Synthesis, properties and applications of epoxy resin.

BIODEGRADABLE POLYMERS: Introduction, Synthesis of polylactic acid (PLA), Properties and their applications.

MODULE 4: E-WASTE MANAGEMENT AND ANALYTICAL TECHNIQUES (8hrs)

E-WASTE MANAGEMENT: Introduction, Sources, Types, Effects of E-waste on Environment and Human Health, Methods of Disposal, Advantages of Recycling. Extraction of Copper and Gold from E-Waste.

ANALYTICAL TECHNIQUES: Introduction, Principle, Instrumentation of Potentiometric Sensors; its Application in the Estimation of Iron, Conductometric Sensor: Its Application in the Estimation Of Weak Acid, Optical Sensors (Colorimetry); Its Application in the Estimation of the Copper, pH-Sensor (Glass Electrode); Its Application in the determination of pH of Beverages.

MODULE 5: PHASE RULE AND STRUCTURAL MATERIALS (8hrs)
PHASE RULE: Introduction, Definition of Terms, Phase, Components, Degree of Freedom, Phase Rule Equation. Phase Diagram: Two Component Lead Silver System. **ALLOYS:** Introduction, Classification, Composition, Properties and Applications of Stainless Steel, Brass and Alnico. **CERAMICS**: Introduction, Classification Based on Chemical Composition, Properties and Applications of Perovskites ($CaTiO_3$). **LUBRICANTS:** Introduction, Classification, Properties and Industrial Applications of Lubricants. **NANO CHEMISTRY:** Introduction, Size-Dependent Properties of Nanomaterial (Surface Area, Catalytic and Thermal), Synthesis of Nanoparticles by Sol-Gel, and Co-Precipitation Method. Introduction, Properties and Engineering Applications of Carbon Nanotubes, Fullerenes and Graphene.

PRACTICAL COMPONENT OF IPCC *(May cover all / major modules)*
Experiments (10-12 Lab slots) **A– Demonstration (any two) offline/virtual:** A1. Synthesis of polyurethane A2. Determination of strength of an acid in Pb-acid battery A3. Synthesis of iron oxide nanoparticles A4. Electroplating of copper on metallic objects **B–Exercise (compulsorily any 4 to be conducted):** B1. Conductometric estimation of acid mixture B2. Potentiometric estimation of FAS using K2Cr2O7 B3. Determination of pKa of vinegar using pH sensor (Glass electrode) B4. Determination of rate of corrosion of mild steel by weight loss method B5. Estimation of total hardness of water by EDTA method **C–Structured Enquiry (compulsorily any 4 to be conducted):** C1. Estimation of Copper present in electroplating effluent by optical sensor (colorimetry) C2. Determination of Viscosity coefficient of lubricant (Ostwald's viscometer) C3. Estimation of iron in TMT bar by diphenyl amine/external indicator method. C4. Estimation of Sodium present in soil/effluent sample using flame photometry C5. Determination of Chemical Oxygen Demand (COD)of industrial waste water sample **D– Open Ended Experiments (any two):** D1. Estimation of metal in e-waste by optical sensors D2. Electroless plating of Nickle on Copper D3. Determination of glucose by electrochemical sensors D4. Synthesis of polyaniline and its conductivity measurement.

COURSE OUTCOMES:
After successfully completing the course, the student will be able to:

CO1	Identify the terms, processes involved in scientific and engineering and applications
CO2	Explain the phenomena of chemistry to describe the methods of engineering processes
CO3	Solve the problems in chemistry that are pertinent in engineering applications
CO4	Apply the basic concepts of chemistry to explain the chemical properties and processes
CO5	Analyse the properties and processes associated with chemical substances in multi-disciplinary approach

ASSESSMENT DETAILS (Both CIE and SEE)

The detailed split up of CIE and SEE for 4-Credit Lab Integrated Theory Courses (IPCC)

Assessment Type	Maximum Marks	Minimum Passing Marks	Evaluation Details
CIE- IA Tests (A)	20	8	Average of Three Internal Assessment Tests each of 50 marks, scaled down to 20 marks.
Alternate Assessment (B)	10	4	Any one Assessment methods as per 24RNBE4.2 scaled to 10 marks.
Total CIE Theory (A+B)	**30**	**12**	**Marks of Tests and Assignments awarded for a maximum of 30.**
CIE Practical	12	5	Marks awarded for Weekly Conduction of Experiments and Submission of Laboratory records, scaled to 12 marks.
CIE Practical Test	8	3	Average of marks of Two tests, each conducted for 100 marks covering all experiments, scaled to 8.
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CIE: Theory + Practical (A + B + C)	**50**	**20**	**CIE Evaluation is done for a maximum of 50 marks.**
SEE (D)	**50**	**18**	**SEE is a theory exam, conducted for 100 marks and scaled down to 50 marks. Exam duration shall be for 3 hours.**
CIE+SEE (A+B+C+D)	**100**	**40**	**Final marks shall be the sum of marks scored in Components A, B, C and D**
• The minimum marks to be secured in CIE is 20 out of allotted 50 marks to appear for SEE, with minimum 40 % scored in every component of CIE. The laboratory component of the IPCC shall be for CIE only. However, in SEE, the questions from the laboratory component shall be included in their respective modules only.			

Question paper for SEE for IPCC

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

1. The question paper will have ten questions with a choice between every pair of questions set for each module. Each question is set for 20 marks.
2. 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.
3. The students have to answer 5 full questions, selecting one full question from each module.
4. Marks scored by the student shall be proportionally scaled down to 50 Marks
5. The number question papers set shall be four, of which two shall be from Internal and remaining two from external examiners.

The theory portion of the IPCC shall be for both CIE and SEE.

Suggested Learning Resources:

Text Books

1. A Text Book of Engineering Chemistry, R.V. Gadag and Nityananda Shetty, I.K. International Publishing house, latest Edition.
2. Chemistry for engineering students for 1st BE, B S Jai Prakash, R Venugopal, Pushpa Iyengar, Subhash Publications, New Edition 2018.
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2. Linden's Handbook of Batteries, Kirby W. Beard, Fifth Edition, McGraw Hill, 2019.
3. Laboratory Manual Engg. Chemistry, Anupma Rajput, Dhanpat Rai & Co.
4. Nanotechnology A Chemical Approach to Nanomaterials, G. A. Ozan & A. C. Arsenault, RSC Publishing,2005.

B.E. (for CV Branch) Outcome Based Education (OBE) and Choice Based Credit System (CBCS) SEMESTER – I / II			
Course Title:	**Applied Chemistry (CV branch)**		
Course Code:	**BCHEC102/202**	**CIE MARKS**	**50**
L: T : P:	**2:2:2**	**SEE MARKS**	**50**
Credits:	**04**	**EXAM HOURS**	**03**
Total hours of Pedagogy	**40 hours Theory + 10 to 12 Lab slots(Lab Slots of 2hr each)**		

COURSE LEARNING OBJECTIVES: The purpose of the course is to facilitate the learner to:

- To enable students to acquire knowledge on principles of chemistry for Engineering Applications.
- To develop an intuitive understanding of chemistry by emphasizing the related branches of engineering.
- To provide students with a solid foundation in analytical reasoning required to solve societal problems.

MODULE-1 ELECTROCHEMISTRY AND ENERGY STORAGE SYSTEMS (8 hrs)

ELECTROCHEMISTRY: Basic concepts of electrochemistry, Derivation of Nernst equation for Single Electrode Potential and Numerical problems. Types of electrodes. Reference electrodes- Introduction, Construction, working and applications of Calomel Electrode. Concentration cell– Definition, Construction, Working and Numerical problems. Ion selective electrode – definition, construction, working and applications of glass electrode. Determination of pH using glass electrode.

ENERGY STORAGE SYSTEMS: Introduction, Classification of batteries with examples. Construction, Working and Applications of Modern Batteries: Li-Ion battery, Na-Ion battery, Vanadium redox flow battery.

MODULE – 2 CORROSION AND ENERGY CONVERSION (8 hrs)

CORROSION: Introduction, Electrochemical theory of corrosion, Types of corrosion: Differential Metal, Differential Aeration (Ex: Pitting and Waterline Corrosion). Corrosion control- Galvanization, Anodization and Sacrificial Anode Method. Corrosion Penetration Rate (CPR) – Introduction, formula and Numerical problems.
GREEN FUELS: Green hydrogen, Properties and production by alkaline electrolysis, Solar Photovoltaic cells – Introduction, Construction, Working, Applications and its advantages. Quantum Dot Sensitized Solar Cells (QDSSC's). Principle, Properties and Applications.
FUEL CELLS: Introduction, Construction, Working and Applications of Methanol–Oxygen fuel cell.

MODULE –3 POLYMERS FOR ENGINEERING APPLICATIONS (8 hrs)

POLYMER: Introduction, Methods of Polymerization, Molecular Weight of Polymers, Numerical Problems. Synthesis, Properties and Engineering Applications of Polyethylene (PE), PMMA, Teflon and Chloro Poly Vinyl Chloride (CPVC).
FIBERS: Synthesis, Properties and Applications of Kevlar.
POLYMER COMPOSITES: Introduction, Properties and Applications of Fibre Reinforced Polymers Composites (FRPC),
GEO POLYMER CONCRETE: Introduction, Synthesis, Constituents, Properties and Applications.
ADHESIVES: Introduction, Synthesis, Properties and Applications of Epoxy Resin.
BIODEGRADABLE POLYMERS: Introduction, Synthesis of polylactic acid (PLA), Properties and their applications.

MODULE – 4 WATER TECHNOLOGY AND NANOMATERIALS (8 hrs)

WATER TECHNOLOGY: Introduction, Water Parameters, Hardness of water, Determination of Temporary, Permanent and Total Hardness by EDTA method, Numerical Problems, Softening of water by Ion Exchange Method, Desalination of Water by Electrodialysis, Reverse Osmosis: Introduction, Process and Applications. Introduction to DO, BOD, Determination of COD, and its Numerical problems.

NANO MATERIALS: Introduction, Size dependent properties of nanomaterial (surface area, catalytic, electrical), Synthesis of nanomaterial by sol-gel method and co-precipitation method, Properties and Engineering Applications of Carbon Nanotubes, Graphene and Nanomaterials for Water treatment (Metal oxide).

MODULE – 5 STRUCTURAL MATERIALS AND ANALYTICAL TECHNIQUES (8 hrs)

CEMENT: Introduction, Composition, Properties, Types, Manufacturing Process of Portland cement, process of Setting and Hardening of cement, Additives for cement. Estimation of percentage of CaO in Cement (using EDTA).

REFRACTORIES: Introduction, Classification based on Chemical Composition, Properties and application of refractory materials.

GLASS: Introduction, Composition, Types, Preparation of Soda-lime glass, properties and applications of glass.

METALS AND ALLOYS: Introduction, Properties and application of Iron and its alloy, Aluminium and its alloys. Phase Rule: Introduction, Definition of terms: Phase, components, degree of freedom, Phase rule equation. Phase diagram: Two component Pb-Ag system.

ANALYTICAL TECHNIQUES: Principle, instrumentation and applications of Colorimetry (Copper), Potentiometry (FAS), Conductometry (Acid mixtures, determination of Soil pH using pH sensors)

PRACTICAL COMPONENT OF IPCC *(May cover all / major modules)*

A – Demonstration (any two) offline/virtual:

A1. Synthesis of polyurethane**.**
A2. Quantitative estimation of Aluminium by precipitation method.
A3. Synthesis of iron oxide nanoparticles**.**
A4. Determination of chloride content in the given water sample by Argentometric method.

B – Exercise (compulsorily any 4 to be conducted):

B1. Conductometric estimation of acid mixture.
B2. Potentiometric estimation of FAS using $K_2Cr_2O_7$.
B3. Determination of pK_a of vinegar using pH sensor (Glass electrode).
B4. Determination of rate of corrosion of mild steel by weight loss method.
B5. Estimation of total hardness of water by EDTA method.

C – Structured Enquiry (compulsorily any 4 to be conducted):

C1. Estimation of Copper present in electroplating effluent by optical sensor (colorimetry).
C2. Determination of Viscosity coefficient of lubricant (Ostwald's viscometer).
C3. Estimation of iron in TMT bar by diphenyl amine/external indicator method.
C4. Determination of Chemical Oxygen Demand (COD) of industrial effluent
C5. Estimation of Sodium present in soil/effluent sample using flame photometry.

D – Open Ended Experiments (any two):

D1. Gravimetric estimation of gypsum in Portland cement.
D2. Electroplating of desired metal on substrate.
D3. Estimation of manganese dioxide in pyrolusite.
D4. Analysis of cement for its components.

COURSE OUTCOMES:

After successfully completing the course, the student will be able to:

CO1	Identify the terms and processes involved in scientific and engineering applications.
CO2	Explain the phenomena of chemistry to describe the methods of engineering processes.
CO3	Solve for the problems in chemistry that are pertaining in engineering applications.
CO4	Apply the basic concepts of chemistry to explain the chemical properties and processes.

CO5	Analyse the properties and processes associated with chemical substances in multi-disciplinary approach

ASSESSMENT DETAILS (Both CIE and SEE)

The detailed split up of CIE and SEE for 4-Credit Lab Integrated Theory Courses (IPCC)

Assessment Type	Maximum Marks	Minimum Passing Marks	Evaluation Details
CIE- IA Tests (A)	20	8	Average of Three Internal Assessment Tests each of 50 marks, scaled down to 20 marks.
Alternate Assessment (B)	10	4	Any one Assessment methods as per 24RNBE4.2 scaled to 10 marks.
Total CIE Theory (A+B)	**30**	**12**	**Marks of Tests and Assignments awarded for a maximum of 30.**
CIE Practical	12	5	Marks awarded for Weekly Conduction of Experiments and Submission of Laboratory records, scaled to 12 marks.
CIE Practical Test	8	3	Average of marks of Two tests, each conducted for 100 marks covering all experiments, scaled to 8.
Total CIE Practical (C)	**20**	**8**	**Marks of Experiments, Record and Test awarded for a maximum of 20 marks.**
CIE: Theory + Practical (A + B + C)	**50**	**20**	**CIE Evaluation is done for a maximum of 50 marks.**
SEE (D)	**50**	**18**	**SEE is a theory exam, conducted for 100 marks and scaled down to 50 marks. Exam duration shall be for 3 hours.**
CIE+SEE (A+B+C+D)	**100**	**40**	**Final marks shall be the sum of marks scored in Components A, B, C and D**
• The minimum marks to be secured in CIE is 20 out of allotted 50 marks to appear for SEE, with minimum 40 % scored in every component of CIE. The laboratory component of the IPCC shall be for CIE only. However, in SEE, the questions from the laboratory component shall be included in their respective modules only.			

Question paper for SEE for IPCC

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

1. The question paper will have ten questions with a choice between every pair of questions set for each module. Each question is set for 20 marks.
2. 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.
3. The students have to answer 5 full questions, selecting one full question from each module.
4. Marks scored by the student shall be proportionally scaled down to 50 Marks
5. The number question papers set shall be four, of which two shall be from Internal and remaining two from external examiners.

The theory portion of the IPCC shall be for both CIE and SEE.

Suggested Learning Resources:

Text Books

1. A Text Book of Engineering Chemistry, R.V. Gadag and Nityananda Shetty, I.K. International Publishing house, latest Edition.
2. Chemistry for engineering students for 1st BE, B S Jai Prakash, R Venugopal, Pushpa Iyengar, Subhash Publications, New Edition 2018.
3. Wiley Engineering Chemistry, Wiley India Pvt. Ltd. New Delhi, 2013- 2nd Edition.
4. Polymer Science, V R Gowariker, N V Viswanathan, Jayadev, Sreedhar, New age Int. Publishers,4th Edition, 2021

Reference Books:

1. Corrosion Engineering, M. G. Fontana, N. D. Greene, McGraw Hill Publications, New York, 3rd Edition, 1996.
2. Linden's Handbook of Batteries, Kirby W. Beard, Fifth Edition, McGraw Hill, 2019.
3. Laboratory Manual Engg. Chemistry, Anupma Rajput, Dhanpat Rai & Co.
4. Nanotechnology A Chemical Approach to Nanomaterials, G. A. Ozan & A. C. Arsenault, RSC Publishing,2005.

B.E.(for CSE & allied branches)
Outcome Based Education (OBE) and Choice Based Credit System (CBCS)
SEMESTER – I / II

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

Course Learning objectives: The purpose of the course is to facilitate the learner to:

- Study the essentials of photonics for engineering applications.
- Learn the principles of quantum mechanics and its applications in quantum computing.
- Study the electrical properties of materials.
- Study the essentials of physics for computational aspects like design and data analysis.
-

Module- 1 **(8hrs)**

PHOTONICS:

LASERS: Introduction to Lasers, Interaction of Radiation with Matter, Basic properties of a LASER beam, Einstein's Coefficients, Boltzmann's relation, Population ratio and Population Inversion, Metastable State, Principle of Laser action, Requisites of a laser system, Semiconductor Laser, Power of a laser beam in terms of energy gap, Applications of Lasers: Bar code scanner, Laser printer, numerical problems.

OPTICAL FIBERS: Principle and working, Acceptance angle and Numerical Aperture (NA) and derivation of Expression for NA, Modes of Propagation, Classification of Optical Fibers, Attenuation and derivation of fiber Loss. Fiber Optic Communication. Numerical Problems.

Module-2 **(8hrs)**

QUANTUM MECHANICS:

Wave particle duality and Matter Waves, de-Broglie wavelength, Phase Velocity and Group Velocity and their relation, Heisenberg's Uncertainty Principle and its application to non-existence of electron in nucleus and beta decay mechanism. Wave Function, Schrodinger time independent wave equation in 1D and extension to 3D, Physical Significance of a wave function and Born Interpretation, Operators, Eigen functions and Eigen Values of Particle in 1D infinite potential well, extension to 3D case and degeneracy. Quantization of energy, Wave function, wavelength and velocity, Waveforms and Probabilities for n=1, 2 states of 1D box, Numerical problems.

Module-3 **(8hrs)**

QUANTUM COMPUTING:

Principles of Quantum Information & Quantum Computing: Introduction to Quantum Computing, Moore's law & its end. Differences between classical & quantum computing, quantum superposition and the concept of qubit. Properties of a qubit, its mathematical representation and bloch sphere representation.

Wave Function in Ket Notation: Matrix form of wave function, Identity Operator, Determination of I|0> and I|1>, Pauli Matrices and its operations on 0 and 1 states, Mention of Conjugate and Transpose, Unitary Matrix, Hermitian, Examples: Row and Column Matrices and their multiplication (Inner Product), Probability, Orthogonality, orthonormality.

Quantum Gates: Single Qubit Gates: Quantum Not Gate, Pauli Y & Z gates, Hadamard Gate, Phase Gate (S Gate), T Gate. Multiple Qubit Gates: CNOT Gate, (Discussion for 4 different input states). Swap gate, Controlled-Z gate, Toffoli gate. Numerical problems.

Module-4 **(8hrs)**

QUANTUM SCIENCE AND TECHNOLOGY

Electrical conductivity in metals: Quantum free electron theory, Assumptions, Density of states, Fermi Energy, Fermi level, Variation of fermi factor with temperature, Fermi energy at 0K (derivation), Average energy (derivation), fermi velocity, fermi temperature.

Nanomaterials: Conductive nanomaterials, Quantum structures, Variation of density of states from 3D to 1D, Semiconductor nanostructures-Quantum well, Quantum wire and Quantum dot (qualitative).

Superconductivity: Temperature dependence of resistivity, BCS theory (Qualitative), Meissner's Effect, Proof of diamagnetism, Critical field and its temperature dependance, Types of Superconductors, London's equations (derivation), High-Temperature superconductivity, SQUIDs, Numerical problems.

Module-5 **(8hrs)**

COMMUNICATION PHYSICS

Elements of communication and types of radio wave propagation. Ionospheric effects on radio waves, Key factors, Frequency Selection, Skip distance (SK) and relation between SK and MUF for flat surface (derivation) and secant law. Remote sensing, types, process, advantages and limitations. Principle of RADAR, Terminology, Radar range equation (derivation), Receiver noise, Figure of merit (derivation), Doppler effect and Doppler frequency (derivation).

PRACTICAL COMPONENT

List of Experiments

1. Determination of wavelength of LASER using Diffraction Grating.
2. Study of the Characteristics of a Photo-Diode and to determine the power responsivity
3. Study the I-V Characteristics of the Given Bipolar Junction Transistor.
4. Verification of Stefan's law
5. Determination of Fermi Energy of Copper.
6. Determination of acceptance angle and numerical aperture of the given Optical Fiber.
7. Determination of Magnetic Flux Density at any point along the axis of a circular coil.
8. Study the frequency response of Series & Parallel LCR circuits.
9. Determination of Energy gap of the given Thermistor.
10. Determination of Planck's Constant using LEDs.
11. Determination of dielectric constant of the material of capacitor by Charging and Discharging method.
12. Simulations using V-labs.

COURSE OBJECTIVES

After successfully completing the course, the student will be able to:

CO1	**Describe** the principles of LASERS and Optical fibers and their relevant applications.
CO2	**Discuss** the basic principles of Quantum Mechanics and their application in Quantum Computing.
CO3	**Summarize** the essential properties of conductors, superconductors and nanomaterials for their application in Quantum Computing.
CO4	**Illustrate** the application of physics in Communication.
CO5	**Practice** working in groups to conduct experiments in physics and **perform** precise and honest measurements.

ASSESSMENT DETAILS (Both CIE and SEE)

The detailed split up of CIE and SEE for 4-Credit Lab Integrated Theory Courses (IPCC)

Assessment Type	Maximum Marks	Minimum Passing Marks	Evaluation Details
CIE- IA Tests (A)	20	8	Average of Three Internal Assessment Tests each of 50 marks, scaled down to 20 marks.
Alternate Assessment (B)	10	4	Any one Assessment methods as per 24RNBE4.2 scaled to 10 marks.
Total CIE Theory (A+B)	**30**	**12**	**Marks of Tests and Assignments awarded for a maximum of 30.**
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Question paper for SEE for IPCC

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

1. The question paper will have ten questions with a choice between every pair of questions set for each module. Each question is set for 20 marks.
2. 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.
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5. The number question papers set shall be four, of which two shall be from Internal and remaining two from external examiners.

The theory portion of the IPCC shall be for both CIE and SEE.

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

1. Solid State Physics, S O Pillai, New Age International Private Limited, 8th Edition, 2018.

2. Engineering Physics by Gupta and Gour, Dhanpat Rai Publications, 2016 (Reprint).
3. Concepts of Modern Physics, ArthurBeiser, McGraw-Hill, 6th Edition, 2009.
4. Lasers and Non-Linear Optics, B B Loud, New age international, 2011 edition.
5. 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.
6. Quantum Computation and Quantum Information, Michael A. Nielsen & Isaac L. Chuang, Cambridge Universities Press, 2010 Edition.
7. Quantum Computing, Vishal Sahani, McGraw Hill Education, 2007 Edition.
8. Engineering Physics, S P Basavaraj, 2005 Edition,
9. Physics for Animators, Michele Bousquet with Alejandro Garcia, CRC Press, Taylor & Francis, 2016.
10. Communication physics, Gullybaba publishing house pvt ltd 2017.
11. Communication Systems by H. Taub and D. Schilling McGraw Hill Education; 4th edition 2017

B.E.(for EE Stream)
Outcome Based Education (OBE) and Choice Based Credit System (CBCS)
SEMESTER – I / II

Course Title:	**Engineering Physics (for EE stream)**		
Course Code:	**BPHYE102/202**	CIE Marks	50
Course Type (Theory/Practical/Integrated)	Integrated	SEE Marks	50
		Total Marks	100
Teaching Hours/Week (L:T:P)	2:2:2	Exam Hours	03
Total Hours of Pedagogy	40 hours Theory + 10 to 12 Lab slots	Credits	04

Course Learning objectives: The purpose of the course is to facilitate the learner to:

- Learn the principles of quantum mechanics and its applications in quantum computing.
- Study the electrical properties of materials.
- Study the essentials of photonics for engineering applications.
- Study the essentials of physics for computational aspects like design and data analysis.

Module-1 **(8hrs)**

FUNDAMENTALS OF QUANTUM MECHANICS:

Origin of Quantum theory- Block body spectrum, Wein's and Rayleigh Jeans theories. Max-planck's quantum theory- Planck's equation and its success. Wave-particle duality, de-Broglie waves, Heisenberg's Uncertainty Principle and its application to prove non existence of electron inside the nucleus. Wave Function, Schrodinger time independent wave equation in 1D and extension to 3D, Physical Significance of a wave function, Operators. Particle in 1D infinite potential well, Eigen functions and Eigen Values, extension to 3D case and degeneracy. Quantization of energy, wave function, wavelength and velocity, Waveforms and Probabilities for n=1, 2 states of 1D box, Numerical problems.

Module-2 **(8hrs)**

ELECTRICAL PROPERTIES OF SOLIDS:

Quantum Free Electron theory: Assumptions, Density of states, Fermi energy, Fermi level. Fermi factor, Variation of Fermi Factor with Temperature, Fermi Energy (derivation), Average energy (derivation), Fermi velocity and Fermi temperature. Conductive nanomaterials, Quantum well, Quantum wire and Quantum dot (qualitative).

Dielectric Properties: Polar and non-polar dielectrics, Types of Polarization, internal fields in solid, Clausius- Mossotti equation (Derivation). Numericals.

Superconductivity : Critical temperature, BCS theory (Qualitative), Meissner Effect, Proof of diamagnetism, Temperature dependence of Critical field, Types of Super Conductors, London's equations (deivation), High Temperature superconductivity, Persistent currents and Lossless power transmission, Numerical problems.

Module-3 **(8hrs)**

QUANTUM OPTICS AND DEVICES:

Lasers: Photon (Quantum) and its properties, Characteristics of Laser, Interaction of radiation with matter, Boltzman's relation, Expression for energy density equation (derivation). Requisites of a Laser system. Conditions for Laser action. Principle, Semiconductor laser, Power of a laser beam interms of energy gap, Characteristics of LASER. Application of Lasers in Defense and Laser bar code reader.

Optical Fibers: Propagation mechanism, TIR, Angle of acceptance, Numerical aperture (derivation), Modes of propagation, Number of modes and V-parameter, Types of optical fibers. Attenuation and Mention of expression for attenuation coefficient (derivation). Point to point communication. Optical fiber sensors-

Displacement sensor and temperature based sensor, Numerical problems.

Module-4 **(8hrs)**

ELECTROMAGNETISM:

Fundamentals of vector calculus. Divergence and curl of electric field and magnetic field, Gauss' divergence theorem with proof and Stokes' theorem. Description of laws of electrostatics, magnetism and Faraday's laws of EMI. Displacement current (derivation), Maxwell's equations in vacuum (derivation).

EM Waves: Generation of EM waves by Hertz method, Equation for Electromagnetic wave equations in differential form in free space (derivation), Equation of Plane electromagnetic waves in vacuum, Velocity of EM waves (derivation) Energy density of EM waves (derivation). Numerical problems.

Module-5 **(8hrs)**

OPTOELECTRONICS:

Conductivity of semiconductors (derivation), Expression for electron and hole concentrations (no derivation), Law of mass action, Fermi level in intrinsic semiconductors (derivation of Ef=Eg/2). Diode equation (derivation), LED, Photodiode, quantum efficiency (derivation). Hall effect, derivation of Hall voltage, Hall field and Hall coefficient (derivation). Fluorescence and Phosphorescence. Luminescence and types in it. Mechanism of photoluminescence and thermoluminescence and applications of luminescence. Numerical problems.

PRACTICAL COMPONENT

List of Experiments

1. Determination of wavelength of LASER using Diffraction Grating.
2. Study of the Characteristics of a Photo-Diode and to determine the power responsivity
3. Study the I-V Characteristics of the Given Bipolar Junction Transistor.
4. Verification of Stefan's law
5. Determination of Fermi Energy of Copper.
6. Determination of acceptance angle and numerical aperture of the given Optical Fiber.
7. Determination of Magnetic Flux Density at any point along the axis of a circular coil.
8. Study the frequency response of Series & Parallel LCR circuits.
9. Determination of Energy gap of the given Thermistor.
10. Determination of Planck's Constant using LEDs.
11. Determination of dielectric constant of the material of capacitor by Charging and Discharging method.
12. Simulations using V-labs.

COURSE OBJECTIVES

After successfully completing the course, the student will be able to:

CO1	**Describe** the principles of the Quantum Mechanics and the concepts of dielectrics and superconductivity .

CO2	**Elucidate** the essentials of Lasers and optical fibers
CO3	**Discuss** the fundamentals of vector calculus and their applications in Maxwell's Equations and EM Waves.
CO4	**Illustrate** the application of physics in Modern Electronic devices.
CO5	**Practice** working in groups to conduct experiments in physics and **perform** precise and honest measurements.

ASSESSMENT DETAILS (Both CIE and SEE)

The detailed split up of CIE and SEE for 4-Credit Lab Integrated Theory Courses (IPCC)

Assessment Type	Maximum Marks	Minimum Passing Marks	Evaluation Details
CIE- IA Tests (A)	20	8	Average of Three Internal Assessment Tests each of 50 marks, scaled down to 20 marks.
Alternate Assessment (B)	10	4	Any one Assessment methods as per 24RNBE4.2 scaled to 10 marks.
Total CIE Theory (A+B)	**30**	**12**	**Marks of Tests and Assignments awarded for a maximum of 30.**
CIE Practical	12	5	Marks awarded for Weekly Conduction of Experiments and Submission of Laboratory records, scaled to 12 marks.
CIE Practical Test	8	3	Average of marks of Two tests, each conducted for 100 marks covering all experiments, scaled to 8.
Total CIE Practical (C)	**20**	**8**	**Marks of Experiments, Record and Test awarded for a maximum of 20 marks.**
CIE: Theory + Practical (A + B + C)	**50**	**20**	**CIE Evaluation is done for a maximum of 50 marks.**
SEE (D)	**50**	**18**	**SEE is a theory exam, conducted for 100 marks and scaled down to 50 marks. Exam duration shall be for 3 hours.**
CIE+SEE (A+B+C+D)	**100**	**40**	**Final marks shall be the sum of marks scored in Components A, B, C and D**
• The minimum marks to be secured in CIE is 20 out of allotted 50 marks to appear for SEE, with minimum 40 % scored in every component of CIE. The laboratory component of the IPCC shall be for CIE only. However, in SEE, the questions from the laboratory component shall be included in their respective modules only.			

Question paper for SEE for IPCC

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

6. The question paper will have ten questions with a choice between every pair of questions set for each module. Each question is set for 20 marks.

7. 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.
8. The students have to answer 5 full questions, selecting one full question from each module.
9. Marks scored by the student shall be proportionally scaled down to 50 Marks
10. The number question papers set shall be four, of which two shall be from Internal and remaining two from external examiners.

The theory portion of the IPCC shall be for both CIE and SEE.

Suggested Learning Resources:

Books

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

1. Engineering Physics by Gupta and Gour, Dhanpat Rai Publications, 2016 (Reprint).
2. Solid State Physics, S O Pillai, New Age International Private Limited, 8th Edition, 2018.
3. Concepts of Modern Physics, ArthurBeiser, McGraw-Hill, 6th Edition, 2009.
4. Lasers and Non-Linear Optics, B B Loud, New age international, 2011 edition.
5. 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.
6. Solid state Electronic devices by B G Streetman and Sanjeeb kumar , 2019 Edition, Pearson Prentice Hall
7. Introduction to Electrodynamics, David Griffith, 4th Edition, Cambridge University press 2017.
8. Engineering Physics, S P Basavaraj, 2005 Edition,

B.E.(for ME Stream)
Outcome Based Education (OBE) and Choice Based Credit System (CBCS)
SEMESTER – I / II

Course Title:	**Engineering Physics (ME stream)**		
Course Code:	**BPHYM102/202**	CIE Marks	50
Course Type (Theory/Practical/Integrated)	Integrated	SEE Marks	50
		Total Marks	100
Teaching Hours/Week (L:T:P)	2:2:2	Exam Hours	03
Total Hours of Pedagogy	40 hours Theory + 10 to 12 Lab slots	Credits	04

Course Learning objectives: The purpose of the course is to facilitate the learner to:

- Study the essentials of photonics for engineering applications.
- Learn the principles of quantum mechanics and its applications in quantum computing.
  Study the electrical properties of materials.
- Study the essentials of physics for computational aspects like design and data analysis.

Module-1 **(8hrs)**

MECHANICS OF OSCILLATIONS AND WAVES

Oscillations: Simple Harmonic motion (SHM), differential equation for SHM (derivation), Sprigs: Stiffness Factor and its Physical Significance, series and parallel combination of springs (derivation).
Types of oscillations- Free oscillations, Damped oscillations and Forced oscillations, Theory of each type of oscillation (qualitative), Resonance, Quality factor, Sharpness of resonance.
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.

Module-2 **(8hrs)**

ELASTICITY

Types of stress and strain, relation between compression, elongation and shear strains. Hookes law, Stress-Strain Curve. Elastic Moduli, Poisson's ratio and its limiting values. relation between Y , n and *k* (with derivation), Beams, types of beams, Applications of beams, bending moment and derivation of its expression. Cantilever, formula for depression of a loaded beam (no derivation) and arrival of Young's modulus of cantilever beam. Torsional pendulum and its applications (qualitative). Numerical problems.

Module-3 **(8hrs)**

THERMOELECTRIC MATERIALS AND DEVICES

Thermo emf and thermo current, Seeback effect, peltier effect, Seeback and peltier coefficients, figure of merit (Mention Expression), laws of thermoelectricity. Expression for thermo emf in terms of T_1 and T_2, Thermo couples, thermopile, Construction and Working of Thermoelectric generators (TEG) and Thermoelectric coolers (TEC), low, mid and high temperature thermoelectric materials, Applications: Exhaust of Automobiles, Refrigerator, Space Program (RTG), Numerical Problems.

Module-4 **(8hrs)**

CRYOGENICS AND RADIOACTIVITY:

Production of low temperature - Joule Thomson effect (Derivation), Porous plug experiment, Thermodynamical analysis of Joule Thomson effect, Liquefaction of Oxygen by cascade process, Lindey's airliquefier.

Radioactivity: α, β and γ-decay, derivation of energy of emitted α-particle, β-particles, and recoil energy of γ-decay: Activity, Decay law, Rradioactive decay rate, Radioactive decay law, $N=N_0e^{-\lambda t}$, Half life, Mean Life, and their expressions (derivation), applications of radioactivity. Numerical Problems.

Module-5 **(8hrs)**

MATERIALS SCIENCE AND CHARCTERIZATION TECHNIQUES

Superconductors: Transition temperature, Meissner effect, Critical field, Type I & Type II Superconductors, Applications in Maglev.

Laser materials: Laser fundamentals, Energy density (derivation), Population inversion, Requisites of a laser, Ruby Laser, laser cutting and welding.

Characterization techniques: Bragg's law (derivation), Basic Principles of X- Ray diffractometer, AFM, SEM and TEM, Numerical Problems.

	PRACTICAL COMPONENT
	List of Experiments: 1. LCR Resonance 2. Torsional Pendulum 3. Energy gap of a Thermistor 4. Laser Diffraction 5. Fermi Energy 6. Spring Constant 7. Single Cantilever 8. Air Wedge 9. Uniform Bending 10. Moment of Inertia 11. Diffraction grating using Spectrometer 12. Dielectric constant 13. V-labs Simulation Experiments

After successfully completing the course, the student will be able to:

CO1	**Elucidate** the concepts in oscillations, waves, elasticity and material failures
CO2	**Discuss** the fundamentals of Thermoelectric materials and their application
CO3	**Summarize** the low temperature phenomena and basics of radio activity
CO4	**Explain** the Physics principles in various engineering materials
CO5	**Practice** working in groups to conduct experiments in physics and **perform** precise and honest measurements.

ASSESSMENT DETAILS (Both CIE and SEE)

The detailed split up of CIE and SEE for 4-Credit Lab Integrated Theory Courses (IPCC)

Assessment Type	Maximum Marks	Minimum Passing Marks	Evaluation Details
CIE- IA Tests (A)	20	8	Average of Three Internal Assessment Tests each of 50 marks, scaled down to 20 marks.
Alternate Assessment (B)	10	4	Any one Assessment methods as per 24RNBE4.2 scaled to 10 marks.
Total CIE Theory (A+B)	**30**	**12**	**Marks of Tests and Assignments awarded for a maximum of 30.**
CIE Practical	12	5	Marks awarded for Weekly Conduction of Experiments and Submission of Laboratory records, scaled to 12 marks.
CIE Practical Test	8	3	Average of marks of Two tests, each conducted for 100 marks covering all experiments, scaled to 8.
Total CIE Practical (C)	**20**	**8**	**Marks of Experiments, Record and Test awarded for a maximum of 20 marks.**
CIE: Theory + Practical (A + B + C)	**50**	**20**	**CIE Evaluation is done for a maximum of 50 marks.**
SEE (D)	**50**	**18**	**SEE is a theory exam, conducted for 100 marks and scaled down to 50 marks. Exam duration shall be for 3 hours.**
CIE+SEE (A+B+C+D)	**100**	**40**	**Final marks shall be the sum of marks scored in Components A, B, C and D**
• The minimum marks to be secured in CIE is 20 out of allotted 50 marks to appear for SEE, with minimum 40 % scored in every component of CIE. The laboratory component of the IPCC shall be for CIE only. However, in SEE, the questions from the laboratory component shall be included in their respective modules only.			

Question paper for SEE for IPCC

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

11. The question paper will have ten questions with a choice between every pair of questions set for each module. Each question is set for 20 marks.
12. 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.
13. The students have to answer 5 full questions, selecting one full question from each module.
14. Marks scored by the student shall be proportionally scaled down to 50 Marks
15. The number question papers set shall be four, of which two shall be from Internal and remaining two from external examiners.

The theory portion of the IPCC shall be for both CIE and SEE.

Suggested Learning Resources:

Books

1. Vibrations and Waves (MIT introductory Physics Series), A P French, CBS, 2003 Edition
2. Engineering Physics by R. K. Gaur and S. L. Gupta, 2010 edition, Dhanpat Rai Publications Ltd., New Delhi-110002,
3. Timoshenko, S. and Goodier J.N. “Theory of Elasticity”, 2nd Edition, McGraw Hill Book Co, 2001.
4. Sadhu Singh, “Theory of Elasticity”, Khanna Publishers, 1997
5. Mechanical Properties of Engineered Materials By Wole Soboyejo, CRC Press; 1st edition, 2002
6. A textbook of Engineering Physics by M .N. Avadhanulu, P G. Kshirsagar and T V S Arun Murthy, Eleventh edition, S Chand and Company Ltd. New Delhi-110055.
7. Heat & Thermodynamics and Statistical Physics(XVIII-Edition) – Singhal, Agarwal & Satyaprakash – Pragati Prakashan, Meerut, 2006. 4
8. Heat and Thermodynamics (I-Edition) – D.S.Mathur - S. Chand & Company Ltd., New-Delhi, 1991
9. Physics of Cryogenics by Bahman Zohuri, Elsevier, 2018
10. Materials Characterization Techniques-Sam Zhang, Lin Li, Ashok Kumar, CRC Press, First Edition, 2008.
11. Characterization of Materials- Mitra P.K . Prentice Hall India Learning Private Limited.
12. Lasers and Non-Linear Optics, B B Loud, New age international, 2019 edition.
13. Solid State Physics-S O Pillai, 8th Ed- New Age International Publishers-2018.

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B.E.(for CSE & allied branches)
Outcome Based Education (OBE) and Choice Based Credit System (CBCS)
SEMESTER – I / II

Course Title:	**Engineering Physics (CV Stream)**		
Course Code:	**BPHYC 102/202**	CIE Marks	50
Course Type (Theory/Practical/Integrated)	Integrated	SEE Marks	50
		Total Marks	100
Teaching Hours/Week (L:T:P)	2:2:2	Exam Hours	03
Total Hours of Pedagogy	40 hours+10 to12 Lab Slots	Credits	04

Course objectives

- To study the principles of quantum mechanics
- To understand the properties of dielectrics and superconductors
- To study the essentials of photonics for engineering applications.
- To understand fundamentals of vector calculus and EM waves.
- To study the knowledge about semiconductors and devices.

Module-1 **(08Hours)**

MECHANICS OF OSCILLATIONS AND WAVES

Oscillations: Simple Harmonic motion (SHM), Differential equation for SHM (derivation), Sprigs: Stiffness Factor and its Physical Significance, series and parallel combination of springs (derivation), Types of oscillations- Free oscillations, Damped oscillations and Forced oscillations, Theory of each type of oscillation (qualitative), Resonance, Quality factor, Sharpness of resonance.

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.

Module-2 **(08 hours)**

PHYSICS OF ELASTIC MATERIALS

Types of stress and strain, Stress-Strain Curve, relation between compression, elongation and shear strains. Elastic Moduli, Poisson's ratio and its limiting values. Assume relation between Relation between Y , n and σ *and* Y , K and σ and derive the relation between Y, n and *K.* Beams, types of beams, Applications of beams, bending moment and derivation of its expression. Cantilever, expression for depression of a loaded beam (no derivation) and arrival of Young's modulus of cantilever beam. Torsional pendulum and its applications (qualitative). Numerical problems.

Module-3 **(08 hours)**

ACOUSTICS, RADIOMETRY AND PHOTOMETRY

Acoustics: Introduction to acoustics, Types of Acoustics, reverberation and reverberation time, absorption power and absorption coefficient, Requisites for acoustics in auditorium, Sabine's formula (derivation), measurement of absorption coefficient, factors affecting the acoustics and remedial measures.

Ultrasonics: Properties, production of ultrasonics and their applications.

Radiometry and Photometry: Radiation quantities, Spectral Quantities, Relation between luminescence and radiantquantities, Reflectance and Transmittance, Cosine law and Inverse square law of Photometry, Numerical problems.

Module-4 **(08 hours)**

LASERS AND OPTICAL FIBERS:

Lasers: Interaction of Radiation with Matter, Einsteins coefficients and energy density (derivation), Population Inversion,Metastable State, Requisites of a LASER System, Semiconductor LASER, Application of LASERS in Range Finder, LIDAR, Road Profiling, Bridge Deflection, Speed Checker. Numerical Problems.

Optical Fiber: Principle and Construction of Optical Fibers, Acceptance angle and Numerical Aperture (NA), Expression for NA (derivation), Modes of Propagation, Attenuation and Fiber Losses (derivation), Fiber Optic Displacement Sensor, Fiber Optic Temperature Sensor, Numerical problems.

Module-5 **(08 hours)**

CRYSTAL STRUCTURES AND CHARACTERIZATION TECHNIQUES

Lattice, Basis, Crystal structure, Unit cell, Primitive lattice cell, Lattice parameter, Bravais lattices in two dimensions, Seven crystal systems, Miller indices, Crystal planes, Co-ordination number and Atomic packing for SC, BCC and FCC. Characterization techniques: X-ray diffraction, Bragg's law and Bragg's spectrometer, principle and working of SEM and TEM. Numerical problems.

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PRACTICAL COMPONENT

List of Experiments:

1. LCR Resonance
2. Torsional Pendulum
3. Energy gap of a Thermistor
4. Laser Diffraction
5. Fermi Energy
6. Spring Constant
7. Single Cantilever
8. Air Wedge
9. Uniform Bending
10. Moment of Inertia
11. Diffraction grating using Spectrometer
12. Dielectric constant
13. V-labs Simulation Experiments

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	**Explain** the Physics principles various crystal structures and their characterization techniques
CO5	**Practice** working in groups to conduct experiments in physics and **perform** precise and honest measurements.

ASSESSMENT DETAILS (Both CIE and SEE)

The detailed split up of CIE and SEE for 4-Credit Lab Integrated Theory Courses (IPCC)

Assessment Type	Maximum Marks	Minimum Passing Marks	Evaluation Details
CIE- IA Tests (A)	20	8	Average of Three Internal Assessment Tests each of 50 marks, scaled down to 20 marks.
Alternate Assessment (B)	10	4	Any one Assessment methods as per 24RNBE4.2 scaled to 10 marks.
Total CIE Theory (A+B)	**30**	**12**	**Marks of Tests and Assignments awarded for a maximum of 30.**
CIE Practical	12	5	Marks awarded for Weekly Conduction of Experiments and Submission of Laboratory records, scaled to 12 marks.
CIE Practical Test	8	3	Average of marks of Two tests, each conducted for 100 marks covering all experiments, scaled to 8.
Total CIE Practical (C)	**20**	**8**	**Marks of Experiments, Record and Test awarded for a maximum of 20 marks.**
CIE: Theory + Practical (A + B + C)	**50**	**20**	**CIE Evaluation is done for a maximum of 50 marks.**
SEE (D)	**50**	**18**	**SEE is a theory exam, conducted for 100 marks and scaled down to 50 marks. Exam duration shall be for 3 hours.**
CIE+SEE (A+B+C+D)	**100**	**40**	**Final marks shall be the sum of marks scored in Components A, B, C and D**
• The minimum marks to be secured in CIE is 20 out of allotted 50 marks to appear for SEE, with minimum 40 % scored in every component of CIE. The laboratory component of the IPCC shall be for CIE only. However, in SEE, the questions from the laboratory component shall be included in their respective modules only.			

Question paper for SEE for IPCC

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

1. The question paper will have ten questions with a choice between every pair of questions set for each module. Each question is set for 20 marks.
2. 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.
3. The students have to answer 5 full questions, selecting one full question from each module.
4. Marks scored by the student shall be proportionally scaled down to 50 Marks
5. The number question papers set shall be four, of which two shall be from Internal and remaining two from external examiners.

The theory portion of the IPCC shall be for both CIE and SEE.

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. Shock waves made simple by Chintoo S Kumar, K Takayama and K P J Reddy: Willey India Pvt. Ltd, Delhi 2014.
3. 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.
4. Engineering Physics by R. K. Gaur and S. L. Gupta, 2010 edition, Dhanpat Rai Publications Ltd., New Delhi-110002,
5. Building Science: Lighting and Acoustics, B. P. Singh and Devaraj Singh, Dhanpat Rai Publications (P) Ltc.,
6. Building Acoustics: Tor Eric Vigran, Taylor and Francis, 2008 Edition.
7. Photometry Radiometry and Measurements of Optical Losses, MichealBukshtab, Springer, 2nd edition.
8. Materials Science for Engineers by James F. Shackelford and Madanapalli K Muralidhara, sixth edition, Pearson Education Asia Pvt. Ltd., New Delhi.
9. Lasers and Non-Linear Optics, B B Loud, New Age Internationals, 2011 edition
10. Solid State Physics-S O Pillai, 8th Ed- New Age International Publishers-2018.

Engineering Science Courses

Department Specific Core Courses

ELEMENTS OF CIVIL ENGINEERING & ENGINEERING MECHANICS (BCIVC103/203): FOR CIV
ELEMENTS OF MECHANICAL ENGINEERING (BEMEM103/203): FOR MECH
ELEMENTS OF ELECTRICAL ENGINEERING (BEEEE103/203): FOR EEE
BASIC ELECTRONICS (BBEEC103/203): FOR ECE
PRINICPLES OF C PROGRAMMING (BPOPS103/203): FOR CSE & ALLIED BRANCHES

B.E. (Civil Engineering)
Outcome Based Education(OBE) and Choice Based Credit System(CBCS)
SEMESTER – I / II

Course Title:	**Elements of Civil Engineering and Engineering Mechanics**		
Course Code:	**BCIVC 103/203**	**CIE MARKS**	**50**
L : T : P	**2:2:0**	**SEE MARKS**	**50**
Credits:	**3**	**EXAM HOURS**	**3**
Total hours of Pedagogy	**40 hours Theory**	**Total Marks**	**100**

COURSE LEARNING OBJECTIVES: *The purpose of the course is to facilitate the learner:*

- To help students learn the scope of various specializations in civil engineering.
- To develop students' ability to analyze problems involving system of forces and moments and their applications.
- Students should understand the equilibrium equations for coplanar concurrent and non-concurrent forces.
- To help students learn the effect of friction on different planes.
- To develop students' ability to find the center of gravity and moment of inertia and their applications.

MODULE – 1 **(8 hrs)**

INTRODUCTION TO CIVIL ENGINEERING: Scope of different field of civil engineering -Surveying, Geotechnical Engineering, Structural Engineering, Hydraulics & Water Resources, Transportation Engineering, Environmental Engineering, Construction planning & Project management.

CONSTRUCTION MATERIALS: Bricks, Stones, Timber, Cement & mortars, Cement Concrete-Plain, Reinforced, Pre-stressed Concrete, Structural steel.

STRUCTURAL ELEMENTS OF A BUILDING: Foundation, Plinth, Lintel, Chejja, Masonry wall, Beam, Column, Slab and Staircase.

MODULE – 2 **(8 hrs)**

RESULTANT OF COPLANAR FORCE SYSTEM: Basic dimensions and units, Idealizations, Force-Characteristic and Classification of force system, Principle of transmissibility of a force, Principle of superposition and Principle of physical independence of forces, Resolution and Composition of forces, Resultant of coplanar concurrent force system- Parallelogram law of forces, Moment and Couple, Resultant of coplanar non-concurrent force system- Varignon's theorem. Numerical examples on moment, couple, resultant of coplanar concurrent and non-concurrent force system.

MODULE – 3 **(8 hrs)**

EQUILIBRIUM OF COPLANAR CONCURRENT FORCE SYSTEM: Conditions of equilibrium, Free body diagrams, Equilibrium of coplanar concurrent force system, Lami's theorem, Numerical examples on equilibrium of force and Lami's theorem.

EQUILIBRIUM OF COPLANAR NON-CONCURRENT FORCE SYSTEM: Types of supports in beams, types of beams, types of loadings, Difference between statically determinate and indeterminate beams, Numerical examples on support reactions of statically determinate beams subjected to various types of loads (point loads, uniformly distributed loads, uniformly varying loads)
MODULE – 4 **(8 hrs)**
FRICTION: Introduction, Types of friction, Concept of static and dynamic friction, laws of dry friction, Limiting friction, coefficient of friction, angle of friction, angle of repose, cone of friction, equilibrium of blocks resting on horizontal and inclined planes with connected bodies, wedge friction, ladder friction, Applications to engineering problems, Numerical examples.
MODULE – 5 **(8 hrs)**
CENTROID OF PLANE AREAS: Introduction, Differences between centre of gravity and centroid, symmetrical and asymmetrical axis**,** Locating the centroid of rectangle, triangle, circle, semicircle, quadrant and sector of a circle using method of integration (no derivations), Numerical examples on centroid of simple built up sections. **MOMENT OF INERTIA OF PLANE AREAS:** Introduction-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, semi-circular and quarter-circular areas using the method of integration (no derivations), Numerical examples on moment of inertia of simple built up sections.

COURSE OUTCOMES:

After successfully completing the course, the student will be able to:

CO1	Understand the various disciplines of civil engineering and fundamentals of construction materials & elements.
CO2	Develop engineering problem solving skills for coplanar force system.
CO3	Understand the concepts of friction and apply to solve engineering problems.
CO4	Determine centroid and moment of inertia of built-up sections.

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) and for the SEE minimum passing mark is 35% of the maximum marks (18 out of 50 marks). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student 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.

Continuous Internal Evaluation (CIE):

Assessment Type	Maximum Marks	Minimum Passing Marks	Evaluation Details
CIE – IA Tests (A)	30	12	Average of Three Internal Assessment Tests each of 50 marks, scaled down to 30 marks.
Alternate Assessment (B)	20	8	Any two Assessment methods as per 24RNBE4.2 (*if it is project based, one assignment shall be given), scaled to 20 marks.
Total CIE (A+B)	**50**	**20**	**CIE Evaluation is done for a maximum of 50 marks**
SEE (C)	**50**	**18**	**SEE is a theory exam conducted for 100 marks and scaled down to 50 marks. Exam duration shall befor 3 hours.**
CIE + SEE (A+B+C)	**100**	**40**	Final marks shall be the sum of marks scored in Components **A, B and C.**

· The minimum marks to be secured in CIE is 20 out of allotted 50 marks to appear for SEE, with minimum 40 % scored in every component of CIE.
· If any courses of 3 credits are of Integrated Course type, for such courses the method suggested for 4 credits IPCC shall be followed.

SEE

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

1) The question paper will have ten questions. Each question is set for 20 marks.
2) 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.
3) The students have to answer 5 full questions, selecting one full question from each module.
4) Marks scored by the student shall be proportionally scaled down to 50 Marks

Suggested Learning Resources:

Text Books

1) Bansal R. K, Basic Civil Engineering and Engineering Mechanics, 2015, Laxmi Publications; Third edition.
2) Bhavikatti S S, Engineering Mechanics, 2019, New Age International Publishers, Seventh edition.
3) Kolhapure B K, Elements of Civil Engineering and Engineering Mechanics, 2018, BookLeey.
4) H J Sawant and S P Nitsure, Elements of Civil Engineering and Mechanics, 2018, Technical Publication.
5) H S Vishwanath, Elements of Civil Engineering and Mechanics, 2018, Sapna Book House.

Reference Books

1) Beer F.P. and Johnston E. R., Vector Mechanics for Engineers: Statics and Dynamics, 2017, McGraw Hill Education.
2) Hibbeler R. C., Engineering Mechanics: Statics and Dynamics, 2017, Pearson Education.
3) Timoshenko S, Young D. H., Rao J. V., Engineering Mechanics, 5th Edition, 2017, McGraw Hill Education.

B.E. (Mechanical Engineering)
Outcome Based Education (OBE) and Choice Based Credit System (CBCS)
SEMESTER – I / II

Course Title:	**ELEMENTS OF MECHANICAL ENGINEERING**		
Course Code:	**BEMEM 103/203**	**CIE MARKS**	**50**
L : T : P	**2:2:0**	**SEE MARKS**	**50**
Credits:	**3**	**EXAM HOURS**	**3**
Total hours of Pedagogy	**40 hours Theory**	**Total Marks**	**100**

COURSE LEARNING OBJECTIVES: *The purpose of the course is to facilitate the learner to:*

- Acquire a basic understanding about scope of mechanical engineering, fundamentals about steam and non-conventional energy sources.
- Acquire a basic knowledge about conventional and advanced manufacturing processes.
- Acquiring a basic understanding about IC engines refrigeration and air conditioner.
- Acquiring a basic knowledge about power transmission and joining processes.
- Acquiring a basic insight into future mobility, mechatronics, robotics and IoT.

TEACHING-LEARNING PROCESS (GENERAL INSTRUCTIONS)
These are sample Strategies, which teacher can use to accelerate the attainment of the various course outcomes.

1. Adopt different types of teaching methods to develop the outcomes through PowerPoint presentations and Video demonstrations or Simulations.
2. Arrange visits to show the live working models other than laboratory topics.
3. Adopt collaborative (Group Learning) Learning in the class.

MODULE – 1 **(*8 hours*)**

INTRODUCTION TO MECHANICAL ENGINEERING: Role of Mechanical Engineering in Industries and Society. Emerging Trends and Technologies in different sectors such as Energy, Manufacturing, Automotive, Aerospace, and Marine sectors. Steam Formation and Application: Steam formation, Types of steam, applications of steam (No Numerical)

ENERGY SOURCES AND POWER PLANTS: Basic working principles of Hydel power plant, Thermal power plant, nuclear power plant, Solar power plant and Wind power plant.

MODULE – 2 **(*8 hours*)**

MACHINE TOOL OPERATIONS: Lathe: Principle of working of a center lathe, lathe operations: Turning, facing, knurling, thread cutting, taper turning by swiveling the compound rest**.** Drilling Machine: Working of radial drilling machine, drilling operations: drilling, boring, reaming, tapping. Milling Machine: Working principle of horizontal and vertical milling machine, milling operations: plane milling, end milling and slot milling. (No sketches of machine tools, sketches to be used only for explaining the operations).

INTRODUCTION TO ADVANCED MANUFACTURING SYSTEMS: Introduction, components of CNC, advantages and applications of CNC, Introduction to3D printing,

MODULE – 3 **(*8 hours*)**

INTRODUCTION TO IC ENGINES: Components and working principles,4-Stroke Petrol and Diesel engines, Comparison between 4-stroke and 2- stroke engine, Application of IC Engines, performance of IC engines (Simple numerical on IP, BP, FP and Efficiency).

INTRODUCTION TO REFRIGERATION AND AIR CONDITIONING: Principle of refrigeration, Refrigerants and their desirable properties. Working principle of VCR refrigeration system, working principle of room air conditioner & Applications of air Conditioners
Problems on power and efficiency of IC Engine (L2, L3)

MODULE – 4 **(*8 hours*)**
MECHANICAL POWER TRANSMISSION: Gear Drives: Types - spur, helical, bevel, worm and rack and pinion, velocity ratio, simple and compound gear trains (simple numerical problems)**.** Belt Drives: Introduction, Types of belt drives (Flat and V-Belt Drive), Derivation on tension ratio (simple numerical on Tension ratio) **JOINING PROCESSES**: Soldering, Brazing and Welding, Definitions, classification of welding process, Arc welding, Gas welding, (types of flames in Oxyacetylene gas welding) ***Problems on gear ratio and tension ratio (L2, L3)***
MODULE – 5 **(*8 hours*)**
INSIGHT INTO FUTURE MOBILITY TECHNOLOGY: Electric and Hybrid Vehicles, Components of Electric and Hybrid Vehicles. Advantages and disadvantages of Electric Vehicles (EVs) and Hybrid vehicles. **INTRODUCTION TO MECHATRONICS, ROBOTICS and IIOT:** Open-loop and Closed-loop mechatronic systems. Joints & links, Robot anatomy, Applications of Robots in material handling, processing, assembly and inspection. Definition and Characteristics of IIOT, Industry 4.O.

COURSE OUTCOMES:

After successfully completing the course, the student will be able to:

CO1	Describe the role of mechanical engineering in industry and society, fundamentals of steam and energy sources
CO2	Explain the different conventional and advanced machining processes.
CO3	Classify the IC engines, working principle of four stroke petrol, diesel engine, refrigeration, air conditioning.
CO4	Differentiate the different power transmission systems :gear drives and belt drive and different joining processes:welding,brazing,soldering.
CO5	Appraise the aspects of future mobility, configurations of robotics, Characteristics of IIOT and Industry 4.O.

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):

Assessment Type	Maximum Marks	Minimum Passing Marks	Evaluation Details
CIE – IA Tests (A)	30	12	Average of Three Internal Assessment Tests each of 50 marks, scaled down to 30 marks.
Alternate Assessment (B)	20	8	Any two Assessment methods as per 24RNBE4.2 (*if it is project based, one assignment shall be given), scaled to 20 marks.
Total CIE (A+B)	**50**	**20**	**CIE Evaluation is done for a maximum of 50 marks**
SEE (C)	**50**	**18**	**SEE is a theory exam conducted for 100 marks and scaled down to 50 marks. Exam duration shall be for 3 hours.**
CIE + SEE (A+B+C)	**100**	**40**	Final marks shall be the sum of marks scored in Components **A, B and C.**
• The minimum marks to be secured in CIE is 20 out of allotted 50 marks to appear for SEE, with minimum 40 % scored in every component of CIE. • If any courses of 3 credits are of Integrated Course type, for such courses the method suggested for 4 credits IPCC shall be followed.			

SEMESTER END EXAMINATION (SEE):

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

1. The question paper will have ten questions. Each question is set for 20 marks.
2. 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.
3. The students have to answer 5 full questions, selecting one full question from each module.
4. Marks scored by the student shall be proportionally scaled down to 50 Marks

SUGGESTED LEARNING RESOURCES:

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

1. Elements of Mechanical Engineering, K R Gopala Krishna, Subhash Publications, 2008
2. Elements of Workshop Technology (Vol. 1 and 2), Hazra Choudhry and Nirzar Roy, Media Promoters and Publishers Pvt. Ltd., 2010.
3. Electric and Hybrid Vehicles, A K Babu, Second Edition,2022

REFERENCE BOOKS

1. An Introduction to Mechanical Engineering, Jonathan Wickert and Kemper Lewis, Third Edition, 2012
2. Manufacturing Technology- Foundry, Forming and Welding, P.N.Rao Tata McGraw Hill 3rdEd., 2003.
3. Robotics, Appu Kuttan KK K. International Pvt Ltd, volume 1

ACTIVITY BASED LEARNING (SUGGESTED ACTIVITIES IN CLASS)/ PRACTICAL BASED LEARNING

1. Demonstration of lathe/milling/drilling/CNC operations
2. Demonstration of working of IC engine/refrigerator
3. Demonstration of metal joining process
4. Video demonstration of latest trends in mobility/robotics

B.E. (Elements of Electrical Engineering)
Outcome Based Education (OBE) and Choice Based Credit System (CBCS)
SEMESTER – I / II

Course Title:	**Elements of Electrical Engineering (For EEE Students)**	
Course Code:	**BEEEE103/203**	**CIE Marks : 50**
Course Type (Theory/Practical /Integrated)	**Theory**	**SEE Marks : 50**
		Total Marks : 100
Teaching Hours/Week (L: T:P)	**2:2:0**	**Exam Hours : 03**
Total Hours of Pedagogy	**40 hours**	**Credits : 03**

COURSE LEARNING OBJECTIVES: The purpose of the course is to facilitate the learner to:

- ➢ Know the methods of electric power generation, transmission and distribution schemes.

Learn the laws used in the analysis of electric circuits.

- ➢ Get insight about the behavior of circuit elements in single phase AC circuits.
- ➢ Understand the concept of three phase AC system.
- ➢ Know the construction and operation of electrical machines.
- ➢ Understand concepts of domestic wiring, general safety measures, working of circuit protecting devices and earthing.

Teaching-Learning Process (General Instructions)

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

- ➢ Apart from conventional lecture methods various types of innovative teaching techniques through videos, animation films, PPTs may be adopted so that the delivered lesson can progress the students in theoretical, applied and practical skills.
- ➢ Demonstration of cut section models of electrical machines.
- ➢ Demonstration of working of fuse, MCBs, 2-way, 3-way control of lamps.

MODULE-1 **8 Hours**

INTRODUCTION: Power generation using Thermal, Hydel, Nuclear, Solar and Wind energy (Block diagram approach), general structure of electrical power transmission and distribution scheme (single line diagram approach).

DC CIRCUITS: Ohm's Law and its limitations, KCL, KVL, Series, parallel and series parallel circuits, concept of power and energy, Numericals (Branch current method restricted to 2 loops).

MODULE-2 **8 Hours**

AC CIRCUITS: Generation of sinusoidal voltage, definitions of time period, frequency, amplitude, phase, phase difference, average value, RMS value, form factor, peak factor of sinusoidal wave. Analysis of R, L, C, RL, RC and RLC series, parallel and series-parallel circuits with phasor diagrams, concepts of real power, reactive power, apparent power and power factor, Numericals.

MODULE-3	8 Hours
THREE PHASE AC CIRCUITS: Advantages of three phase system over single phase, Generation of 3ϕ AC voltage, Types of connections, Relation between line and phase quantities in balanced star and delta connections, measurement of three phase power and power factor by 2 wattmeter method, Numericals. **THREE PHASE SYNCHRONOUS GENERATORS:** Construction and types, working principle, concept of synchronous speed, EMF equation, Numericals on EMF equation (Excluding derivation and calculation of winding factor)	
MODULE-4	**8 Hours**
THREE PHASE INDUCTION MOTOR: Construction and types, concept of rotating magnetic field, working principle, slip and its significance, Applications, Numericals. **SINGLE PHASE TRANSFORMERS:** Necessity of transformer, construction and types of transformers (core and shell type), working principle, turns ratio, EMF equation, losses, efficiency and condition for maximum efficiency, voltage regulation, Numericals.	
MODULE-5	**8 Hours**
DC MOTOR: Principle of operation, back emf and its significance. Torque equation, types of motors, characteristics of DC motors (series & shunt only). Applications of DC motors Numerical. **DOMESTIC WIRING, EQUIPMENT AND PERSONAL SAFETY MEASURES:** Types of wiring, 2 way and 3 way control of lamp, necessity of earthing, types of earthing, working of fuse and MCB. Electric shock, Precautions from electric shock.	

COURSE OUTCOMES:

After successfully completing the course, the student will be able to:

CO1	Understand the concepts of various energy sources, power transmission and distribution scheme.
CO2	Apply the Basic Laws to Electric circuits
CO3	Analyze the behavior of circuit elements in single phase and three phase AC circuits
CO4	Know the construction, working principles of electrical machines
CO5	Understand concepts of domestic wiring, general safety measures, working of circuit protecting devices and earthing.

ASSESSMENT DETAILS (BOTH CIE AND SEE)

Assessment Type	Maximum Marks	Minimum Passing Marks	Evaluation Details
CIE – IA Tests (A)	30	12	Average of Three Internal Assessment Tests each of 50 marks, scaled down to 30 marks.
Alternate Assessment (B)	20	8	Any two Assessment methods as per 24RNBE4.2 (*if it is project based, one assignment shall be given), scaled to 20 marks.
Total CIE (A+B)	**50**	**20**	**CIE Evaluation is done for a maximum of 50 marks**
SEE (C)	**50**	**18**	**SEE is a theory exam conducted for 100 marks and scaled down to 50 marks. Exam duration shall be for 3 hours.**
CIE + SEE (A+B+C)	**100**	**40**	Final marks shall be the sum of marks scored in Components **A, B and C.**
The minimum marks to be secured in CIE is 20 out of allotted 50 marks to appear for SEE, with minimum 40 % scored in every component of CIE.			

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). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student 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.Theory SEE will be conducted by Institute as per the scheduled timetable, with common question papers for the course (**duration 03 hours**)

Question Paper Pattern for SEE:

1. The question paper will have ten questions. Each question is set for 20 marks.
2. 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.
3.The students have to answer 5 full questions, selecting one full question from each module.
4. Marks scored by the student shall be proportionally scaled down to 50 Marks.

Suggested Learning Resources:
Books:

1) Basic Electrical Engineering by D C Kulshreshtha, Tata McGraw Hill, First Edition 2019.
2) A text book of Electrical Technology by B.L. Theraja, Volume 1, S Chand and Company, reprint edition 2014.
3) A text book of Electrical Technology by B.L. Theraja, Volume 3, S Chand and Company, reprint edition 2014.

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

- Visit to campus switch yard
- Visit to Electrical machines lab to explain DC, single phase AC, Three phase AC supply systems

B.E. (For ECE)
Outcome Based Education (OBE) and Choice Based Credit System (CBCS)
SEMESTER – I /II

Course Title:	**Basic Electronics (For ECE)**		
Course Code:	**BBEEC103/203**	**CIE MARKS**	50
L: T: P	**2:2:0**	**SEE MARKS**	50
Credits:	**3**	**EXAM HOURS**	**3**
Total Hours of Pedagogy	**40 hours**	**Total Marks**	**100**

COURSE LEARNING OBJECTIVES: Students will be taught

1. Operation of Semiconductor diode, Zener diode and Special purpose diodes and their applications.
2. Biasing circuits for transistor (BJT) as an amplifier.
3. Study of linear Op-amps and its applications.
4. Logic circuits and their optimization.
5. Principles of Communication.

Teaching-Learning Process (General Instructions)

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

1. Lecturer method (L) does not mean only the traditional lecture method, but a different type of teaching method may be adopted to develop the outcomes.
2. Arrange visits to nearby PSUs such as BHEL, BEL, ISRO, etc., and small-scale hardware Industries to give brief information about the electronics manufacturing industry.
3. Show Video/animation films to explain the functioning of various analog and digital circuits.
4. Encourage collaborative (Group) Learning in the class
5. Ask at least three HOTS (Higher-order Thinking) questions in the class, which promotes critical thinking.
6. Adopt Problem-Based Learning (PBL), which fosters students' Analytical skills, develop thinking skills such as the ability to evaluate, generalize, and analyse information rather than simply recall it.
7. Topics will be introduced in multiple representations.
8. Show the different ways to solve the same problem and encourage the students to come up with their own creative ways to solve them.
9. Discuss how every concept can be applied to the real world - and when that's possible, it helps improve the students' understanding.

MODULE – 1 **(8 hrs)**

Semiconductor Diodes: Introduction, PN Junction diode, Characteristics and Parameters, Diode Approximations, DC Load Line analysis.

Diode Applications: Introduction, Half Wave Rectification, Full Wave Rectification, Full Wave Rectifier Power Supply: Capacitor Filter Circuit, RC π Filter.

Zener Diodes: Junction Breakdown, Circuit Symbol and Package, Characteristics and Parameters, Equivalent Circuit, Zener Diode Voltage Regulator.

MODULE – 2 **(8 hrs)**

Bipolar Junction Transistors: Introduction, BJT Voltages & Currents, BJT Amplification, Common Base Characteristics, Common Emitter Characteristics, Common Collector Characteristics, **BJT Biasing**: Introduction, DC Load line and Bias point, Biasing techniques, Transistor as a Switch.

Feedback: Feedback Principle, Types of feedback: Positive and Negative Feedback, Advantages of negative feedback. **Oscillators:** Principle of Oscillations, Phase Shift Oscillator, Wien Bridge Oscillator.

MODULE – 3 (8 hrs)
Operational Amplifiers: Introduction, The Operational Amplifier, Block Diagram Representation of Typical Op-Amp, Schematic Symbol, Op-Amp parameters - Gain, input resistance, Output resistance, CMRR, Slew rate, Bandwidth, input offset voltage, Input bias Current and Input offset Current, The Ideal Op-Amp, Equivalent Circuit of Op-Amp, Open Loop Op-Amp configurations, Differential Amplifier, Inverting & Non Inverting Amplifier. **Op-Amp Applications:** Inverting Configuration, Non-Inverting Configuration, Differential Configuration, Voltage Follower, Integrator, Differentiator.
MODULE – 4 (8 hrs)
Boolean Algebra and Logic Circuits: Binary numbers, Number Base Conversion, Octal & Hexa Decimal Numbers, Complements, Basic definitions, Axiomatic Definition of Boolean Algebra, Basic Theorems and Properties of Boolean Algebra, Boolean Functions, Canonical and Standard Forms, Other Logic Operations, Digital Logic Gates. **Combinational logic**: Introduction, Design procedure, Adders- Half adder, Full adder.
MODULE – 5 (8 hrs)
Analog Communication Schemes – Modern communication system scheme, Information source, input transducer, Transmitter, Channel or Medium – Hardwired and Soft wired, Noise, Receiver, Multiplexing. Types of modulation AM, FM, PM, Concept of Radio wave Propagation (Ground, space, Sky). **Digital Modulation Schemes**: ASK, PSK, FSK, Advantages of Digital communication over Analog communication.

COURSE OUTCOMES:

After successfully completing the course, the student will be able to

CO1	Gain fundamental Knowledge of the construction, operation, and characteristics of semiconductor devices.
CO2	Understand the characteristics of BJT and Oscillator operations.
CO3	Understand the Op-amps operation and analyse its applications.
CO4	Acquire competence in creating basic digital circuits using logic gates and understanding their functions.
CO5	Explore the foundational concepts of basic communication systems.

ASSESSMENT DETAILS (Both CIE and SEE)

Assessment Type	Maximum Marks	Minimum Passing Marks	Evaluation Details
CIE – IA Tests (A)	30	12	Average of Three Internal Assessment Tests each of 50 marks, scaled down to 30 marks.
Alternate Assessment (B)	20	8	Any two Assessment methods as per 24RNBE4.2 (*if it is project based, one assignment shall be given), scaled to 20 marks.
Total CIE (A+B)	**50**	**20**	**CIE Evaluation is done for a maximum of 50 marks**

SEE (C)	**50**	**18**	**SEE is a theory exam conducted for 100 marks and scaled down to 50 marks. Exam duration shall be for 3 hours.**
CIE + SEE (A+B+C)	**100**	**40**	Final marks shall be the sum of marks scored in Components **A, B and C.**
• The minimum marks to be secured in CIE is 20 out of allotted 50 marks to appear for SEE, with minimum 40 % scored in every component of CIE. • If any courses of 3 credits are of Integrated Course type, for such courses the method suggested for 4 credits IPCC shall be followed.			

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.

Semester End Examination (SEE):

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

1. The question paper will have ten questions. Each question is set for 20 marks.
2. 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.
3. The students have to answer 5 full questions, selecting one full question from each module.
4. Marks scored by the student shall be proportionally scaled down to 50 Marks.

Suggested Learning Resources:

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

1. Electronic Devices and Circuits, David A Bell, 5th Edition, Oxford, 2016
2. Op-amps and Linear Integrated Circuits, Ramakanth A Gayakwad, Pearson Education, 4th Edition
3. Digital Logic and Computer Design, M. Morris Mano, PHI Learning, 2008 ISBN-978-81-203-0417-8
4. S L Kakani and Priyanka Punglia, ‘Communication Systems’, New Age International Publisher, 2017.

B.E. (Common to CSE Allied Branches)
Outcome Based Education (OBE) and Choice Based Credit System (CBCS)
SEMESTER – I / II

Course Title:	**Principles of Programming using C**		
Course Code:	**BPOPS103/203**	**CIE MARKS**	**50**
L: T: P:	**2:0:2**	**SEE MARKS**	**50**
Credits:	**03**	**EXAM HOURS**	**03**
Total Hours of Pedagogy	**40 hours Theory+8 to 10 Lab slots**	**Total Marks**	**100**

COURSE LEARNING OBJECTIVES: The purpose of the course is to facilitate the learner to:

- Elucidate the basic architecture and functionalities of a computer.
- Apply programming constructs of C language to solve real-world problems.
- Explore user-defined data structures like arrays in implementing solutions to problems
- Explore user-defined data structures like structures, union & pointers in implementing solutions to problems.
- Design & develop solutions to problems using structured programming constructs such as functions & procedures.

MODULE – 1 **(8 hrs)**

Introduction to Computers: Computer, Characteristics of Computers, Stored Program Concept, History of Computers, Classification of Computers, Applications of Computers, Basic Organization of a Computer, Lab Session- Inside the Computer, Motherboard.

Input and output Devices: Input Devices, Output Devices of Computers.

Introduction to C: Introduction, Structure of C Program, Writing the first C Program, Files Used in a C Program, Compiling and Executing C Program, Using Comments, C Tokens, character Set in C, Keywords, Identifiers.

Textbook: Chapter 1.1-1.9, 2.1-2.2,9.1-9.10

MODULE – 2 **(8hrs)**

Introduction to C: Basic Data Types, Variables, Constants, Input/Output statements in C, Operators in C, Type Conversion and Typecasting.

Decision Control and Looping Statements: Introduction to Decision Control Statements, Conditional Branching Statements, Iterative Statements, Nested Loops, Break and Continue Statements, goto statements.

Textbook: Chapter 9.11-9.16,10.1-10.6

MODULE – 3 **(8hrs)**

Arrays: Introduction, Declaration of Arrays, Accessing the Elements of an Array, storing values in Arrays, Operations on Arrays, Two dimensional arrays, Operations on two-dimensional arrays.

Pointers: Introduction to pointers, Declaring Pointer Variables, Pointer Expressions and Pointer Arithmetic.

Textbook: Chapter 12.1 - 12.5,12.7,12.8,14.2 -14.6

MODULE – 4 **(8hrs)**

Functions: Introduction, using functions, Function Declaration/Function Prototype, Function Definition, Function call, return statement, passing parameters to functions, Passing arrays to functions, Scope of variables, Storage classes, Recursive functions.

Strings: Introduction, Operations on strings, Arrays of Strings.

Textbook: Chapters 11.1 - 11.10,12.6,13.1,13.4,13.6

MODULE – 5 **(8hrs)**

Structure, Union, Enumerated Data Type and Files: Introduction, Nested Structure, Array of structures, Structures and functions, Unions.

Files: Introduction to files, using files in C, reading and writing data files.

Textbook: Chapter 15.1 – 15.4, 15.6, 16.1-16.4

PRACTICAL COMPONENT OF IPCC *(May cover all / major modules)*

Experiments (8-10 Lab slots)

1. Simulation of a Simple Calculator.
2. Compute the roots of a quadratic equation by accepting the coefficients. Print appropriate messages.
3. An electricity board charges the following rates for the use of electricity: for the first 200 units 80 paise per unit: for the next 100 units 90 paise per unit: beyond 300 units Rs 1 per unit. All users are charged a minimum of Rs.100 as the meter charge. If the total amount is more than Rs 400, then an additional surcharge of 15% of the total amount is charged. Write a program to read the name of the user, number of units consumed and print out the charges.
4. Write a C Program to display the following by reading the number of rows as input.

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

5. Implement Binary Search on Integers.
6. Implement Matrix multiplication and validate the rules of multiplication.
7. Sort the given set of N numbers using Bubble sort.
8. Write functions to implement string operations such as compare, concatenate, and find string length. Use the parameter passing techniques.
9. Develop a program using pointers to compute the sum, mean and standard deviation of all elements stored in an array of N real numbers.
10. Develop a basic database management system that allows users to create, read, update, and delete records in a database.
11. Develop a calendar application that allows users to manage events, set reminders, and view their schedule.

COURSE OUTCOMES:

After successfully completing the course, the student will be able to:

CO1	Acquire the fundamental knowledge of C language to solve the real-world problems.
CO2	Demonstrate the working of decision making and Looping constructs.
CO3	Signify the usage of derived data structures and file IO operations.
CO4	Design reusable codes by utilizing modular programming constructs.

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) and for the SEE minimum passing mark is 35% of the maximum marks (18 out of 50 marks). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student 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.

Continuous Internal Evaluation (CIE):

Assessment Type	Maximum Marks	Minimum Passing Marks	Evaluation Details
CIE- IA Tests (A)	20	8	Average of Three Internal Assessment Tests each of 50 marks, scaled down to 20 marks.
Alternate Assessment (B)	10	4	Any one Assessment methods as per 24RNBE4.2 scaled to 10 marks.
Total CIE Theory (A+B)	**30**	**12**	**Marks of Tests and Assignments awarded for a maximum of 30.**
CIE Practical	12	5	Marks awarded for Weekly Conduction of Experiments and Submission of Laboratory records, scaled to 12 marks.
CIE Practical Test	8	3	Average of marks of Two tests, each conducted for 100 marks covering all experiments, scaled to 8.
Total CIE Practical (C)	**20**	**8**	**Marks of Experiments, Record and Test awarded for a maximum of 20 marks.**
CIE: Theory + Practical (A + B + C)	**50**	**20**	**CIE Evaluation is done for a maximum of 50 marks.**
SEE (D)	**50**	**18**	**SEE is a theory exam, conducted for 100 marks and scaled down to 50 marks. Exam duration shall be for 3 hours.**
CIE+SEE (A+B+C+D)	**100**	**40**	**Final marks shall be the sum of marks scored in Components A, B, C and D**

- The minimum marks to be secured in CIE is 20 out of allotted 50 marks to appear for SEE, with minimum 40 % scored in every component of CIE. The laboratory component of the IPCC shall be for CIE only. However, in SEE, the questions from the laboratory component shall be included in their respective modules only.

SEE for IPCC

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

1) The question paper will have ten questions. Each question is set for 20 marks.
2) 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.
3) The students must answer 5 full questions, selecting one full question from each module.
4) Marks scored by the student shall be proportionally scaled down to 50 Marks

The theory portion of the IPCC shall be for both CIE and SEE, whereas the practical portion will have a CIE component only. Questions mentioned in the SEE paper may include questions from the practical component.

Textbooks

1) Computer fundamentals and programming in c, “Reema Thareja”, Oxford University, Second edition, 2017.

Reference Books:

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

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

- Quizzes
- Assignments
- Seminars

Engineering Science
Common Course

(COMMON TO ALL BRANCHES)

COMPUTER AIDED ENGINEERING DRAWING (BCEDK103/203)

B.E. (Common to All Branches)
Outcome Based Education(OBE) and Choice Based Credit System(CBCS)
SEMESTER – I / II

Course Title:	**Computer Aided Engineering Drawing**		
Course Code:	**BCEDK103/203**	**CIE MARKS**	**50**
L : T : P:	**2:0:2**	**SEE MARKS**	**50**
Credits:	**3**	**EXAM HOURS**	**3 Hrs**
Total Hours of Pedagogy	**28 hours Theory+28 hours lab**	**Total Marks**	**100**

COURSE LEARNING OBJECTIVES:

The purpose of the course is to facilitate the learner:

1. To understand the basic principles and conventions of engineering drawing
2. To use drawing as a communication mode
3. To generate pictorial views using CAD software
4. To understand the development of lateral surfaces of solids and Isometric Projections.
5. To visualize engineering components

Teaching-Learning Process (General Instructions)

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

1. Students should be made aware of powerful engineering communication tool –Drawing.
2. Simple Case studies can be suitably selected by the teacher for hands on practice to induce the feel of fruitfulness of learning.
3. Appropriate Models, Power Point presentation, Charts, Videos, shall be used to enhance visualization before hands on practice.
4. For application problems use very generally available actual objects. (Example: For rectangular prism / object; matchbox, carton boxes, book, etc can be used. Similarly, for other shapes)
5. Use any CAD software for generating orthographic and pictorial views.
6. Make use of sketch book with graph sheets for manual / preparatory sketching

MODULE – 1 **12Hrs**

Introduction: (for CIE only)

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 1st and 3rd quadrants**.**

Orthographic projections of lines (Placed in First quadrant only).

Orthographic projections of planes viz triangle, square, rectangle, pentagon, hexagon, and circular laminae (Placed in First quadrant only using change of position method).

Application on projections of Lines & Planes (For CIE only)

Problems on projection of points, lines and planes. (L2, L3)

Teaching Learning Process: Chalk and Talk / PPT / Demonstration using software.

MODULE – 2 **18Hrs**

Orthographic Projection of Solids:

Orthographic projection of right regular solids **(Solids Resting on HP only)**: Prisms & Pyramids (triangle, square, rectangle, pentagon, hexagon), Cones, Cubes &Tetrahedron.

Projections of Frustum of cone and pyramids (For practice only, NOT for CIE and SEE).

Problems on projection of solids. (L2, L3)

Teaching Learning Process: Chalk and Talk / PPT / Demonstration using software.

MODULE – 3 **10Hrs**

Isometric Projections:

Isometric scale, Isometric projection of hexahedron (cube), right regular prisms, pyramids, cylinders, cones and spheres. **Isometric projection of combination of two simple solids.** **Conversion of simple isometric drawings into orthographic views.** Problems on applications of Isometric projections of simple objects / engineering components. ***Introduction to drawing views using 3D environment (For CIE only).*** Problems on Isometric Projections. (L2, L3) Teaching Learning Process: Chalk and Talk / PPT / Demonstration using software.
MODULE – 4 **10Hrs**
Development of Lateral Surfaces of Solids: Development of lateral surfaces of right regular prisms, cylinders, pyramids and cones resting with base on HP only. Development of lateral surfaces of their frustums and truncations**. (Section Planes inclined to HP only).** ***Problems on applications of development of lateral surfaces like funnels and trays (For CIE only)*** Problems on Development of lateral surfaces of solids. (L2, L3) Teaching Learning Process: Chalk and Talk / PPT / Demonstration using software.
MODULE – 5 **6Hrs**
Multidisciplinary Applications & Practice (For CIE Only): **Free hand Sketching:** True free hand, Guided Free hand, Roads, Buildings, Utensils, Hand tools & Furniture's etc Drawing Simple Mechanisms; Bicycles, Tricycles, Gear trains, Ratchets, two-wheeler cart &Four-wheeler carts to dimensions etc **Electric Wiring and lighting diagrams:** Like, Automatic fire alarm, Call bell system, UPS system, Basic power distribution system using suitable software **Basic Building Drawing:** Like, Architectural floor plan, basic foundation drawing, steel structures- Frames, bridges, trusses using Auto CAD or suitable software, **Electronics Engineering Drawings-** Like, Simple Electronics Circuit Drawings, practice on layers concept. Problems on application problems (L2, L3, L4) Teaching Learning Process: Chalk and Talk / PPT / Demonstration using software.

COURSE OUTCOMES:

After successfully completing the course, the student will be able to:

CO1	Create accurate orthographic projections of points, lines, and planes in the first quadrant, and solve related projection problems.
CO2	Create orthographic projections of prisms, pyramids, cones, cubes, and tetrahedrons resting on the horizontal plane.
CO3	Apply techniques to represent prisms, pyramids, cones, cubes, and tetrahedrons in orthographic projections.
CO4	Create isometric projections of simple and combined solids.
CO5	Develop the lateral surfaces of the solids.

ASSESSMENT DETAILS (Both CIE and SEE)

The weight age of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks) and that for SEE minimum passing marks is 35% of the maximum marks (18 marks). 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 of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

Continuous Internal Evaluation (CIE)

- CIE shall be evaluated for max. marks of 100 and later the same shall be scaled-down to 50 marks as detailed below:
- CIE component should comprise of Continuous evaluation of drawing work of students as and when the Modules are covered based on below detailed weight age.

Module	Max. Marks Weightage	Evaluation Weightage in marks	
		Computer display and print out (a)	Sketching(b)
Module 1	15	10	05
Module 2	20	15	05
Module 3	20	15	05
Module 4	20	15	05
Module 5	25	25	00
Total	**100**	**80**	**20**
Consideration of Class work		**Total of [(a)+(b)=100] scaled down to 30**	

- At least one Test covering all the modules is to be conducted for 100 marks and evaluation to be based SEE pattern, and the same is to be scaled down to 20Marks.
- The final CIE = Class work marks + Test marks

Continuous Internal Evaluation (CIE)

Assessment Type	Maximum Marks	Minimum Passing Marks	Evaluation Details
CIE – IA Tests (A)	30		Continuous evaluation of drawing work evaluated module wise for 80 Marks, scaled down to 30 marks.
Alternate Assessment (B)	20		Two tests covering all the modules is to be conducted for 50 marks each and evaluation to be based SEE pattern, scaled to 20 marks.
Total CIE (A+B)	**50**	**20**	**CIE Evaluation is done for a maximum of 50 marks**
SEE (C)	**50**	**18**	**SEE is a theory exam conducted for 100 marks and scaled down to 50 marks. Exam duration shall be for 3 hours.**
CIE + SEE (A+B+C)	**100**	**40**	Final marks shall be the sum of marks scored in Components **A, B and C.**

- The minimum marks to be secured in CIE is 20 out of allotted 50 marks to appear for SEE, with minimum 40 % scored in every component of CIE.
- If any courses of 3 credits are of Integrated Course type, for such courses the method suggested for 4 credits IPCC shall be followed.

Semester End Examination (SEE)

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

- SEE shall be conducted and evaluated for maximum marks 100. Marks obtained shall be accounted for SEE final marks, reducing it by50%
- Question paper shall be set jointly by both Internal and External Examiner and made available for each batch as per schedule. ***Questions are to be set preferably from Text Books***.
- **Related to Module-1**: One full question shall be set from "***points & lines***" and "***planes***" where students will be given an option to answer any one.
- Evaluation shall be carried jointly by both the examiners.
- One full question shall be set from each of the Module from Modules 1,2,3 and 4 as per the below tabled weightage details.
- ***However, the student may be awarded full marks, if he/she completes solution on computer display without sketch.***

Module	Max. Marks Weightage	Evaluation Weightage in marks	
		Computer display and print out (a)	Preparatory 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**	

Suggested Learning Resources:

Text Books

1. S.N. Lal, & T Madhusudhan:, Engineering Visualization, 1st Edition, Cengage,Publication
2. Parthasarathy N. S., Vela Murali, Engineering Drawing, Oxford University Press, 2015.

Reference Books

3. Bhattacharya S. K., Electrical Engineering Drawing, New Age International publishers, second edition 1998, reprint2005.
4. Chris Schroder, Printed Circuit Board Design using AutoCAD, Newnes,1997.
5. K S Sai Ram Design of steel structures, , Third Edition byPearson
6. Nainan p kurian Design of foundation systems, Narosapublications
3. A S Pabla, Electrical power distribution, 6th edition, Tata Mcgrawhill
7. Bhatt, N.D., Engineering Drawing: Plane and Solid Geometry, 53rd edition, Charotar Publishing House Pvt. Limited, 2019.
8. K. R. Gopalakrishna, & Sudhir Gopalakrishna: Textbook Of Computer Aided Engineering Drawing, 39thEdition, Subash Stores, Bangalore,2017

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

- Hands on experience in workshop using sheet metal.

Engineering Science Courses – I

Elective Course

INTRODUCTION TO CIVIL ENGINEERING (BESCK104A/204A)
INTRODUCTION TO ELECTRICAL ENGINEERING (BESCK104B/204B)
INTRODUCTION TO ELECTRONICS ENGINEERING (BESCK104C/204C)
INTRODUCTION TO MECHANICAL ENGINEERING (BESCK104D/204D)
INTRODUCTION TO C PROGRAMMING (BESCK104E/204E)

B.E. (Common to All Branches)
Outcome Based Education(OBE) and Choice Based Credit System(CBCS)
SEMESTER – I / II

Course Title:	**Introduction to Civil Engineering (For Other Non-CV Branch students)**		
Course Code:	**BESCK104A/204A**	**CIE MARKS**	**50**
L : T : P	**3:0:0**	**SEE MARKS**	**50**
Credits:	**03**	**EXAM HOURS**	**03**
Total hours of Pedagogy	**40 hours Theory**	**Total Marks**	**100**

COURSE LEARNING OBJECTIVES: The purpose of the course is to facilitate the learner:

- To make students learn the scope of various specializations of civil engineering.
- To develop students' ability to analyse the problems involving forces, moments with their applications.
- To develop the student's ability to find out the center of gravity and moment of inertia and their applications.

MODULE – 1 **(8 hrs)**

CIVIL ENGINEERING DISCIPLINES AND BUILDING SCIENCE:
Introduction to Civil Engineering: Surveying, Structural Engineering, Geotechnical Engineering, Hydraulics & Water Resources, Transportation Engineering, Environmental Engineering, Construction planning & Project management.
Basic Materials of Construction: Desirable Properties and application of Bricks, Structural steel, Cement, wood, fine aggregates and coarse aggregates
Structural elements of a building: foundation, plinth, sill, lintel, chejja, Masonry wall, column, beam, slab and staircase.

MODULE – 2 **(8 hrs)**

RESULTANT OF COPLANAR FORCE SYSTEM: Basic dimensions and units, Idealizations, Force-Characteristic and Classification of force system, Principle of transmissibility of a force, Principle of superposition and Principle of physical independence of forces, Resolution and Composition of forces, Resultant of coplanar concurrent force system- Parallelogram law of forces, Moment and Couple, Resultant of coplanar non-concurrent force system- Varignon's theorem. Numerical examples on moment, couple, resultant of coplanar concurrent and non-concurrent force system.

MODULE – 3 **(8 hrs)**

EQUILIBRIUM OF COPLANAR CONCURRENT FORCE SYSTEM: Conditions of equilibrium, Free body diagrams, Equilibrium of coplanar concurrent force system, Lami's theorem, Numerical examples on equilibrium of force and Lami's theorem.

MODULE – 4 **(8 hrs)**

CENTROID OF PLANE AREAS: Introduction, Differences between centre of gravity and centroid, symmetrical and asymmetrical axis**,** Locating the centroid of rectangle, triangle, circle, semicircle, quadrant and sector of a circle using method of integration (no derivations), Numerical examples on centroid of simple built up sections.
MODULE – 5 **(8 hrs)**
MOMENT OF INERTIA OF PLANE AREAS: Introduction-Moment of inertia, Polar moment of inertia, radius of gyration, Parallel axes theorem, Perpendicular axis theorem, Moment of inertia of rectangular, triangular, semi-circular and quarter-circular areas using the method of integration (no derivations), Numerical examples on moment of inertia of simple built up sections.

COURSE OUTCOMES:

After successfully completing the course, the student will be able to:

CO1	Understand Civil Engineering disciplines and fundamentals of construction materials and elements
CO2	Develop engineering problem skills for coplanar force system.
CO3	Understand the concepts of centroid and moment of inertia and their engineering applications
CO4	Apply theoretical principles to practical numerical problems in civil engineering

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) and for the SEE minimum passing mark is 35% of the maximum marks (18 out of 50 marks). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student 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.

Continuous Internal Evaluation (CIE):

Assessment Type	Maximum Marks	Minimum Passing Marks	Evaluation Details
CIE – IA Tests (A)	30	12	Average of Three Internal Assessment Tests each of 50 marks, scaled down to 30 marks.
Alternate Assessment (B)	20	8	Any two Assessment methods as per 24RNBE4.2 (*if it is project based, one assignment shall be given), scaled to 20 marks.
Total CIE (A+B)	**50**	**20**	**CIE Evaluation is done for a maximum of 50 marks**
SEE (C)	**50**	**18**	**SEE is a theory exam conducted for 100 marks and scaled down to 50 marks. Exam duration shall befor 3 hours.**

CIE + SEE **(A+B+C)**	**100**	**40**	Final marks shall be the sum of marks scored in Components **A, B and C.**
· The minimum marks to be secured in CIE is 20 out of allotted 50 marks to appear for SEE, with minimum 40 % scored in every component of CIE. · If any courses of 3 credits are of Integrated Course type, for such courses the method suggested for 4 credits IPCC shall be followed.			

SEE

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

1) The question paper will have ten questions. Each question is set for 20 marks.
2) 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.
3) The students have to answer 5 full questions, selecting one full question from each module.
4) Marks scored by the student shall be proportionally scaled down to 50 Marks

Suggested Learning Resources:

Text Books

1) Bansal R. K, Basic Civil Engineering and Engineering Mechanics, 2015, Laxmi Publications; Third edition.
2) Bhavikatti S S, Engineering Mechanics, 2019, New Age International Publishers, Seventh edition.
3) Kolhapure B K, Elements of Civil Engineering and Engineering Mechanics, 2018, BookLeey.
4) H J Sawant and S P Nitsure, Elements of Civil Engineering and Mechanics, 2018, Technical Publication.
5) H S Vishwanath, Elements of Civil Engineering and Mechanics, 2018, Sapna Book House.

Reference Books

1) Beer F.P. and Johnston E. R., Vector Mechanics for Engineers: Statics and Dynamics, 2017, McGraw Hill Education.
2) Hibbeler R. C., Engineering Mechanics: Statics and Dynamics, 2017, Pearson Education.
3) Timoshenko S, Young D. H., Rao J. V., Engineering Mechanics, 5th Edition, 2017, McGraw Hill Education.

B.E. (Common to All Branches)
Outcome Based Education(OBE) and Choice Based Credit System(CBCS)
SEMESTER – I / II

Course title	**Introduction to Electrical Engineering (For Other Non-EE Branch students)**		
Course Code:	**BESCK104B/204B**	**CIE Marks**	**50**
Course Type (Theory/Practical /Integrated)	**Theory**	**SEE Marks**	**50**
		Total Marks	**100**
Teaching Hours/Week (L:T:P)	**3:0:0**	**Exam Hours**	**03**
Total Hours of Pedagogy	**40 hours**	**Credits**	**03**

COURSE LEARNING OBJECTIVES: The purpose of the course is to facilitate the learner to:

- ➢ Know the methods of electric power generation, transmission and distribution schemes.
- ➢ Learn the laws used in the analysis of Electric circuits.
- ➢ Understand the concept of three phase AC system.
- ➢ Introduce concepts of circuit protecting devices and earthing.
- ➢ Know the construction and operation of electrical machines.
- ➢ To get insight about electric vehicles and hybrid electric vehicles.

Teaching-Learning Process (General Instructions)

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

- ➢ Apart from conventional lecture methods various types of innovative teaching techniques through videos, animation films, PPTs may be adopted so that the delivered lesson can progress the students in theoretical, applied and practical skills.
- ➢ Demonstration of cut section models of electrical machines.
- ➢ Demonstration of working of fuse, MCBs, 2-way, 3-way control of lamps.

MODULE-1 **8 Hours**

INTRODUCTION: Power generation using Hydel, Thermal, Nuclear, Solar and Wind energy (Block diagram approach), general structure of electrical power transmission and distribution scheme (single line diagram approach).

DC CIRCUITS: Ohm's Law and its limitations, KCL, KVL, Series, parallel and series parallel circuits, concept of power and energy, Numericals.

MODULE-2 **8 Hours**

AC CIRCUITS: Generation of sinusoidal voltage, definitions of time period, frequency, amplitude, phase, phase difference, average value, RMS value, form factor, peak factor of sinusoidal wave. Analysis of R, L, C, RL, RC, RLC series circuits with phasor diagram, concepts of real power, reactive power, apparent power and power factor, Numericals.

MODULE-3	8 Hours
THREE PHASE AC CIRCUITS: Advantages of three phase system over single phase, Generation of 3ϕ AC voltage, Types of connections, Relation between line and phase quantities in balanced star and delta connections and expression for power, Numericals.	
THREE PHASE SYNCHRONOUS GENERATORS: Construction and types, working principle, concept of synchronous speed, EMF equation, Numericals on EMF equation (Excluding derivation and calculation of winding factor)	
MODULE-4	**8 Hours**
THREE PHASE INDUCTION MOTOR: Construction and types, concept of rotating magnetic field, working principle, slip and its significance, Applications, Numericals. **SINGLE PHASE TRANSFORMERS:** Necessity of transformer, construction and types of transformers (core and shell type), working principle, EMF equation, Transformation ratio, losses and efficiency, voltage regulation, numericals.	
MODULE-5	**8 Hours**
ELECTRICITY BILL: Power rating of household appliances such as air conditioners, PCs, Laptops, printers etc., Definition of "unit" used for consumption of electrical energy, calculation of electricity bill for domestic consumers. **DOMESTIC WIRING, EQUIPMENT AND PERSONAL SAFETY MEASURES:** Types of wiring, 2 ways and 3way control of lamp, necessity of earthing, types of earthing, working of fuse and MCB. Electric shock, Precautions from electric shock. **INTRODUCTION TO ELECTRIC VEHICLES:** Configuration of an EV, concept of HEV drive train and types of HEV drive trains (Block diagram approach only).	

COURSE OUTCOMES:

After successfully completing the course, the student will be able to:

CO1	Understand the concepts of various energy sources, power transmission and distribution scheme.
CO2	Apply the Basic Laws to Electric circuits.
CO3	Understand the construction and working of electrical machines.
CO4	Analyze methods of electricity billing, working of circuit protective devices and personal safety measures
CO5	Understand the composition of EVs and HEVs

ASSESSMENT DETAILS (both CIE and SEE)

Assessment Type	Maximum Marks	Minimum Passing Marks	Evaluation Details
CIE – IA Tests (A)	30	12	Average of Three Internal Assessment Tests each of 50 marks, scaled down to 30 marks.
Alternate Assessment (B)	20	8	Any two Assessment methods as per 24RNBE4.2 (*if it is project based, one assignment shall be given), scaled to 20 marks.
Total CIE (A+B)	**50**	**20**	**CIE Evaluation is done for a maximum of 50 marks**
SEE (C)	**50**	**18**	**SEE is a theory exam conducted for 100 marks and scaled down to 50 marks. Exam duration shall be for 3 hours.**
CIE + SEE (A+B+C)	**100**	**40**	Final marks shall be the sum of marks scored in Components **A, B and C.**
The minimum marks to be secured in CIE is 20 out of allotted 50 marks to appear for SEE, with minimum40 % scored in every component of CIE.			

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). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student 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.

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

1) The question paper will have ten questions. Each question is set for 20 marks.

2) 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.

3) The students have to answer 5 full questions, selecting one full question from each module.

4) Marks scored by the student shall be proportionally scaled down to 50 Marks.

Suggested Learning Resources:

Books:

1. Basic Electrical Engineering by D C Kulshreshtha, Tata McGraw Hill, First Edition 2019.
2. A text book of Electrical Technology by B.L. Theraja, Volume 1, S Chand and Company, reprint edition 2014.
3. A text book of Electrical Technology by B.L. Theraja, Volume 3, S Chand and Company, reprint edition 2014.
4. Modern Electric, Hybrid electric and Fuel Cell vehicles, Fundamentals, Theory and Design by Mehrdad Ehsani, Yimin Gao, Sebastien. E.Gay, Ali Emadi. CRC press (Chapter 4- 4.1, Chapter 5-5.1,5.2)

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

- Visit to campus switch yard
- Visit to Electrical machines lab to explain DC, single phase AC, Three phase AC supply systems

B.E. (Common to All Branches)
Outcome Based Education(OBE) and Choice Based Credit System(CBCS)
SEMESTER – I / II

Course Title:	**Introduction to Electronics & Communication (For Other Non-EC Branch students)**		
Course Code:	**BESCK104/204C**	**CIE MARKS**	**50**
L : T : P	**3:0:0**	**SEE MARKS**	**50**
Credits:	**03**	**EXAM HOURS**	**03**
Total hours of Pedagogy	**40 hours Theory**	**Total Marks**	**100**

COURSE LEARNING OBJECTIVES: students will be taught

1. Operation of semiconductor diode and Rectifiers, fundamental knowledge of Amplifiers.
2. Transistor operation, study of Oscillators and Operational amplifiers and its applications.
3. Logic circuits and their optimization.
4. Acquire basic knowledge of Embedded systems and sensors.
5. Gain knowledge in Communication systems and different modulation techniques

Teaching-Learning Process (General Instructions)

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

1. Lecturer method (L) does not mean only the traditional lecture method, but a different type of teaching method may be adopted to develop the outcomes.
2. Arrange visits to nearby PSUs such as BHEL, BEL, ISRO, etc., and small-scale hardware Industries to give brief information about the electronics manufacturing industry.
3. Show Video/animation films to explain the functioning of various analog and digital circuits.
4. Encourage collaborative (Group) Learning in the class
5. Ask at least three HOTS (Higher-order Thinking) questions in the class, which promotes critical thinking.
6. Adopt Problem-Based Learning (PBL), which fosters students' Analytical skills, develop thinking skills such as the ability to evaluate, generalize, and analyse information rather than simply recall it.
7. Topics will be introduced in multiple representations.
8. Show the different ways to solve the same problem and encourage the students to come up with their own creative ways to solve them.
9. Discuss how every concept can be applied to the real world - and when that's possible, it helps improve the students' understanding.

MODULE – 1 **(8 hrs)**

Semiconductor Diodes & Power Supplies: Semiconductor diode Working and Characteristics. Block diagram of Power supply, Half Wave Rectifiers, Full Wave Rectifiers-Bi Phase and Bridge Rectifiers and filters, Zener Diode and its characteristics, Voltage regulators. Output resistance and voltage regulation.
Amplifiers: Types of amplifiers, Gain, Input and output resistance, Frequency response, Bandwidth, Phase shift, Negative feedback, multi-stage amplifiers (Text 1)

MODULE – 2 **(8 hrs)**

Bipolar junction transistor: Introduction, Symbols of NPN and PNP, BJT operation.
Oscillator: Barkhausen criterion, sinusoidal and non-sinusoidal oscillator, Ladder network oscillator, Wein bridge oscillator, Multivibrators, Single stage astable oscillator, Crystal controlled oscillator.
Operational amplifiers: Operational Amplifier Parameters**,** Operational Amplifier characteristics, Operational Amplifier Configurations, Operational Amplifier circuits (only Qualitative analysis): Inverting and Non-Inverting Amplifiers, Voltage follower, Summer, Integrator, Differentiator. (Text 1)

MODULE – 3 **(8 hrs)**

Boolean Algebra and Logic Circuits: Binary numbers, Number Base Conversion, octal & Hexa Decimal Numbers, Complements(1's and 2's), Basic definitions, Axiomatic Definition of Boolean Algebra, Basic

Theorems and Properties of Boolean Algebra, Boolean Functions, Canonical and Standard Forms, Other Logic Operations, Digital Logic Gates (Text 2) **Combinational logic**: Introduction, Design procedure, Adders- Half adder, Full adder
MODULE – 4 **(8 hrs)**
Embedded Systems – Definition, Embedded systems vs general computing systems, Classification of Embedded Systems, Major application areas of Embedded Systems, Elements of an Embedded System, Core of the Embedded System, Microprocessor vs Microcontroller, RISC vs CISC. **Sensors and Interfacing –** Instrumentation and control systems, Transducers, Sensors, Actuators, LED, 7-Segment LED Display.(Text 3)
MODULE – 5 **(8 hrs)**
Analog Communication Schemes – Modern communication system scheme, Information source, input transducer, Transmitter, Channel or Medium – Hardwired and Soft wired, Noise, Receiver, Multiplexing, Types of communication systems. Types of modulation (only concepts) - AM, FM, PM, Concept of Radio wave Propagation (Ground, space, Sky). **Digital Modulation Schemes**: ASK, PSK, FSK, Advantages of Digital communication over Analog communication. (Text 4)

COURSE OUTCOMES:

After successfully completing the course, the student will be able to:

CO1	Understand the basic knowledge of semiconductor diodes and construct Rectifiers, gain the fundamental knowledge on Amplifiers.
CO2	Understand the acquired knowledge of Transistors in the design of oscillators and study operation of Opamp with its applications.
CO3	Acquire knowledge to construct basic digital circuitry making use of basic gates and use of Boolean theorems for reduction of Expression.
CO4	Gain the basic knowledge acquired in the construction of Embedded systems design.
CO5	Construct the conceptual blocks for Modern communication system and acquire knowledge on different Modulation techniques.

Assessment Details (both CIE and SEE) in Detail:

Assessment Type	Maximum Marks	Minimum Passing Marks	Evaluation Details
CIE – IA Tests (A)	30	12	Average of Three Internal Assessment Tests each of 50 marks, scaled down to 30 marks.
Alternate Assessment (B)	20	8	Any two Assessment methods as per 24RNBE4.2 (*if it is project based, one assignment shall be given), scaled to 20 marks.
Total CIE (A+B)	**50**	**20**	**CIE Evaluation is done for a maximum of 50 marks**

SEE (C)	**50**	**18**	**SEE is a theory exam conducted for 100 marks and scaled down to 50 marks. Exam duration shall be for 3 hours.**
CIE + SEE (A+B+C)	**100**	**40**	Final marks shall be the sum of marks scored in Components **A, B and C.**
• The minimum marks to be secured in CIE is 20 out of allotted 50 marks to appear for SEE, with minimum 40 % scored in every component of CIE. • If any courses of 3 credits are of Integrated Course type, for such courses the method suggested for 4 credits IPCC shall be followed.			

Assessment Details (both CIE and SEE):
The weightage of Continuous Internal Evaluation (CIE) is 50% and the 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.

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

1. The question paper will have ten questions. Each question is set for 20 marks.
2. 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.
3. The students have to answer 5 full questions, selecting one full question from each module.
4. Marks scored by the student shall be proportionally scaled down to 50 Marks

Suggested Learning Resources:

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

1.Mike Tooley, ‘Electronic Circuits, Fundamentals & Applications’,4thEdition, Elsevier, 2015. DOI https://doi.org/10.4324/9781315737980. eBook ISBN9781315737980

2. Digital Logic and Computer Design, M. Morris Mano, PHI Learning, 2008 ISBN-978-81-203- 0417-84.

3. K V Shibu, ‘Introduction to Embedded Systems’, 2nd Edition, McGraw Hill Education (India), Private Limited, 2016

4. S L Kakani and Priyanka Punglia, ‘Communication Systems’, New Age International Publisher, 2017.

B.E. (Common to All Branches)
Outcome Based Education(OBE) and Choice Based Credit System(CBCS)
SEMESTER – I / II

Course Title:	**INTRODUCTION TO MECHANICAL ENGINEERING (For Other Non-ME Branch students)**		
Course Code:	**BESCK104D/204D**	**CIE MARKS**	**50**
L : T : P	**3:0:0**	**SEE MARKS**	**50**
Credits:	**3**	**EXAM HOURS**	**3**
Total hours of Pedagogy	**40 hours Theory**	**Total Marks**	**100**

COURSE LEARNING OBJECTIVES: *The purpose of the course is to facilitate the learner*:

- To develop the basic knowledge on Mechanical Engineering, Fundamentals and Energy Sources.
- Understand the concept of different types of Machine tool operations and Modern Manufacturing Processes like CNC, 3D printing.
- To know the concept of IC engines and Future Mobility vehicles.
- To give exposure in the field of Engineering Materials, Manufacturing Processes, Technology and its applications
- To acquire a basic understanding of role of Mechanical Engineering in the Robotics, IoT and Automation in industry.

Teaching-Learning Process (General Instructions)

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

1. Adopt different types of teaching methods to develop the outcomes through Power Point presentations and Video demonstrations
2. Arrange visits to show the live working models other than laboratory topics.
3. Adopt collaborative (Group Learning) Learning in the class.

MODULE – 1 ***8 hours***

INTRODUCTION: Role of Mechanical Engineering in Industries and Society- Emerging Trends and Technologies in different sectors such as Energy, Manufacturing, Automotive, Aerospace, and Marine sectors. **ENERGY**: Introduction to fossil fuels and nuclear fuels. Bio fuels (Fuel pellets, Bio diesel, Bio ethanol). Harnessing of energy sources like Hydel, Solar photovoltaic cell, Flat plate collector, solar pond, wind, Environmental issues like Global warming and Ozone depletion.

MODULE – 2 ***8 hours***

MACHINE TOOL OPERATIONS:
Working Principle of lathe, Lathe operations: Turning, facing, knurling. Working principles of radial Drilling Machine, drilling operations: drilling, boring, reaming. Working of Horizontal Milling Machine, Milling operations: plane milling and slot milling. (No sketches of machine tools, sketches to be used only for explaining the operations).
INTRODUCTION TO ADVANCED MANUFACTURING SYSTEMS: Introduction, components of CNC, advantages and applications of CNC, Introduction to3D printing, FDM method.

MODULE – 3 **8 *hours***

INTRODUCTION TO IC ENGINES: Components and Working Principles,4 Stroke Petrol and Diesel Engines, Comparison between 4-Stroke and 2-Stroke Engine. Application of IC Engines. (No Numerical)
INSIGHT INTO FUTURE MOBILITY: Electric and Hybrid Vehicles, Components of Electric and Hybrid Vehicles. Advantages and disadvantages of EVs and Hybrid vehicles.

MODULE – 4 **8 *hours***

ENGINEERING MATERIALS: Types and applications of Ferrous & Nonferrous Metals (no composition tables), silica, ceramics, glass, graphite, diamond and polymer. Shape Memory Alloys.
JOINING PROCESSES: Soldering, Brazing and Welding, Definitions, classification of welding process, Arc welding, Gas welding and types of flames in Oxyacetylene gas welding.

MODULE – 5 ***8 hours***

INTRODUCTION TO MECHATRONICS AND ROBOTICS: Open-loop and Closed-loop mechatronic systems. Classification based on robot configuration: polar, cylindrical, Cartesian coordinate and Jointed Arm. Robot application, Advantages and disadvantages.
AUTOMATION IN INDUSTRY AND INTRODUCTION TO IIOT: Definition, types – Fixed, programmable and flexible automation, Basic elements with block diagrams, advantages: Definition and Characteristics of IIoT, Industry 4.O.

COURSE OUTCOMES:
After successfully completing the course, the student will be able to:

CO1	Describe the role of mechanical engineering in industry and society and various energy sources.
CO2	Explain the Machine Tool Operations and Advanced Manufacturing Process.
CO3	Classify the IC engines and working principle of IC engines ,EV vehicles and Hybrid Vehicles
CO4	Differentiate the Properties of Common Engineering Materials and various Metal Joining Processes.
CO5	Appraise the Concepts of Mechatronics, Robotics,Automation, Characteristics of IIoT, Industry 4.O

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):

Assessment Type	Maximum Marks	Minimum Passing Marks	Evaluation Details
CIE – IA Tests (A)	30	12	Average of Three Internal Assessment Tests each of 50 marks, scaled down to 30 marks.
Alternate Assessment (B)	20	8	Any two Assessment methods as per 24RNBE4.2 (*if it is project based, one assignment shall be given), scaled to 20 marks.
Total CIE (A+B)	**50**	**20**	**CIE Evaluation is done for a maximum of 50 marks**
SEE (C)	**50**	**18**	**SEE is a theory exam conducted for 100 marks and scaled down to 50 marks. Exam duration shall be for 3 hours.**
CIE + SEE (A+B+C)	**100**	**40**	Final marks shall be the sum of marks scored in Components **A, B and C.**

- The minimum marks to be secured in CIE is 20 out of allotted 50 marks to appear for SEE, with minimum 40 % scored in every component of CIE.
- If any courses of 3 credits are of Integrated Course type, for such courses the method suggested for 4 credits IPCC shall be followed.

SEMESTER END EXAMINATION (SEE):

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

1. The question paper will have ten questions. Each question is set for 20 marks.
2. 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.
3. The students have to answer 5 full questions, selecting one full question from each module.
4. Marks scored by the student shall be proportionally scaled down to 50 Marks

SUGGESTED LEARNING RESOURCES:

Text Books:

1. Elements of Mechanical Engineering, K R Gopala Krishna, Subhash Publications, 2008
2. An Introduction to Mechanical Engineering, Jonathan Wickert and Kemper Lewis, Third Edition, 2012
3. Electric and Hybrid Vehicles, A K Babu, Second Edition 2022

REFERENCE BOOKS:

1. Elements of Workshop Technology (Vol. 1 and 2), Hazra Choudhry and Nirzar Roy, Media Promoters and Publishers Pvt. Ltd., 2010.
2. Manufacturing Technology- Foundry, Forming and Welding, P.N.Rao Tata McGraw Hill 3rd Ed. 2003.
3. Internal Combustion Engines, V. Ganesan, Tata McGraw Hill Education; 4th edition, 2017
4. Robotics, Appu Kuttan KK K. International Pvt Ltd, volume 1
5. Dr SRN Reddy, Rachit Thukral and Manasi Mishra, “Introduction to Internet of Things: A Practical Approach”, ETI Labs
6. Raj kamal, “Internet of Things: Architecture and Design”, McGraw hill.

ACTIVITY BASED LEARNING (SUGGESTED ACTIVITIES IN CLASS)/ PRACTICAL BASED LEARNING

- Demonstration of lathe/milling/drilling operations
- Demonstration of working of IC Engine.
- Study arc welding.
- Video demonstration of latest trends in mobility robotics and Automation

B.E. (Common to All Branches)
Outcome Based Education(OBE) and Choice Based Credit System(CBCS)
SEMESTER – I / II

Course Title:	**Introduction to C Programming (For Other-Non-IT Branch students)**		
Course Code:	**BESCK104E/204E**	**CIE MARKS**	**50**
L : T : P:	**2:0:2**	**SEE MARKS**	**50**
Credits:	**3**	**EXAM HOURS**	**03**
Total hours of Pedagogy	**40 hours Theory+8 to 10 lab slots**	**Total Marks**	**100**

COURSE LEARNING OBJECTIVES: The purpose of the course is to facilitate the learner to:

- Elucidate the basic functionalities of a computer and recognize the hardware parts
- Apply programming constructs of C language to solve the real-world problems
- Analyze user-defined data structures to solve the problems related to searching and sorting
- Develop reusable code utilizing modular programming constructs

MODULE – 1 **(8hrs)**

Introduction to Computers. Computer Memory and processors. Introduction to C, Structure of C program, Files used in a C program, Compilers, Compiling and executing C programs, Using Comments, C Tokens, Identifiers, Keywords, Basic Datatypes in C

Textbook: 1.1-1.3, 3.1-3.7, 9.1-9.11

MODULE – 2 **(8hrs)**

Introduction to C: Variables, constants, Input/output statements in C, Operators in C, Type conversion and typecasting.
Decision control and Looping statements: Introduction to decision control, Conditional branching statements, iterative statements, nested loops, break and continue statements, goto statement.

Textbook: 9.12-9.16, 10.1-10.6

MODULE – 3 **(8hrs)**

Arrays: Declaration of arrays, accessing the elements of an array, storing values in arrays, Operations on arrays, Passing arrays to functions, Two dimensional arrays, operations on two-dimensional arrays, two-dimensional arrays to functions, Applications of arrays, Case study with sorting techniques – Linear Search, Binary Search, Bubble Sort

Textbook: 12.1-12.7, 12.12

MODULE – 4 **(8hrs)**

Functions: Introduction using functions, Function definition, function declaration, function call, return statement, passing parameters to functions, scope of variables, storage classes, recursive functions.
Introduction to strings: Reading strings, writing strings, summary of functions used to read and write characters. Suppressing input using a Scanset.

Textbook: 11.1-11.10, 13.1-13.3

MODULE – 5 **(8hrs)**

Strings: Operations on strings, Miscellaneous string and character functions, arrays of strings.
Pointers: Introduction to Pointers, Declaring Pointer Variables
Structures: Introduction to structures, Introduction to Unions
Files: Introduction to files, Using Files in C

Textbook: 13.4-13.6, 14.1-14.3, 15.1, 16.1-16.2

PRACTICAL COMPONENT OF IPCC *(May cover all / major modules)*

Experiments (10 Lab slots)

1. a. C Program to convert temperature value from Celsius to Fahrenheit.
   b. Simulation of Simple Calculator using Switch statement.

2. C Program to find whether the given number is an Armstrong number or not.

3. Write a program to calculate tax, given the following conditions:
   if income is less than 1,50,000 then no tax
   if taxable income is in the range 1,50,001-3,00,000 then charge 10% tax
   if taxable income is in the range 3,00,001-5,00,000 then charge 20% tax
   if taxable income is above 5,00,001 then charge 30% tax

4. C Program to print Pascal's triangle

5. Implement Matrix multiplication and valid at the rules of multiplication.

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

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

8. Write functions to implement string operations such as compare, concatenate, string length. Convince the parameter passing techniques.

9. Create an employee Structure with members empid, empname, basicpay, allowance, deductions and NetPay. Calculate NetPay from the structure member data. (NetPay= basicpay +allowance-deductions). Create an array of structure for 5 employees and print the NetPay for every employee.

10. Develop a program using pointers to compute the sum, mean and standard deviation of all elements stored in an array of N real numbers.

COURSE OUTCOMES:

After successfully completing the course, the student will be able to:

CO1	Elucidate the basic functionalities of a computer and recognize the hardware parts.
CO2	Apply programming constructs of C language to solve the real world problem
CO3	Analyse user-defined data structures to solve the problems related to searching and sorting
CO4	Develop reusable code utilizing modular programming constructs.

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) and for the SEE minimum passing mark is 35% of the maximum marks (18 out of 50 marks). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student 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.

Continuous Internal Evaluation (CIE):

Assessment Type	Maximum Marks	Minimum Passing Marks	Evaluation Details
CIE- IA Tests (A)	20	8	Average of Three Internal Assessment Tests each of 50 marks, scaled down to 20 marks.
Alternate Assessment (B)	10	4	Any one Assessment methods as per 24RNBE4.2 scaled to 10 marks.
Total CIE Theory (A+B)	**30**	**12**	**Marks of Tests and Assignments awarded for a maximum of 30.**
CIE Practical	12	5	Marks awarded for Weekly Conduction of Experiments and Submission of Laboratory records, scaled to 12 marks.
CIE Practical Test	8	3	Average of marks of Two tests, each conducted for 100 marks covering all experiments, scaled to 8.
Total CIE Practical (C)	**20**	**8**	**Marks of Experiments, Record and Test awarded for a maximum of 20 marks.**
CIE: Theory + Practical (A + B + C)	**50**	**20**	**CIE Evaluation is done for a maximum of 50 marks.**
SEE (D)	**50**	**18**	**SEE is a theory exam, conducted for 100 marks and scaled down to 50 marks. Exam duration shall be for 3 hours.**
CIE+SEE (A+B+C+D)	**100**	**40**	**Final marks shall be the sum of marks scored in Components A, B, C and D**

- The minimum marks to be secured in CIE is 20 out of allotted 50 marks to appear for SEE, with minimum 40 % scored in every component of CIE. The laboratory component of the IPCC shall be for CIE only. However, in SEE, the questions from the laboratory component shall be included in their respective modules only.

SEE for IPCC

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

1) The question paper will have ten questions. Each question is set for 20 marks.
2) 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.
3) The students have to answer 5 full questions, selecting one full question from each module.
4) Marks scored by the student shall be proportionally scaled down to 50 Marks

The theory portion of the IPCC shall be for both CIE and SEE, whereas the practical portion will have a CIE component only. Questions mentioned in the SEE paper may include questions from the practical component.

Textbooks

1) Computer fundamentals and programming in c, “Reema Thareja”, Oxford University, Second edition, 2017.

Reference Books:

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

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

- Debugging

Emerging Technology

Courses – I / II

Elective Course

SMART MATERIALS & SYSTEMS (BETCK105A/205 A)
GREEN BUILDING (BETCK105B/205 B)
INTRODUCTION TO NANO TECHNOLOGY (BETCK105C/205 C)
INTRODUCTION TO SUSTAINABLE ENGINEERING (BETCK105D/205D)
RENEWABLE ENERGY SOURCES (BETCK105E/205E)
WASTE MANAGEMENT (BETCK105F/205F)
EMERGING APPLICATIONS OF BIO SENSORS (BETCK105G/205G)
INTRODUCTION TO INTERNET OF THINGS (BETCK105H/205H)
INTRODUCTION TO CYBER SECURITY (BETCK105I/205I)
INTRODUCTION TO EMBEDDED SYSTEM (BETCK105J/205J)
DIGITAL MARKETING (BETCK105K/205K)

B.E. (Common to All Branches) Outcome Based Education(OBE) and Choice Based Credit System(CBCS) SEMESTER – I / II			
Course Title:	**Smart Materials and devices**		
Course Code:	**BETCK105A/205 A**	**CIE Marks**	**50**
Course Type (Theory/Practical/Integrated)	**Theory**	**SEE Marks**	**50**
		Total Marks	**100**
Teaching Hours/Week (L:T:P)	**3:0:0**	**Exam Hours**	**03**
Total Hours of Pedagogy	**40 hours Theory**	**Credits**	**03**

Course Learning objectives: The purpose of the course is to facilitate the learner to:

- To develop the students' ability to learn emerging materials.
- To make students to learn prefabricated building components.
- To understand the sensors deployed in smart buildings.
- To learn building information modelling for building design.
- To learn the concepts of Smart devices

Module-1 **(8hrs)**

Emerging Materials

Honey comb structure, cubic structures and coordination number, packing factor, Nano-materials, polymers and conductivity, emerging sustainable by products, Electro-optic Activity and construction chemicals .

Module-2 **(8hrs)**

Manufactured building components

Definition, types of fabricated / manufactured building components and infrastructure, elastic components, elastic moduli, cantilever systems, torsional systems and their moment of inertia, modular coordination, production and installation.

Module-3 **(8hrs)**

Smart Materials

Definition, Principles of Piezo-electricity, materials (Polymers and Ceramics), sensors (Piezo-electric sensor, strain gauge, shear sensor, in-plane and out of plane sensor, accelerometer), smart composites

Module-4 **(8hrs)**

BIM and IBMS

Building Information modelling (BIM), advantages, BIM in building design and construction. Acoustical considerations, decibel, Phon, Sound build up. Lighting requirement-Beers and Lamberts laws, Power systems, IBMS, Types of IBMS and advantages.

Module-5 **(8hrs)**

SMART DEVICES:

Automatic on and off systems, Smart doors, Smart Lights, Fog lamps, Photocells, LEDs, Photodetectors, Quantum detectors, SQUIDS, Smart sensors, Smart electronic gadgets-Phones, Speakers, Watches

After successfully completing the course, the student will be able to:

CO1	Make use emerging materials for construction
CO2	Decide the proper prefabricated building component
CO3	Use smart materials and methods in building construction
CO4	Implement BIM in building design
CO5	Learn the principles of smart devices

Continuous Internal Evaluation (CIE):

Assessment Type	Maximum Marks	Minimum Passing Marks	Evaluation Details
CIE – IA Tests (A)	30	12	Average of Three Internal Assessment Tests each of 50 marks, scaled down to 30 marks.
Alternate Assessment (B)	20	8	Any two Assessment methods as per 24RNBE4.2 (*if it is project based, one assignment shall be given), scaled to 20 marks.
Total CIE (A+B)	**50**	**20**	**CIE Evaluation is done for a maximum of 50 marks**
SEE (C)	**50**	**18**	**SEE is a theory exam conducted for 100 marks and scaled down to 50 marks. Exam duration shall befor 3 hours.**
CIE + SEE (A+B+C)	**100**	**40**	Final marks shall be the sum of marks scored in Components **A, B and C.**

· The minimum marks to be secured in CIE is 20 out of allotted 50 marks to appear for SEE, with minimum 40 % scored in every component of CIE.

· If any courses of 3 credits are of Integrated Course type, for such courses the method suggested for 4 credits IPCC shall be followed.

SEE Question Paper pattern:

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

1) The question paper will have ten questions. Each question is set for 20 marks.

2) 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.

3) The students have to answer 5 full questions, selecting one full question from each module.

4) Marks scored by the student shall be proportionally scaled down to 50 Marks

Suggested Learning Resources:

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

1. Essentials of Materials Science and Engineering, Donald R. Askeland and Pradeep P. Fulay, Cengage Learning Publication 2019
2. Fundamentals of Smart Materials, by Prof. Mohsen Shahinpoor, Royal Society of Chemistry Publication 2020
3. Encyclopedia of smart materials by Mel Schwartz, A Wiley-Interscience Publication, 2022
4. Engineering Analysis of Smart Material Systems, Donald J Leo, John Wiley and sons publication 2017

B.E. (Common to All Branches)
Outcome Based Education(OBE) and Choice Based Credit System(CBCS)
SEMESTER – I / II

Course Title:	**GREEN BUILDINGS**		
Course Code:	**BETCK105B/205B**	**CIE MARKS**	**50**
L : T : P	**3:0:0**	**SEE MARKS**	**50**
Credits:	**03**	**EXAM HOURS**	**03**
Total hours of Pedagogy	**40 hours Theory**	**Total Marks**	**100**

COURSE LEARNING OBJECTIVES: The purpose of the course is to facilitate the learner to:

- Understand the Definition, Concept & Objectives of the terms cost effective construction and green building
- Apply cost effective techniques in construction
- Apply cost effective Technologies and Methods in Construction
- Understand the Problems due to Global Warming
- State and understand the Concept of Green Building

MODULE – 1 **(8hrs)**

INTRODUCTION TO THE CONCEPT OF COST EFFECTIVE CONSTRUCTION MATERIALS: Uses of different types of materials and their availability - Stone and Laterite blocks, Burned Bricks, Concrete Blocks, Stabilized Mud Blocks, Lime Pozzolana Cement, Gypsum Board, Light Weight Beams, Fiber Reinforced Cement Components, Fiber Reinforced Polymer Composite, Bamboo, Rammed Earth, Availability of different materials Recycling of building materials – Brick, Concrete, Steel, Plastics, Environmental issues related to quarrying of building materials.

MODULE – 2 **(8hrs)**

ENVIRONMENT-FRIENDLY AND COST EFFECTIVE BUILDING TECHNOLOGIES:

Different substitute for wall construction Flemish Bond - Rat Trap Bond Cavity Wall. Ferro Cement and Ferro Concrete constructions – different precast members using these materials. Wall and Roof Panels – Beams, Columns, Door and Window frames, Water tanks - Septic tanks, Alternate roofing systems - Filler slab, Composite Beam and Panel Roof. Pre-engineered and ready to use building elements - wood products, steel, plastic. NITI Aayog- principles.

MODULE – 3 **(8hrs)**

GLOBAL WARMING – Definition, Causes and Effects, Contribution of buildings towards Global Warming. Carbon Footprint – Global Efforts to reduce carbon emissions. Green Buildings – Definition, Features, Necessity, Environmental benefits, Economical benefits, Health and Social benefits. The major energy efficient area for buildings – Embodied Energy in Materials. Green Materials - Comparison of Initial cost of Green v/s Conventional Buildings, Life cycle cost of Buildings. Net-zero energy building-introduction and its advantage, disadvantage.

MODULE – 4	(8hrs)
GREEN BUILDING RATING SYSTEMS: BREEAM, LEED, GREEN STAR –GRIHA, IGBC, BEE for new buildings – Purpose, Key highlights, Point System with Differential weightage. Green Design – Definition, Principles of sustainable development in Building Design, Characteristics of Sustainable Buildings, Sustainably managed Materials, Integrated Lifecycle design of Materials and Structures (Concepts only)	
MODULE – 5	**(8hrs)**
UTILITY OF SOLAR ENERGY IN BUILDINGS: Utility of Solar energy in buildings - concepts of Solar Passive Cooling and Heating of Buildings. Low Energy Cooling. Case studies of Solar Passive Cooled and Heated Buildings. **GREEN COMPOSITES FOR BUILDINGS:** Concepts of Green Composites. Water Utilization in Buildings, Low Energy approaches to Water Management. Urban Environment and Green Buildings. Green Cover and Built Environment.	

COURSE OUTCOMES:

After successfully completing the course, the student will be able to:

CO1	Select different building materials for construction.
CO2	Apply effective environmental friendly building technology
CO3	Analyze global warming due to different materials in construction
CO4	Analyse buildings for green rating.
CO5	Use alternate source of energy and effective use of water.

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) and for the SEE minimum passing mark is 35% of the maximum marks (18 out of 50 marks). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student 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.

Continuous Internal Evaluation (CIE):

Assessment Type	Maximum Marks	Minimum Passing Marks	Evaluation Details
CIE – IA Tests (A)	30	12	Average of Three Internal Assessment Tests each of 50 marks, scaled down to 30 marks.
Alternate Assessment (B)	20	8	Any two Assessment methods as per 24RNBE4.2 (*if it is project based, one assignment shall be given), scaled to 20 marks.
Total CIE (A+B)	**50**	**20**	**CIE Evaluation is done for a maximum of 50 marks**

SEE (C)	**50**	**18**	**SEE is a theory exam conducted for 100 marks and scaled down to 50 marks. Exam duration shall before 3 hours.**
CIE + SEE (A+B+C)	**100**	**40**	Final marks shall be the sum of marks scored in Components A, B and C.
· The minimum marks to be secured in CIE is 20 out of allotted 50 marks to appear for SEE, with minimum 40 % scored in every component of CIE. · If any courses of 3 credits are of Integrated Course type, for such courses the method suggested for 4 credits IPCC shall be followed.			

SEE Question paper pattern:

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

1) The question paper will have ten questions. Each question is set for 20 marks.
2) 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.
3) The students have to answer 5 full questions, selecting one full question from each module.
4) Marks scored by the student shall be proportionally scaled down to 50 Marks

Suggested Learning Resources:
Text Books

1) Harihara Iyer G, Green Building Fundamentals, Notion Press, 2022
2) Dr. Adv. Harshul Savla, Green Building: Principles & Practices, Notion Press, 2021
3) Abe Kruger and Carl Seville, Green Building: Principles and Practices in Residential Construction, Delmar Cengage Learning; 2012.
4) Vinod B R and Shobha R, Green Building Materials and Techniques, Notion Press, 2023

B.E. (Common to All Branches)
Outcome Based Education(OBE) and Choice Based Credit System(CBCS)
SEMESTER – I / II

Course Title:	**Introduction to Nano Technology**		
Course Code:	**BETCK105C/205C**	**CIE MARKS**	**50**
L : T : P:	**3:0:0**	**SEE MARKS**	**50**
Credits:	**03**	**EXAM HOURS**	**03**
Total hours of Pedagogy	**40 hours Theory**	**Total Marks**	**100**

COURSE LEARNING OBJECTIVES

- To provide a comprehensive overview of synthesis and characterization of nanoparticles, nanocomposites and hierarchical materials with nanoscale features.
- To provide the engineering students with necessary background for understanding various nanomaterials characterization techniques
- To develop an understanding of the basis of the choice of material for device applications
- To give an insight into complete systems where nanotechnology can be used to improve our everyday life

MODULE-1: Introduction to Nanomaterials (8 hrs)

Nanotechnology, Frontier of future-an overview, Length Scales, Variation of physical properties from bulk to thin films to nanomaterials, Confinement of electron in 0D, 1D, 2D and 3D systems, Surface to Volume Ratio, Synthesis of Nanomaterials: Bottom-Up approach: Chemical Routes for Synthesis of nanomaterials- Sol-gel, Precipitation, Solution Combustion synthesis, Hydrothermal, SILAR, Chemical Bath Deposition. Top-Down approach- Ball milling technique, Sputtering, Laser Ablation

MODULE-2: Characterization of Nanomaterials (8 hrs)

Basic principles and instrumentations of Electron Microscopy –Transmission Electron Microscope, Scanning Electron Microscope, Scanning Probes- Scanning Tunneling microscope, Atomic Force Microscope – different imaging modes, comparison of SEM and TEM, AFM and STM, AFM and SEM.

Basic principles of working of X-ray diffraction, derivation of Debye-Scherrer equation, numericals on Debye Scherrer equation, Optical Spectroscopy- Instrumentation and application of IR, UV/VIS (Band gap measurement)

MODULE-3: Carbon Based Materials (8 hrs)

Introduction, Synthesis, Properties (electrical, Electronic and Mechanical), and Applications of Graphene, SWCNT, MWCNT, Fullerenes and other Carbon Materials: Carbon nanocomposites, nanofibres, nanodiscs, nanodiamonds.

MODULE-4: Nanotechnology in Energy storage and conversion (8 hrs)

Solar cells: First generation, Second generation and third generation solar cells: Construction and working of Dye sensitized and Quantum dot sensitized solar cells.
Batteries: Nanotechnology in Lithium ion battery- working, Requirements of anodic and cathodic materials, classification based on ion storage mechanisms, limitations of graphite anodes, Advances in Cathodic materials, Anodic materials, Separators
Fuel Cells:Introduction, construction, working of fuel cells and nanotechnology in hydrogen storage and proton exchange membranes

MODULE-5: Applications of Nanotechnology (8 hrs)

Nanotech Applications and Recent Breakthroughs: Introduction, Significant Impact of Nanotechnology and Nanomaterial, Medicine and Healthcare Applications, Biological and Biochemical Applications (Nano biotechnology), Electronic Applications (Nano electronics), Computing Applications (Nano computers), Chemical Applications (Nano chemistry), Optical Applications (Nano photonics), Agriculture and Food Applications, Recent Major Breakthroughs in Nanotechnology.

Suggested Learning Resources:

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

1. Nano Materials – A.K. Bandyopadhyay/ New Age Publishers
2. Nanocrystals: Synthesis, Properties and Applications – C.N.R. Rao, P. John Thomas and G. U. Kulkarni, Springer Series in Materials Science
3. Nano Essentials- T. Pradeep/TMH
4. Peter J. F. Harris, Carbon nanotube science: synthesis, properties, and applications. Cambridge University Press, 2011
5. M.A. Shah, K.A. Shah, "Nanotechnology: The Science of Small", Wiley India, ISBN 13: 9788126538683

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

1. Introduction to Nanotechnology, C. P. Poole and F. J. Owens, Wiley, 2003
2. Understanding Nanotechnology, Scientific American 2002
3. Nanotechnology, M. Ratner and D. Ratner, Prentice Hall 2003
4. Nanotechnology, M. Wildon, K. Kannagara, G. Smith, M. Simmons and B. Raguse, CRC Press Boca Raton 2002
5. Recent reviews on Li-ion batteries, solar cells and fuel cells

COURSE OUTCOMES:

After successfully completing the course, the student will be able to:

CO1	Classify the nanomaterials based on the dimensions. Demonstrate the synthesis of nanoparticles by various techniques.
CO2	Explain working of basic instruments used in characterization of nanoparticles.
CO3	Synthesis and properties of Carbon based nanomaterials and nanocomposites.
CO4	Discuss the application of nanotechnology in all domains of engineering.
CO5	Assess the suitability of nanomaterials for various device applications.

ASSESSMENT DETAILS (Both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks out of 50) and for the SEE minimum passing mark is 35% of the maximum marks (18 out of 50 marks). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student 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.

Continuous Internal Evaluation (CIE):

Assessment Type	Maximum Marks	Minimum Passing Marks	Evaluation Details
CIE – IA Tests (A)	30	12	Average of Three Internal Assessment Tests each of 50 marks, scaled down to 30 marks.
Alternate Assessment (B)	20	8	Any two Assessment methods as per 24RNBE4.2 (*if it is project based, one assignment shall be given), scaled to 20 marks.
Total CIE (A+B)	**50**	**20**	**CIE Evaluation is done for a maximum of 50 marks**
SEE (C)	**50**	**18**	**SEE is a theory exam conducted for 100 marks and scaled down to 50 marks. Exam duration shall befor 3 hours.**
CIE + SEE (A+B+C)	**100**	**40**	Final marks shall be the sum of marks scored in Cmpoonents **A, B and C.**

· The minimum marks to be secured in CIE is 20 out of allotted 50 marks to appear for SEE, with minimum 40 % scored in every component of CIE.

· If any courses of 3 credits are of Integrated Course type, for such courses the method suggested for 4 credits IPCC shall be followed.

SEE Question Paper pattern:

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

1) The question paper will have ten questions. Each question is set for 20 marks.

2) 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.

3) The students have to answer 5 full questions, selecting one full question from each module.

4) Marks scored by the student shall be proportionally scaled down to 50 Marks

B.E. (Common to All Branches)
Outcome Based Education(OBE) and Choice Based Credit System(CBCS)
SEMESTER – I / II

Course Title:	**Introduction to Sustainable Engineering**		
Course Code:	**BETC105D/BTEC205D**	**CIE MARKS**	**50**
L : T : P:	**3:0:0**	**SEE MARKS**	**50**
Credits:	**3**	**EXAM HOURS**	**3 Hrs**

COURSE LEARNING OBJECTIVES: The purpose of the course is to facilitate the learner:

- To familiarize the students to the area of sustainability and concepts of sustainability engineering
- To enable students with an understanding of principles and frame work of sustainable engineering
- To provide students with an understanding of Life Cycle Assessment tool in sustainable engineering
- To provide students with understanding of integration of sustainability with design.

MODULE – 1 **(8 hrs)**

Sustainable Development and Role of Engineers: Introduction, Why and What is Sustainable Development, THE SDFs, Paris Agreement and Role of Engineering, Sustainable development tools, Sustainable Development and the Engineering Profession, Key attributes of the Graduate Engineering

Sustainable Engineering Concepts: Key concepts – Factor 4 and Factor 10: Goals of sustainability, System Thinking, Life Cycle Thinking and Circular Economy

MODULE – 2 **(8 hrs)**

Sustainable Engineering and Concepts, Principles and Frame Work: Green Economy and Low Carbon Economy, Eco Efficiency, Triple bottom Line, Guiding principles of sustainable engineering, Frameworks for sustainable Engineering.

Tools for sustainability Assessment: Environmental Management System, Environmental Auditing, Cleaner Production Assessment, Environmental Impact Assessment, Strategic Environmental

MODULE – 3 **(8 hrs)**

Fundamentals of Life Cycle Assessment

Why and What is LCA, LCA Goal and Scope, Life cycle inventory, Life Cycle Impact Assessment, Interpretation and presentation of Results, Iterative Nature of LCA, Methodological Choices, LCI Databases and LCA Softwares, Strength and Limitations of LCA.

MODULE – 4	(8 hrs)
Environmental Life Cycle Costing, Social Life Cycle Assessment, and Life Cycle Sustainability Assessment: Introduction, Environmental Life Cycle Costing, Social Life Cycle Assessment, Life Cycle Sustainability, LCA Applications in Engineering: Environmental Product Declarations and Product Category Rules, Carbon and Water Foot Printing, Energy systems, Buildings and the Built Environment**,** Chemical and Chemical Production Food and Agriculture **Introduction to Environmental Economics:** Introduction – What Is Environmental Economics? Valuing the Environment, Market-based Incentives (or Economic Instruments) for Sustainability, Command-and-Control versus Economic Instruments, A Simple Model of Pollution Control	
MODULE – 5	**(8 hrs)**
Integrating Sustainability in Engineering Design: Problems Solving in Engineering, conventional to Sustainable Engineering Design Process, Design for Life Guidelines and Strategies, Measuring Sustainability, Sustainable Design through sustainable procurement criteria, Case studies on Sustainable practices in data center and concept of PUE, Role of IOT devices and AI&ML techniques for cooling Data centers.	

COURSE OUTCOMES:

After successfully completing the course, the student will be able to:

CO1	Elucidate the basics of sustainable development, sustainable engineering and its role in engineering
CO2	Application of Sustainable Engineering Concepts and Principles in Engineering
CO3	Apply the Principle, and methodology of Life Cycle Assessment Tool to engineering systems
CO4	Understand integration methods of sustainability to Engineering Design

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) and for the SEE minimum passing mark is 35% of the maximum marks (18 out of 50 marks). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student 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.

Continuous Internal Evaluation (CIE):

Assessment Type	Maximum Marks	Minimum Passing Marks	Evaluation Details
CIE – IA Tests (A)	30	12	Average of Three Internal Assessment Tests each of 50 marks, scaled down to 30 marks.

Alternate Assessment (B)	20	8	Any two Assessment methods as per 24RNBE4.2 (*if it is project based, one assignment shall be given), scaled to 20 marks.
Total CIE (A+B)	**50**	**20**	**CIE Evaluation is done for a maximum of 50 marks**
SEE (C)	**50**	**18**	**SEE is a theory exam conducted for 100 marks and scaled down to 50 marks. Exam duration shall befor 3 hours.**
CIE + SEE (A+B+C)	**100**	**40**	Final marks shall be the sum of marks scored in Cmpoonents **A, B and C.**

· The minimum marks to be secured in CIE is 20 out of allotted 50 marks to appear for SEE, with minimum 40 % scored in every component of CIE.

· If any courses of 3 credits are of Integrated Course type, for such courses the method suggested for 4 credits IPCC shall be followed.

SEE Question Paper pattern:

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

1) The question paper will have ten questions. Each question is set for 20 marks.
2) 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.
3) The students have to answer 5 full questions, selecting one full question from each module.
4) Marks scored by the student shall be proportionally scaled down to 50 Marks

Suggested Learning Resources:

Text Books

1) Introduction to Sustainability for Engineers, Toolseeram Ramjeawon, CRC Press, 1st Edn., 2020
2) Sustainability Engineering: Concepts, Design and Case studies, Prentice Hall, 1st Edn, 2015
3) System Analysis for sustainable Engineering: Theory and applications, Ni bin Chang, McGraw Hill Publications, 1st Edn., 2010
4) Engineering for Sustainable development: Delivery a sustainable development goals, UNESCO, International Centre for Engineering Education, France, 1st Edn., 2021
5) Introduction to Sustainable Engineering, Rag. R.L. and Ramesh Lakshmi Dinachandran, PHI Learning Pvt. Ltd., 2nd Edn., 2016

B.E. (Common to All Branches) Outcome Based Education(OBE) and Choice Based Credit System(CBCS) SEMESTER – I / II			
Course Title:	**Renewable Energy Sources**		
Course Code:	**BETCK105E/205E**	**CIE Marks**	**50**
Course Type(Theory/Practical/Integrated)	**Theory**	**SEE Marks**	**50**
		Total Marks	**100**
Teaching Hours/Week(L:T:P)	**3:0:0**	**Exam Hours**	**03**
Total Hours of Pedagogy	**40 hours**	**Credits**	**03**

Course Learning Objectives: *The purpose of the course is to facilitate the learner*

- To understand energy scenario, energy sources and their utilization.
- To explore society's present needs and future energy demands.
- To study the principles of renewable energy conversion systems.
- To get exposed to energy conservation methods.

Teaching-Learning Process

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

1. Use of Chalk and Talk / PPT / Videos.
2. Use of pie chart showing distribution of renewable energy sources.
3. Use of wind turbine models.

Module-1 **(08hours)**

Introduction: Principles of renewable energy; energy and sustainable development, worldwide renewable energy availability, renewable energy availability in India.

Introduction on solar energy, wind energy, tidal energy, hydro energy, wave energy, ocean thermal energy, biomass energy, geothermal energy, oil shale. Introduction to Internet of energy (IOE).

Module-2 **(08hours)**

Solar Energy: Fundamentals; Solar Radiation; Solar radiation Measurements- Pyrheliometers, Pyrometer, Sunshine Recorder. Solar Thermal systems: Flat plate collector; Solar distillation; Solar pond electric power plant.

Solar electric power generation- Principle of Solar cell, Photovoltaic system for electric power generation, advantages, Disadvantages and applications of solar photovoltaic system. Simple numerical on solar system Power, load for home applications.

Module-3 **(08hours)**

Wind Energy: Properties of wind, availability of wind energy in India, wind velocity and power from wind; major problems associated with wind power, Basic components of wind energy conversion system (WECS); Classification of WECS-Horizontal axis-single, double and multi blade system. Vertical axis-Savonius and darrieus types. Simple numerical on wind power, Torque and axial thrust.

Biomass Energy: Introduction; Photosynthesis Process; Biofuels; Biomass Resources; Biomass conversion technologies-fixed dome; Urban waste to energy conversion; Biomass gasification (Downdraft, updraft).

Module-4	**(08hours)**
Tidal Power: Tides and waves as energy suppliers and their mechanics (single, double basin); fundamental characteristics of tidal power, harnessing tidal energy, advantages and limitations. **Ocean Thermal Energy Conversion:** Principle of working (open and closed cycle), OTEC power stations in the world, problems associated with OTEC.	
Module-5	**(08hours)**
Green Energy: Introduction, Fuel cells: Classification of fuel cells – H_2; Operating principles, Zero energy Concepts. Benefits of hydrogen energy. **Hydrogen production technologies :**(electrolysis method only), hydrogen energy storage, applications of hydrogen energy, problem associated with hydrogen energy.	

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

CO1	Describe the environmental aspects of renewable energy resources. In Comparison with various conventional energy systems, their prospects and limitations.
CO2	Explain the use of solar energy and the various components used in the energy production with respect to applications like-heating, cooling, desalination, power generation.
CO3	Classify the conversion principles of wind energy and Bio mass energy
CO4	Distinguish the concept of Tidal Energy, ocean thermal energy conversion
CO5	Appraise the basic knowledge of Green energy and hydrogen energy.

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 of100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

Continuous Internal Evaluation(CIE):

Assessment Type	Maximum Marks	Minimum PassingMarks	Evaluation Details
CIE – IA Tests (A)	30	12	Average of Three Internal Assessment Tests each of 50 marks, scaled down to 30 marks.
Alternate Assessment (B)	20	8	Any two Assessment methods as per 24RNBE4.2 (*if it is project based, one assignment shall be given), scaled to 20 marks.
Total CIE (A+B)	**50**	**20**	**CIE Evaluation is done for a maximum of 50 marks**
SEE (C)	**50**	**18**	**SEE is a theory exam conducted for 100 marks and scaled down to 50 marks. Exam duration shall be for 3 hours.**
CIE + SEE (A+B+C)	**100**	**40**	Final marks shall be the sum of marks scored in Components **A, B and C.**
• The minimum marks to be secured in CIE is 20 out of allotted 50 marks to appear for SEE, with minimum 40 % scored in every component of CIE. • If any courses of 3 credits are of Integrated Course type, for such courses the method suggested for 4 credits IPCC shall be followed.			

Semester End Examination (SEE):

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

1. The question paper will have ten questions. Each question is set for 20 marks.
2. There will be 2 questions from each module. Each of the two questions under a module (with amaximum of 3 sub-questions), **should have a mix of topics** under that module.
3. The students have to answer 5 full questions, selecting one full question from each module.
4. Marks scored by the student shall be proportionally scaled down to 50 Marks

Suggested Learning Resources:

Text Books

1. Non-conventional Energy sources, G D Rai, Khanna Publication, Fourth Edition.
2. Energy Technology, S Rao and, Dr. B B Parulekar, Khanna Publication.
3. Solar energy, Subhas P Sukhatme, Tata Mc Graw Hill, 2nd Edition, 1996.
4. Electric and Hybrid Vehicles, A K Babu, Second Edition, 2022

Reference Books:

1. Principles of Energy conversion, A.W.CulpJr.,, McGraw Hill,1996
2. Non-Convention Energy Resources, Shobh Nath Singh, Pearson,2018

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

1. Poster presentation on the theme of renewable energy sources.
2. Seminars.

B.E. (Common to All Branches)
Outcome Based Education(OBE) and Choice Based Credit System(CBCS)
SEMESTER – I / II (For Physics cycle)

Course Title:	**Waste Management**		
Course Code:	**BETCK105F/205F**	**CIE MARKS**	**50**
L : T : P	**3:0:0**	**SEE MARKS**	**50**
Credits:	**03**	**EXAM HOURS**	**100**

COURSE LEARNING OBJECTIVES: The purpose of the course is to facilitate the learner to:

- To learn broader understandings on various aspects of solid waste management practiced in industries.
- To learn recovery of products from solid waste to compost and biogas, incineration and energy recovery, hazardous waste management and treatment, and integrated waste management.
-

MODULE – 1 **(8 hrs)**

INTRODUCTION TO SOLID WASTE MANAGEMENT: Classification of solid wastes (source and type based), solid waste management (SWM), elements of SWM, ESSWM (environmentally sound solid waste management) and EST (environmentally sound technologies), factors affecting SWM. Indian scenario and its progress in MSW (municipal solid waste) management.

MODULE – 2 **(8 hrs)**

WASTE GENERATION ASPECTS: Waste stream assessment (WSA), waste generation and composition, waste characteristics (physical and chemical), health and environmental effects (public health and environmental), a case study results from an Indian city, handouts on solid waste compositions.

MODULE – 3 **(8 hrs)**

COLLECTION, STORAGE, TRANSPORT AND DISPOSAL OF WASTES: Waste Collection, Storage and Transport: Collection components, storage containers/collection vehicles, collection operation, transfer station, Route optimization, record keeping, control, inventory and monitoring, implementing collection and transfer system.

WASTE DISPOSAL: key issues in waste disposal, disposal options and selection criteria, sanitary landfill, Effects of landfill gases and leachate on human and environment. A case study on an existing landfill site.

MODULE – 4 **(8 hrs)**

WASTE PROCESSING TECHNIQUES: Purpose of processing, mechanical volume and size reduction, component separation, drying and dewatering.

SOURCE REDUCTION, PRODUCT RECOVERY & RECYCLING: Source Reduction, Product Recovery and Recycling: basics, purpose, implementation monitoring and evaluation of source reduction, significance of recycling, recycling programme elements, Reuse and recycling of waste materials. (any five materials)

MODULE – 5	(8 hrs)
HAZARDOUS WASTE, E-WASTE and C&D waste MANAGEMENT AND TREATMENT: Identification and classification of hazardous waste, hazardous waste treatment, E-waste generation, E-waste management process flow chart, C&D Waste management and treatment. **CASE STUDY:** Report making on Bengaluru city as a case study for Solid waste management, E-waste management and Hazardous waste management	

COURSE OUTCOMES:

After successfully completing the course, the student will be able to:

CO1	Understand the characteristics and waste generation aspects of solid waste and apply this knowledge towards solid waste management.
CO2	Comprehend the collection, storage, transfer, transport and disposal for domestic solid waste.
CO3	Apply waste processing techniques and recycling methods to apprehend solid waste management.
CO4	Understand the issues with hazardous waste and E-waste and prepare reports for different scenarios.

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) and for the SEE minimum passing mark is 35% of the maximum marks (18 out of 50 marks). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student 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.

Continuous Internal Evaluation (CIE):

Assessment Type	Maximum Marks	Minimum Passing Marks	Evaluation Details
CIE – IA Tests (A)	30	12	Average of Three Internal Assessment Tests each of 50 marks, scaled down to 30 marks.
Alternate Assessment (B)	20	8	Any two Assessment methods as per 24RNBE4.2 (*if it is project based, one assignment shall be given), scaled to 20 marks.
Total CIE (A+B)	**50**	**20**	**CIE Evaluation is done for a maximum of 50 marks**

SEE (C)	**50**	**18**	**SEE is a theory exam conducted for 100 marks and scaled down to 50 marks. Exam duration shall befor 3 hours.**
CIE + SEE (A+B+C)	**100**	**40**	Final marks shall be the sum of marks scored in Components **A, B and C.**
· The minimum marks to be secured in CIE is 20 out of allotted 50 marks to appear for SEE, with minimum 40 % scored in every component of CIE. · If any courses of 3 credits are of Integrated Course type, for such courses the method suggested for 4 credits IPCC shall be followed.			

SEE

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

1) The question paper will have ten questions. Each question is set for 20 marks.

2) 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.

3) The students have to answer 5 full questions, selecting one full question from each module. **4)** Marks scored by the student shall be proportionally scaled down to 50 Marks

Suggested Learning Resources:

Text Books

1. Tchobanoglous, G., Theisen, H., and Samuel A Vigil, Integrated Solid Waste Management, McGraw-Hill Publishers, 1993.
2. Bilitewski B., Hard He G., Marek K., Weissbach A., and Boeddicker H., Waste Management, Springer, 1994.

Reference Books:

1. White, F. R., Franke P. R.,& Hindle M., Integrated solid waste management: a life cycle inventory. McDougall,P. John Wiley & Sons. 2001
2. Nicholas, P., & Cheremisinoff, P. D., Handbook of solid waste management and waste minimization technologies, Imprint of Elsevier Science. 2005

B.E. (Common to All Branches) Outcome Based Education (OBE) and Choice Based Credit System (CBCS) SEMESTER – I / II			
Course Title:	**Emerging Applications of Biosensors**		
Course Code:	**BETCK105G**	**CIE MARKS**	**50**
L : T : P:	**3:0:0**	**SEE MARKS**	**50**
Credits:	**03**	**EXAM HOURS**	**3 Hrs of Theory**
Total hours of Pedagogy	**40 hours Theory**	**Total Marks**	**100**

COURSE LEARNING OBJECTIVES: The purpose of the course is to facilitate the learner to:

- Provide a comprehensive understanding of the fundamental components, principles, and classifications of biosensors.
- Explore and analyze various types of electrochemical biosensors, including their mechanisms and applications.
- Examine the principles, designs, and applications of optical, piezoelectric, and calorimetric biosensors.
- Teach various immobilization methods for integrating bio-recognition elements into biosensor systems.
- Evaluate the diverse applications of biosensors in fields such as food safety, clinical diagnostics, defense, and environmental monitoring.

MODULE – 1 **(8 Hours)**

FUNDAMENTALS OF BIOSENSORS: Introduction: Components of a Biosensor, Developments in Biosensors: Schematic of a Biosensor, Classification of Biosensors.
BIOSENSORS I: Electrochemical Biosensors: Amperometric sensors, Potentiometric sensors, Conductometric sensors, Electrochemical Impedance Spectroscopy.

MODULE – 2 **(8 Hours)**

BIOSENSORS II: Optical based Biosensor: Surface Plasmon Resonance, Chemiluminescence, Fibre Optic Biosensor. Piezoelectric Sensors, Calorimetric based Biosensor.
IMMOBILISATION METHODS: Introduction, Immobilisation methods: Adsorption, Covalent Bonding, Cross Linking, Entrapment.

MODULE – 3 **(8 Hours)**

BIORECOGNITION PRINCIPLES AND ELEMENTS: Principles of Biorecognition, Natural Biorecognition elements: Enzymes, Antibodies, Semi-synthetic Biorecognition elements: Nucleic acids, Aptamers, Synthetic Biorecognition elements: Imprinted Polymers.

MODULE – 4 **(8 Hours)**

APPLICATIONS OF BIOSENSORS I: Introduction, Biosensors for Food/Water Safety: Biosensors for Detection of Foodborne/Waterborne Pathogens: Biosensors for Escherichia Coli Detection, Biosensors for Salmonella Detection, Biosensors for Mycotoxin Detection: Biosensors for Aflatoxin Detection, Biosensors for Ochratoxin Detection.

MODULE – 5 **(8 Hours)**

APPLICATIONS OF BIOSENSORS II: Biosensors for the Defence Industries, Biosensors for Clinical Diagnostics: Biosensors for Glucose Detection, Biosensors for Cholesterol Detection, Biosensors for Cancer Detection, Biosensors for Environmental Monitoring.

NANOMATERIAL-BASED BIOSENSORS: Introduction, Metal Nanoparticle-based Biosensor, Nanostructured Metal Oxide-based Biosensors, Carbon Nanotube-based Biosensors.

COURSE OUTCOMES: After successfully completing the course, the student will be able to:

CO1	Understand the fundamental components and classifications of biosensors.
CO2	Analyze and differentiate various types of electrochemical and optical biosensors.

CO3	Apply different immobilization methods for integrating biorecognition elements in biosensor design.
CO4	Evaluate the applications of biosensors in food safety, clinical diagnostics, defense, and environmental monitoring.

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) and for the SEE minimum passing mark is 35% of the maximum marks (18 out of 50 marks). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student 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.

Continuous Internal Evaluation (CIE):

Assessment Type	Maximum Marks	Minimum Passing Marks	Evaluation Details
CIE – IA Tests (A)	30	12	Average of Three Internal Assessment Tests each of 50 marks, scaled down to 30 marks.
Alternate Assessment (B)	20	8	Any two Assessment methods as per 24RNBE4.2 (*if it is project based, one assignment shall be given), scaled to 20 marks.
Total CIE (A+B)	**50**	**20**	**CIE Evaluation is done for a maximum of 50 marks**
SEE (C)	**50**	**18**	**SEE is a theory exam conducted for 100 marks and scaled down to 50 marks. Exam duration shall be for 3 hours.**
CIE + SEE (A+B+C)	**100**	**40**	Final marks shall be the sum of marks scored in Components **A, B and C.**
• The minimum marks to be secured in CIE is 20 out of allotted 50 marks to appear for SEE, with minimum 40 % scored in every component of CIE.			

SEE

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

1. The question paper will have ten questions. Each question is set for 20 marks.
2. 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.
3. The students have to answer 5 full questions, selecting one full question from each module.
4. Marks scored by the student shall be proportionally scaled down to 50 Marks

Suggested Learning Resources:

Text Books:

Chandra Mouli Pandey, Bansi Dhar Malhotra; Biosensors: Fundamentals and Applications, Publisher: De Gruter, 2019, 2nd edition

Reference Books:

1. Zvi Liron, Novel Approaches in Biosensors and Rapid Diagnostic Assays; Publisher: Springer US Ed..2001 2.
2. Pierre R. C, and Loïc J.B, Biosensor Principles and Applications, , CRC Press, 2019
3. Jeong-Yeol Yoon, Introduction to Biosensors, Springer-Verlag New York Ed. 2016
4. Mohammed Zourob, Recognition Receptors in Biosensors; Publisher: Springer-Verlag New York Ed. 2010

B.E. (Common to All Branches)
Outcome Based Education(OBE) and Choice Based Credit System(CBCS)
SEMESTER – I/II

Course Title	**Introduction to Internet of Things (IoT)**		
Course Code	**BETCK105H/205H**	**CIE MARKS**	**50**
L : T : P	**3:0:0**	**SEE MARKS**	**50**
Credits	**03**	**EXAM HOURS**	**03**

COURSE LEARNING OBJECTIVES: The purpose of the course is to facilitate the learner to:

- Understand about the fundamentals of Internet of Things and its building blocks along with their characteristics.
- Basics of IoT sensors and Actuators
- Understanding IoT Processing Topologies and Types
- Gain insights about the protocols and the Associated IoT technologies
- Understand the recent application domains of IoT in everyday life

MODULE – 1 **(8hrs)**

Basics of Networking: Introduction, Network Types, Layered network models
Emergence of IoT: Introduction, Evolution of IoT, Enabling IoT and the Complex Interdependence of Technologies, IoT Networking Components

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

MODULE – 2 **(8hrs)**

IoT Sensing and Actuation: Introduction, Sensors, Sensor Characteristics, Sensorial Deviations, Sensing Types, Sensing Considerations, Actuators, Actuator Types, Actuator Characteristics.
Beginning IoT Hardware Projects: Introduction to Arduino Boards, Hands-on Experiments with Arduino (Few Sample experiments)

Textbook 1: Chapter 5 – 5.1 to 5.9, Chapter 16.1 to 16.3.5

MODULE – 3 **(8hrs)**

IoT Processing Topologies and Types: Data Format, Importance of Processing in IoT, Processing Topologies, IoT Device Design and Selection Considerations, Processing Offloading.
IoT Communication Technologies: Introduction, Infrastructure Protocols, Discovery Protocols, Data protocols.

Textbook 1: Chapter 6 – 6.1 to 6.5; Chapter 8.1 to 8.4

MODULE – 4 **(8hrs)**

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

Textbook 1: Chapter 10 – 10.1 to 10.6

MODULE – 5 **(8hrs)**

IOT CASE STUDIES
Agricultural IoT – Introduction and Case Studies
IOT CASE STUDIES AND FUTURE TRENDS
Vehicular IoT – Introduction
Healthcare IoT – Introduction, Case Studies

Textbook 1: Chapter 12– 12.1, 12.2; Chapter 13– 13.1; Chapter 14 – 14.1-14.2

COURSE OUTCOMES:

After successfully completing the course, the student will be able to:

CO1	Demonstrate the evolution of IoT, IoT networking components, and addressing strategies in IoT.

CO2	Experiment with various sensing devices and actuator types
CO3	Summarize Associated IoT Technologies
CO4	Choose IoT applications in different fields

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) and for the SEE minimum passing mark is 35% of the maximum marks (18 out of 50 marks). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student 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.

Continuous Internal Evaluation (CIE):

Assessment Type	Maximum Marks	Minimum Passing Marks	Evaluation Details
CIE – IA Tests (A)	30	12	Average of Three Internal Assessment Tests each of 50 marks, scaled down to 30 marks.
Alternate Assessment (B)	20	8	Any two Assessment methods as per 24RNBE4.2 (*if it is project based, one assignment shall be given), scaled to 20 marks.
Total CIE (A+B)	**50**	**20**	**CIE Evaluation is done for a maximum of 50 marks**
SEE (C)	**50**	**18**	**SEE is a theory exam conducted for 100 marks and scaled down to 50 marks. Exam duration shall be for 3 hours.**
CIE + SEE (A+B+C)	**100**	**40**	Final marks shall be the sum of marks scored in Components **A, B and C.**
• The minimum marks to be secured in CIE is 20 out of allotted 50 marks to appear for SEE, with minimum 40 % scored in every component of CIE. • If any courses of 3 credits are of Integrated Course type, for such courses the method suggested for 4 credits IPCC shall be followed.			

SEE Question paper pattern

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

1) The question paper will have ten questions. Each question is set for 20 marks.
2) 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.
3) The students have to answer 5 full questions, selecting one full question from each module.
4) Marks scored by the student shall be proportionally scaled down to 50 Marks

Text Book

1) Sudip Misra, Anandarup Mukherjee, Arijit Roy, "Introduction to IoT", Cambridge University Press 2021.

Reference Book:

1) Internet of Things: A Hands-On Approach by Arshdeep Bahga, Vijay Madisetti, Orient Blackswan

Private Limited - New Delhi, January 2015

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

- Introduction to Arduino UNO.
- Introduction to the Sensors and Actuators.
- Basic Experiments using the Arduino kits.
- Visit to an IoT based industry.

Programming Assignments: (Sample Programs)

Students should exercise these types of mini projects in group. (**Mapped to Module 2, 3 & 5**) **(L2, L3, L4) (Both Hardware or Simulation is permitted)**

1. Arduino Alarm Clock:
Description: This project presents an alarm clock using Arduino. Real time clock is used in order to get accurate time. Here, this system displays date and time on an LCD display and we can set the alarm using control buttons. Once the alarm time is reached, the system rings a buzzer.

2. Arduino Light Sensor:
Description: Light Sensor is a device that detects radiant energy or light. There are a wide range of applications of light sensors like security systems, burglar alarms, garage door openers, solar tracking systems etc. In this article, a simple light sensor using Light Dependent Resistor (LDR) is designed and controlled using Arduino.

3. Arduino Based Digital Thermometer:
Description: Thermometer is an instrument used for measuring temperature. Digital thermometers are seen very commonly these days. This project presents design of a digital thermometer using Arduino. It measures the room temperature value using a temperature sensor and displays the measured value using a 16X2 LCD display.

4. Smoke Detector using MQ2 Gas Sensor and Arduino
Description: The Smoke Detector Circuit not only sense the smoke in the air but also reads and displays the level of Smoke in the Air in PPM (parts per million). This circuit triggers the Buzzer when Smoke level becomes higher than 1000 ppm, this threshold value can be changed in the Code according to the requirement. This circuit mainly uses MQ2 Smoke/Gas sensor and Arduino to detect and calculate the level of smoke. MQ2 gas sensor is also sensible to LPG, Alcohol, and Methane etc.

5. Touch Dimmer circuit using Arduino
Description: The brightness of a small bulb is controlled using a touch sensor. The longer the touch time, the brighter the bulb glows. So the brightness of the bulb is adjusted in accordance with the touch time.

B.E. (Common to All Branches)
Outcome Based Education(OBE) and Choice Based Credit System (CBCS)
SEMESTER – I / II

Course Title:	**Introduction to Cyber Security**		
Course Code:	**BETCK105I/205I**	**CIE MARKS**	**50**
L : T : P	**3:0:0**	**SEE MARKS**	**50**
Credits:	**03**	**EXAM HOURS**	**03**
Total hours of Pedagogy	**40 hours Theory**	**Total Marks**	**100**

COURSE LEARNING OBJECTIVES: The purpose of the course is to facilitate the learner to:

- Understanding fundamental cybersecurity concepts and gaining knowledge about various cyber threats and vulnerabilities.
- Gaining insights into the tools and methods used in cybercrimes.
- Learning about counter-cybersecurity initiatives in India.
- Understanding how to configure firewalls on computers and implement security measures for social media platforms.

Introduction to Cyber Space: History of internet: Internet Addresses, DNS, Internet Infrastructure, World Wide Web.
Introduction to Cyber-Crime: Classification of cyber-crime, Reasons for commission of cyber- crimes.
Malware and Its Type: Adware, Spyware, Browser Hijacking Software, Virus, Worms, Trojan Horse, Scareware.
Kinds Of Cyber Crime: Cyber Stalking, Child Pornography, Forgery and Counterfeiting, Software Piracy and Crime related to IPRS, Cyber Terrorism, Phishing, Computer Vandalism, Computer Hacking, creating, and distributing viruses over internet, Spamming, Cross Site Scripting, Online auction fraud, Cyber Squatting, logic bombs, Web Jacking, Internet Time Thefts, Denial of service attack, Salami attack, Data diddling, Email spoofing.

Textbook 1: Chapter 1 (1.1 - 1.4)

MODULE – 2 **(8hrs)**

Cyber Security Technique: Authentication, Encryption Digital Signatures Antivirus, Firewall, Steganography.
Investigating Cyber-Crimes: Introduction to cyber forensic, Computer forensics, Why should we report cyber-crime?
Some Recent Cyber Security Attacks: Introduction, some recent cyber-crime incidents.

Textbook 1: Chapter 2 (2.1 - 2.6); Chapter 3 (3.1 - 3.2); Chapter 4 (4.1 - 4.2)

MODULE – 3 **(8hrs)**

Cyber Security Initiatives in India: Introduction, counter cyber security initiatives in India.
Guidelines for Secure Password, Two Step Verification and Using Free Antivirus: Generating secure password, Guideline for setting secure password, using password manager, what is a password manager? Why you should use it?, How does it work?, some popular password managers, enabling two step verification, securing computer using free antivirus.

Textbook 1: Chapter 5 (5.1 - 5.2); Chapter 6 (6.1 - 6.4)

MODULE – 4 **(8hrs)**

Configuring Firewall on Computers: Turning on and configuring the MAC OS X firewall, working with windows firewall in windows, Firewall in Windows 7, Configuring windows firewall. How to start & use the windows firewall with advanced security, How to Access the Windows Firewall with Advanced Security, What are the Inbound & Outbound Rules? What are the Connection Security Rules?, What does the Windows Firewall with Advanced Security Monitor?
Choosing Best Browser to Suit Your Requirements: Finding the best browser according to the users requirement. Safe browsing, Tips for buying online

Textbook 1: Chapter 7 (7.1 - 7.2); Chapter 8 (8.1) & Chapter 9 (9.1 - 9.2)
MODULE – 5 **(8hrs)**
Email and Social Media Security: Safe browsing guidelines for social networking sites, General tips on using social networking platforms safely, Posting personal details, Friends, followers and contacts, Status updates, Sharing online content, revealing your location, Sharing videos and photos, Instant chats, Joining and creating groups, events and communities, Email security tips. **Smartphone Security:** Introduction, Smartphone security guidelines, Purses, wallets, smartphones, platforms, setup and installation, Platforms and operating systems, Feature phones, Branded and locked smartphones, General setup, Installing and updating applications, ***Textbook 1: Chapter 11 (11.1 - 11.2); Chapter 12 (12.1 - 12.2)***

COURSE OUTCOMES:

After successfully completing the course, the student will be able to:

CO1	Understand fundamentals cybersecurity concepts.
CO2	To gain knowledge on tools and methods used in cybercrimes
CO3	Learn the counter cyber security initiatives in India
CO4	Understand the configuration of firewall on computers and security for social media

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) and for the SEE minimum passing mark is 35% of the maximum marks (18 out of 50 marks). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student 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

Continuous Internal Evaluation (CIE):

Assessment Type	Maximum Marks	Minimum Passing Marks	Evaluation Details
CIE – IA Tests (A)	30	12	Average of Three Internal Assessment Tests each of 50 marks, scaled down to 30 marks.
Alternate Assessment (B)	20	8	Any two Assessment methods as per 24RNBE4.2 (*if it is project based, one assignment shall be given), scaled to 20 marks.
Total CIE (A+B)	**50**	**20**	**CIE Evaluation is done for a maximum of 50 marks**
SEE (C)	**50**	**18**	**SEE is a theory exam conducted for 100 marks and scaled down to 50 marks. Exam duration shall be for 3 hours.**
CIE + SEE	**100**	**40**	Final marks shall be the sum of marks
(A+B+C)			scored in Components **A, B and C.**
• The minimum marks to be secured in CIE is 20 out of allotted 50 marks to appear for SEE, with minimum 40 % scored in every component of CIE.			

- If any courses of 3 credits are of Integrated Course type, for such courses the method suggested for 4 credits IPCC shall be followed.

SEE Question Paper pattern

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

1) The question paper will have ten questions. Each question is set for 20 marks.
2) There will be 2 questions from each module. Each of the two questions under a module (with amaximum of 3 sub-questions), **should have a mix of topics** under that module.
3) The students have to answer 5 full questions, selecting one full question from each module.
4) Marks scored by the student shall be proportionally scaled down to 50 Marks

Textbooks:

1) Introduction to Cyber Security available at http://uou.ac.in/foundation-course

Reference Books:

1) Fundamentals of Information Security http://uou.ac.in/progdetail?pid=CEGCS-17
2) Cyber Security Techniques http://uou.ac.in/progdetail?pid=CEGCS-17
3) Cyber Attacks and Counter Measures: User Perspective http://uou.ac.in/progdetail?pid=CEGCS- 17
4) Information System http://uou.ac.in/progdetail?pid=CEGCS-17

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

- Demonstration of different types of cyber attacks using open source tools.

B.E. (Common to All Branches)
Outcome Based Education(OBE) and Choice Based Credit System(CBCS)
SEMESTER – I / II

Course Title:	**INTRODUCTION TO EMBEDDED SYSTEMS**		
Course Code:	**BETCK205J**	**CIE MARKS**	**50**
L : T : P	**3:0:0**	**SEE MARKS**	**50**
Credits:	**03**	**EXAM HOURS**	**03**
Total hours of Pedagogy	**40 hours Theory**	**Total Marks**	**100**

COURSE LEARNING OBJECTIVES: The purpose of the course is to facilitate the learner to:

- Introductory topics of Embedded System design.
- Characteristics & attributes of Embedded System.
- Introduction of Embedded System Software and Hardware development.
- Embedded system design for real time applications.

Teaching-Learning Process (General Instructions)
These are sample Strategies, which teacher can use to accelerate the attainment of the various course outcomes and make Teaching –Learning more effective
1. Lecturer method (L) does not mean only the traditional lecture method, but a different type of teaching method may be adopted to develop the outcomes.
2. Show Video/animation films to explain the functioning of various analog and digital circuits.
3. Adopt Problem Based Learning (PBL), which fosters students' Analytical skills, develop thinking skills such as the ability to evaluate, generalize, and analyse information rather than simply recall it.
4. Show the different ways to solve the same problem and encourage the students to come up with their own creative ways to solve them.
5. Discuss how every concept can be applied to the real world - and when that's possible, it helps improve the students' understanding

MODULE – 1 **(8hrs)**

Introduction: Embedded Systems and general purpose computer systems, history, classifications, applications and purpose of embedded systems
Chapter 1 – Text 1
The Embedded system, Core of Embedded Systems: Microprocessors and microcontrollers, RISC and CISC controllers, Big endian and Little endian processors, Application specific ICs, Programmable logic devices, COTS, Memories in ES, communication interface- I2C, SPI, UART, RS232.
Chapter 2,2.1-2.2,2.4 – Text 1

MODULE – 2 **(8hrs)**

Embedded firmware, Embedded system components: Reset circuit, Brown-out protection circuit, Oscillator unit. Real-Time clock, Watchdog Timer, PCB and Passive components. Characteristics and quality attributes of embedded systems: Characteristics, Operational and non-operational quality attributes, application specific embedded system - washing machine, domain specific – automotive
Chapter 2.5,2.6,2.7, 3 & 4 – Text 1

MODULE – 3 **(8hrs)**

Embedded system with Sensors and Actuators, The I/O subsystem.
Chapter 2, Text1 2.3,
Hardware Software Co design and Program Modelling: Fundamental issues in Hardware Software Co-design, Computational models in Embedded System Design.
Chapter 7 – Text 1: 7.1, 7.2
Embedded Firmware Design and Development: Embedded Firmware Design Approaches, Embedded Firmware Development Languages.
Chapter 9 – Text 1: 9.1, 9.2

MODULE – 4	**(8hrs)**
Embedded System Development Environments: Types of files generated on cross compilation (only explanation – programming codes need not be dealt), disassembler/decompiler, Simulators, Emulators and Debugging **Chapter 13 – Text 1: 13.2, 13.3,13.4** Designing Embedded system with 8-bit microcontroller 8051, Factors to be considered in selecting a controller, Designing with 8051. **Chapter 5, Text 1 5.1,5.2, 5.3.1**	
MODULE – 5	**(8hrs)**
The Memory organization, Registers, Oscillator Unit, 8051and LEDs interfacing with Binary number display circuit , Stepper motor interfacing circuit for 8051(Excluding program) **Chapter 5, Text 1, 5.3.2 (Excluding 5.3.2.6) ,5.3.3,5.3.4(only Example 1 & 2 page112,113,115,116)**	

COURSE OUTCOMES:

After successfully completing the course, the student will be able to:

CO1	Explain the core and memory of Embedded System design
CO2	Acquire knowledge about characteristics and applications of embedded system
CO3	Analyse embedded system software and hardware requirements
CO4	Acquire basic knowledge of Embedded System Software and Hardware development.
CO5	Analyse embedded system for real time applications

ASSESSMENT DETAILS (Both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks out of 50) and for the SEE minimum passing mark is 35% of the maximum marks (18 out of 50 marks). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student 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

Continuous Internal Evaluation (CIE):

Assessment Type	**Maximum Marks**	**Minimum Passing Marks**	**Evaluation Details**
CIE – IA Tests (A)	30	12	Average of Three Internal Assessment Tests each of 50 marks, scaled down to 30 marks.
Alternate Assessment (B)	20	8	Any two Assessment methods as per 24RNBE4.2 (*if it is project based, one assignment shall be given), scaled to 20 marks.
Total CIE (A+B)	**50**	**20**	**CIE Evaluation is done for a maximum of 50 marks**
SEE (C)	**50**	**18**	**SEE is a theory exam conducted for 100 marks and scaled down to 50 marks. Exam duration shall be for 3 hours.**
CIE + SEE	**100**	**40**	Final marks shall be the sum of marks

(A+B+C)			scored in Components **A, B and C.**
• The minimum marks to be secured in CIE is 20 out of allotted 50 marks to appear for SEE, with minimum 40 % scored in every component of CIE. • If any courses of 3 credits are of Integrated Course type, for such courses the method suggested for 4 credits IPCC shall be followed.			

SEE Question Paper pattern

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

5) The question paper will have ten questions. Each question is set for 20 marks.
6) 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.
7) The students have to answer 5 full questions, selecting one full question from each module.
8) Marks scored by the student shall be proportionally scaled down to 50 Marks

The theory portion of the IPCC shall be for both CIE and SEE, whereas the practical portion will have a CIE component only. Questions mentioned in the SEE paper may include questions from the practical component.

Suggested Learning Resources:

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

1. Shibu K V, “Introduction to Embedded Systems”, Second Edition, McGraw Hill Education.

B.E. (Common to CSE Allied Branches)
Outcome Based Education (OBE) and Choice Based Credit System (CBCS)
SEMESTER – I / II

Course Title:	**Digital Marketing**		
Course Code:	**BETCK105K/205K**	**CIE MARKS**	**50**
L: T: P:	**3:0:0**	**SEE MARKS**	**50**
Credits:	**03**	**EXAM HOURS**	**03**
Total hours of Pedagogy	**40 hours Theory**	**Total Marks**	**100**

COURSE LEARNING OBJECTIVES: The purpose of the course is to facilitate the learner to:

- Understand the fundamentals of Digital Marketing and its advantages and challenges for business.
- Explore applications and assess the benefits of surveys and feedback.
- Develop skills to create and manage a website or blog.
- Gain an overview of digital publicity and employability in Digital Marketing.
- Comprehend the benefits and functionalities of digital marketing automation tools.

MODULE – 1

Introduction to Digital Marketing: Introduction, What is Digital Marketing?, How is Digital Marketing different from Traditional Marketing, New Trends and Current Scenario of Digital Marketing, Digital Marketing a boon or a bane, Categorization of Digital Marketing for the business.
Textbook: Chapter 1 – 1.1, 1.3, 1.4, 1.6 Chapter 2 – 2.3, 2.5

MODULE – 2

Web Designing basics, Feedback and Surveys: Web Designing: An Overview, Importance of web designing, simplifying your business by choosing suitable web applications, Web designing and Digital Marketing tools, Benefits and limitations of web designing in business flow, feedback and survey: role and types, Tools available for online survey.
Textbook: Chapter 3 – 3.3, 3.4, 3.5, 3.7, 3.9, 3.11-3.16

MODULE – 3

Content Management System: Content Management System, WordPress-A brief introduction, WordPress Dashboard, Create a WordPress website/Blog, WordPress Post, WordPress Links and Google Map in WordPress.
Keyword Research Tools: Introduction, how to find keyword ideas? How to analyze Keywords, how to target keywords, Online reputation – Tactics & Methods.
Textbook: Chapter 4 – 4.1, 4.3 to 4.8; Chapter 5 – 5.1, 5.3, 5.4, 5.5, 5.7

MODULE – 4

Digital Publicity and Employability: Digital Publicity: An overview, Need of Digitalization, Promotional Tools, Types of Employability in Digital era, Future Prospects.
Digital Marketing and Management: An overview, 5D's of Digital Marketing and Management. Importance and Benefits.
Textbook: Chapters 6.3 to 6.8 Chapter 9 – 9.3 to 9.5

MODULE – 5

Digital Marketing Automation and New Age Skills: An Overview, Benefits of Digital Marketing Automation Tools, Common functionalities, Challenges faced, Difference between email marketing and Digital marketing Automation, Skills required for Digital Marketing.
Textbook: Chapter 8– 8.3 to 8.8

COURSE OUTCOMES:

After successfully completing the course, the student will be able to:

CO1	Understand the concepts, and definitions of digital marketing, distinguishing it from traditional marketing practices.

CO2	Develop and implement effective digital marketing strategies using various tools and platforms, including web design, content management, and automation.
CO3	Analyze and interpret current trends, and career prospects in the digital marketing field.
CO4	Gain hands-on experience with digital marketing tools and techniques in the digital marketing field.

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) and for the SEE minimum passing mark is 35% of the maximum marks (18 out of 50 marks). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student 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.

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Assessment Type	Maximum Marks	Minimum Passing Marks	Evaluation Details
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• The minimum marks to be secured in CIE is 20 out of allotted 50 marks to appear for SEE, with minimum 40 % scored in every component of CIE. • If any courses of 3 credits are of Integrated Course type, for such courses the method suggested for 4 credits IPCC shall be followed.			

SEE Question paper pattern:

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

1) The question paper will have ten questions. Each question is set for 20 marks.
2) 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.
3) The students have to answer 5 full questions, selecting one full question from each module.
4) Marks scored by the student shall be proportionally scaled down to 50 Marks

Textbooks

1. Dr. Gopal Datt, “Introduction to Digital Marketing”, Uttarakhand Open University, Haldwani, Nainital Edition- 2023.

Reference Books:

1. Ryan Deiss and Russ Hennesberry, 2017, Digital Marketing for Dummies, Wiley, a BrightEdge customer.
2. Lisa Sabin-Wilson, WordPress All-in-One for Dummies, 2020, 4ed, Wiley
3. “Keyword Research for SEO: The Definitive Guide (2021 Update),” Backlinko, 13-Oct-2020. [Online]. Available: https://backlinko.com/keyword-research.

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

- Quizzes
- Assignments
- Seminars
- Hand-on usage of Online tools.

PLC

Programming Language Courses

BPLCK105A/205A	**Introduction to Web Programming**
BPLCK105B/205B	**Introduction to Python Programming**
BPLCK105C/205C	**Introduction to Java Programming**
BPLCK105D/205D	**Introduction to C++ Programming**

B.E. (Common to CSE Allied Branches)
Outcome Based Education (OBE) and Choice Based Credit System (CBCS)
SEMESTER – I / II

Course Title:	**Introduction to Web Programming**		
Course Code:	**BPLCK105A/205A**	**CIE MARKS**	**50**
L: T: P:	**2:0:2**	**SEE MARKS**	**50**
Credits:	**03**	**EXAM HOURS**	**03**

COURSE LEARNING OBJECTIVES: The purpose of the course is to facilitate the learner to:

- To use the syntax and semantics of HTML and XHTML
- To develop different parts of a web page
- To understand how CSS can enhance the design of a webpage.
- To create and apply CSS styling to a webpage
- To get familiarity with the JavaScript language and understand Document Object Model handling of Java Script

MODULE – 1

Traditional HTML and XHTML: First Look at HTML and XHTML, Hello HTML and XHTML World, HTML and XHTML: Version History, HTML and XHTML DTDs: The Specifications Up Close, (X)HTML Document Structure, Browsers and (X)HTML, The Rules of (X)HTML, Major Themes of (X)HTML, The Future of Markup—Two Paths?

TextBook1: Chapter 1

MODULE – 2

HTML5:
Hello HTML5, Loose Syntax Returns, XHTML5, HTML5: Embracing the Reality of Web Markup, Presentational Markup Removed and Redefined, HTML5 Document Structure Changes, Adding Semantics, HTML5's Open Media Effort, Client-Side Graphics with <canvas>, HTML5 Form Changes, Emerging Elements and Attributes to Support Web Applications

TextBook1: Chapter 2

MODULE – 3

Cascading Style Sheets (CSS):
Introduction, CSS Overview, CSS Rules, Example with Type Selectors and the Universal Selector, CSS Syntax and Style, Class Selectors, ID Selectors, span and div Elements, Cascading, style Attribute, style Container, External CSS Files, CSS Properties, Color Properties, RGB Values for Color, Opacity Values for Color, HSL and HSLA Values for Color, Font Properties, line-height
Property, Text Properties, Border Properties, Element Box, padding Property, margin Property, Case Study: Description of a Small City's Core Area.

TextBook2: Chapter 3

MODULE – 4

Module-4: Tables and CSS, Links and Images:
Table Elements, Formatting a Data Table: Borders, Alignment, and Padding, CSS Structural Pseudo-Class Selectors, thead and tbody Elements, Cell Spanning, Web Accessibility, CSS display Property with Table Values, a Element, Relative URLs, Navigation Within a Web Page, CSS for Links, Bitmap Image Formats: GIF, JPEG, PNG, img Element, Responsive Images, Positioning Images, Shortcut Icon, iframe Element.

TextBook2: 5.2 to 5.8, 6.2, 6.3, 6.6., 6.7, 6.9, 6.10, 6.12, 7.2 to 7.4

MODULE – 5

Introduction to JavaScript: Functions, DOM, Forms, and Event Handlers:
History of JavaScript, Hello World Web Page, Buttons, Functions, Variables, Identifiers, Assignment Statements and Objects, Document Object Model, Forms and How They're Processed: Client-Side Versus Server-Side, form Element, Controls, Text Control, Accessing a Form's Control Values, reset and focus Methods

TextBook2: 8.2 to 8,13, 8.15, 8.16

PRACTICAL COMPONENT *(May cover all / major modules)*

Programming Assignments

1 Create an XHTML page using tags to accomplish the following:
(i) A paragraph containing text "All that glitters is not gold". Bold face and italicize this text
(ii) Create equation:$x = 1/3\,(y_1^2 + z_1^2)$

(iii) Put a background image to a page and demonstrate all attributes of background image
(iv) Create unordered list of 5 fruits and ordered list of 3 flowers

2 Create following table using XHTML tags. Properly align cells, give suitable cell padding and cell spacing, and apply background color, bold and emphasis necessary

Department	**Sem1**	*SubjectA*
		SubjectB
		SubjectC
	Sem2	*SubjectE*
		SubjectF
		SubjectG
	Sem3	*SubjectH*
		SubjectI
		SubjectJ

3. Use HTML5 for performing following tasks:
(i) Draw a square using HTML5 SVG , fill the square with green color and make 6px brown stroke width
(ii) Write the following mathematical expression by using HTML5 MathML. $d=x^2-y^2$
(iii) Redirecting current page to another page after 5 seconds using HTML5 meta tag

4. Demonstrate the following HTML5 Semantic tags- <article>, <aside>, <details>, <figcaption>, <figure>, <footer>, <header>, <main>, <mark>, <section> for a webpage that gives information about travel experience.

5. Create a class called **income** and make it a background color of #0ff. Create a class Called **expenses** and make it a background color of #f0f. Create a class called **profit** and make it a background color of #f00.

Throughout the document, any text that mentions income, expenses, or profit, attach

the appropriate class to that piece of text. Further create following line of text in the same document:

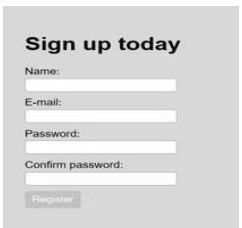
~~The current price is 50₹~~ and new price is 40₹

6. Change the tag **line** to have the following properties:
    - A display status of inline
    - A medium, double-lined, black border
    - No list style type

    Add the following properties to the style for **li**:
    - Margin of 5px
    - Padding of 10px to the top, 20px to the right, 10px to the bottom, and 20px to the left

    Also demonstrate list style type with user defined image logos

7. Create following web page using HTML and CSS with tabular layout



8. Create following calculator interface with HTML and CSS



9. Write a Java Script program that on clicking a button, displays scrolling text which moves from left to right with a small delay

10. Create a webpage containing 3 overlapping images using HTML, CSS and JS. Further when the mouse is over any image, it should be on the top and fully displayed.

COURSE OUTCOMES:

After successfully completing the course, the student will be able to:

CO1	Design and implementation of webpages using HTML and XHTML tags
CO2	Develop HTML5 documents and adding various semantic markup tags
CO3	Analyze various attributes, values and types of CSS
CO4	Implement core constructs and event handling mechanisms of JavaScript.

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):

Assessment Type	Maximum Marks	Minimum Passing Marks	Evaluation Details
CIE- IA Tests (A)	20	8	Average of Three Internal Assessment Tests each of 50 marks, scaled down to 20 marks.
Alternate Assessment (B)	10	4	Any one Assessment methods as per 24RNBE4.2 scaled to 10 marks.
Total CIE Theory (A+B)	**30**	**12**	**Marks of Tests and Assignments awarded for a maximum of 30.**
CIE Practical	12	5	Marks awarded for Weekly Conduction of Experiments and Submission of Laboratory records, scaled to 12 marks.
CIE Practical Test	8	3	Average of marks of Two tests, each conducted for 100 marks covering all experiments, scaled to 8.
Total CIE Practical (C)	**20**	**8**	**Marks of Experiments, Record and Test awarded for a maximum of 20 marks.**
CIE: Theory + Practical (A + B + C)	**50**	**20**	**CIE Evaluation is done for a maximum of 50 marks.**
SEE (D)	**50**	**18**	**SEE is a theory exam, conducted for 100 marks and scaled down to 50 marks. Exam duration shall be for 3 hours.**
CIE+SEE (A+B+C+D)	**100**	**40**	**Final marks shall be the sum of marks scored in Components A, B, C and D**
The minimum marks to be secured in CIE is 20 out of allotted 50 marks to appear for SEE, with minimum 40 % scored in every component of CIE. The laboratory component of the IPCC shall be for CIE only. However, in SEE, the questions from the laboratory component shall be included in their respective modules only.			

SEE for IPCC

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

1. The question paper will have ten questions. Each question is set for 20 marks.
2. 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.
3. The students must answer 5 full questions, selecting one full question from each module.
4. Marks scored by the student shall be proportionally scaled down to 50 Marks

The theory portion of the Integrated Course shall be for both CIE and SEE, whereas the practical portion will have a CIE component only. Questions mentioned in the SEE paper shall include questions from the practical component).

Textbooks

1) TextBook-1: *HTML & CSS: The Complete Reference***,** Thomas A. Powell, Fifth Edition, Tata McGraw Hill, 2010
2) TextBook-2: *WEB PROGRAMMING with HTML5, CSS and JavaScript*, John Dean, Jones & Bartlett Learning, First Edition

Reference Books:

1) Murach's HTML5 and CSS3, Zak Ruvalcaba Anne Boehm, 3rd Edition, Murachs/Shroff Publishers & Distributors Pvt Ltd, 2016. (ISBN:978-9352133246)
2) 2.Reference Book-2: Fundamentals of Web Development, Randy Connolly, Ricardo Hoar, 1st Edition, Pearson Education India. (ISBN:978-9332575271)
3) 3.Reference Book-3: JavaScript & jQuery: The Missing Manual, David Sawyer Mcfarland,1st Edition, O'Reilly/Shroff Publishers & Distributors Pvt Ltd, 2014 (ISBN:978-9351108078)

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

- Develop simple GUI interfaces for a computer program to interact with users

B.E. (Common to All Branches)
Outcome Based Education(OBE) and Choice Based Credit System(CBCS)
SEMESTER – I / II

Course Title:	**Introduction to Python Programming**		
Course Code:	**BPLCK105B/205B**	**CIE MARKS**	**50**
L : T : P:	**2:0:2**	**SEE MARKS**	**100**
Credits:	**3**	**EXAM HOURS**	**3**

COURSE LEARNING OBJECTIVES: The purpose of the course is to facilitate the learner to:

- Learn the syntax and semantics of the Python programming language.
- Illustrate the process of structuring the data using lists, tuples, sets and Dictionary
- Illustrate the working of strings and automating tasks using Regular expressions
- Demonstrate the use of built-in functions to navigate the file system and work with various documents like PDF, word and others
- Enable debugging and implement exception handling in python

MODULE – 1

Python Basics: Entering Expressions into the Interactive Shell, The Integer, Floating-Point, and String Data Types, String Concatenation and Replication, Storing Values in Variables, Your First Program, Dissecting Your Program, Flow control: Boolean Values, Operators, Comparison Operators, Boolean Operators, Mixing Boolean and Comparison Operators, Elements of Flow Control, Program Execution, Flow Control Statements, Importing Modules, Ending a Program Early with sys.exit(), Functions: def Statements with Parameters, Return Values and return Statements, The None Value, Keyword Arguments and print(), Local and Global Scope, The global Statement, Exception Handling, A Short Program: Guess the Number

Text Book 1: Chapter 1, 2, 3

MODULE – 2

Lists: The List Data Type, Working with Lists, Augmented Assignment Operators, Methods, Example Program: Magic 8 Ball with a List, List-like Types: Strings and Tuples, Mutable and **Immutable data types, Sets :** Unordered set of unique objects, References,
Dictionaries and Structuring Data: The Dictionary Data Type, Pretty Printing, Using Data Structures to Model Real-World Things,

Text Book 1: Chapter 4, 5, Text Book 2: Chapter 2

MODULE – 3

Manipulating Strings: Working with Strings, Useful String Methods, Project: Password Locker, Project: Adding Bullets to Wiki Markup
Pattern Matching with Regular Expressions: Finding patterns of text without Regular Expressions, Finding patterns of text with Regular Expressions.

Text book 1: Chapter 6, 7

MODULE – 4

Reading and Writing Files: Files and File Paths, The os.path Module, The File Reading/Writing Process, Saving Variables with the shelve Module, Saving Variables with the print. Format() Function, Project: Generating Random Quiz Files, Project: Multiclipboard, Organizing Files: The shutil Module, Walking a Directory Tree, Compressing Files with the zip file Module, Project: Renaming Files with American-Style Dates to European-Style Dates, Project: Backing Up a Folder into a ZIP File

Text Book 1:Chapter 8, 9

MODULE – 5

Debugging: Exception Handling, Raising Exceptions, Getting the Traceback as a String, Assertions, Logging, IDLE's Debugger. Even More Tools, Libraries, and Modules: Alternatives to >>>, Alternatives to IDLE, Jupyter Notebook: The Web-Based IDE.
Doing Data Science: Introduction to numpy arrays and dataframe.

Text Book 1: Chapter 1, 10; Text Book 2: appendix d: top ten projects not covered

PRACTICAL COMPONENT OF IPCC *(May cover all / major modules)*

Experiments (8-10 Lab slots)

1. **Basics -lists and tuples**
   a. Develop a program to read the student details like Name, USN, and Marks in three subjects. Display the student details, total marks and percentage with suitable messages.
   b. Develop a program to read the name and year of birth of a person. Display whether the person is a senior citizen or not.
2. **Variables**
   a. Develop a program to generate Fibonacci sequence of length (N). Read N from the console.
   b. Write a function to calculate factorial of a number. Develop a program to compute binomial coefficient (Given N and R).
3. **Statistics**
   a. Read N numbers from the console and create a list. Develop a program to print mean, variance and standard deviation with suitable messages.
   b. Read a multi-digit number (as chars) from the console. Develop a program to print the frequency of each digit with suitable message.
4. **Text handling**
   a. Develop a program to print 10 most frequently appearing words in a text file. [Hint: Use dictionary with distinct words and their frequency of occurrences. Sort the dictionary in the reverse order of frequency and display dictionary slice of first 10 items]
   b. 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()].
5. **File handling**
   a. Develop a program to backing Up a given Folder (Folder in a current working directory) into a ZIP File by using relevant modules and suitable methods.
   b. Develop a program to demonstrate the path handling cpapbility of python using os.walk() function.
6. **Pattern recognition**
   a. Write a function called isphonenumber () to recognize a pattern 415-555-4242 without using regular expression and also write the code to recognize the same pattern using regular expression.
   b. Develop a python program that could search the text in a file for phone numbers (+919900889977) and email addresses (sample@gmail.com)
7. **Error handling**
   a. Write a function named DivExp which takes TWO parameters a, b and returns a value c (c=a/b). Write suitable assertion for a>0 in function DivExp and raise an exception for when b=0.
   b. Develop a suitable program which reads two values from the console and calls a function DivExp.

COURSE OUTCOMES:
After successfully completing the course, the student will be able to:

CO1	Demonstrate knowledge of python variables and environment
CO2	Develop skill for coding in python, handling loops and creation of functions.
CO3	Solve automation problems using regular expressions and relevant functions in python
CO4	Analyse various file handling techniques and their applications
CO5	Use various IDEs for programming to develop expertise in them

ASSESSMENT DETAILS (Both CIE and SEE)

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Text Books

1) Al Sweigart,"Automate the Boring Stuff with Python",1st Edition, No Starch Press, 2015. (Available under CC-BY-NC-SA license at https://automatetheboringstuff.com/)

2) Paul Barry, "Head First Python - A brain friendly guide", O'Reilly - 2nd Edition

B.E. (Common to All CSE Branches)
Outcome Based Education(OBE) and Choice Based Credit System(CBCS)
SEMESTER – I / II

Course Title:	**Introduction to Java Programming**		
Course Code:	**PLCK105C/205C**	**CIE MARKS**	**50**
L : T : P:	**2:0:2**	**SEE MARKS**	**50**
Credits:	**3**	**EXAM HOURS**	**3**

COURSE LEARNING OBJECTIVES: The purpose of the course is to facilitate the learner to:

- Learn fundamental features of object-oriented language and JAVA
- Set up Java JDK environment to create, debug and run simple Java programs.
- Learn object-oriented concepts using programming examples.
- Study the concepts of importing of packages and exception handling mechanism

MODULE – 1

Overview of Java:
Object-Oriented Programming, Structure of Java Programming Control Statements, Using Blocks of Code, Lexical Issues, The Java Class Libraries, Data Types, Variables, Literals, Type Conversion, and Casting, Automatic TypePromotion in Expressions, Arrays, Strings

Textbook 1: Ch 2, Ch 3

MODULE – 2

Operators:
Arithmetic Operators, The Bitwise Operators, Relational Operators, Boolean Logical Operators, The AssignmentOperator, The ? Operator, Operator Precedence, Using Parentheses,
Control Statements: Java's Selection Statements, Iteration Statements, Jump Statements.

Textbook 1: Ch 4, Ch 5

MODULE – 3

Introducing Classes: Class Fundamentals, Declaring Objects, Assigning Object Reference Variables, IntroducingMethods, Constructors, The this Keyword, Garbage Collection, The finalize( ) Method, A Stack Class, A Closer Look at Methods and Classes: Overloading Methods, Using Objects as Parameters, A Closer Look at Argument Passing, Returning Objects, Recursion, Introducing Access Control, Understanding static, Introducing final, Arrays Revisited

Text book 1: Ch 6, Ch 7 (7.1-7.9)

MODULE – 4

Inheritance: Inheritance, Using super, Creating a Multilevel Hierarchy, When Constructors Are Called, MethodOverriding, Dynamic Method Dispatch, Using Abstract Classes, Using final with Inheritance, The Object Class. **Exception Handling:** Exception-Handling Fundamentals – Exception Classes , Exception Types.

Text book 1: Ch 8,10

MODULE – 5

Packages :Defining a Package, Importing Packages,
Interfaces: Defining an Interface, Implementing Interfaces, Nested Interfaces, Default Interface Methods
Multithreaded Programming :
The Java Thread Model , The Main Thread , Creating a Thread, CreatingMultiple Threads, ThreadPriorities

Text book 1: Ch 9, Ch 11

PRACTICAL COMPONENT OF IPCC *(May cover all / major modules)*
Experiments (8-10 Lab slots) Programming Assignments 1. Write a Java program that prints all real solutions to the quadratic equation ax2+bx+c=0. Read in a, b, c and use the quadratic formula. 2. Write a Java program for multiplication of two arrays. 3. Demonstrate the following operations and sign extension with Java programs (i) << (ii) >> (iii) >>>> 4. Write a Java program to sort list of elements in ascending and descending order 5. Create a Java class called Student with the following details as variables within it. USN NAME BRANCH PHONE PERCENTAGE. Write a Java program to create n Student objects andprint the USN, Name, Branch, Phone, and percentage of these objects with suitable headings. 6. Write a Java program demonstrating Method overloading and Constructor overloading. 7. Design a super class called Staff with details as StaffId, Name, Phone, Salary. Extend this class bywriting three subclasses namely Teaching (domain, publications), Technical (skills), and Contract (period). Write a Java program to read and display at least 3 staff objects of all three categories. 8. Create two packages P1 and P2. In package P1, create class A, class B inherited from A, class C . Inpackage P2, create class D inherited from class A in package P1 and class E. Demonstrate working ofaccess modifiers (private, public, protected, default) in all these classes using Java. 9. Write a Java program to read two integers a and b. Compute a/b and print, when b is not zero. Raise an exception when b is equal to zero. Also demonstrate working of ArrayIndexOutOfBoundException. 10. Write a Java program that creates two threads. Each thread should print numbers from 1 to 5, but with a delay of 1 second between each number. Make sure the two threads run concurrently

COURSE OUTCOMES:

After successfully completing the course, the student will be able to:

CO1	Acquire knowledge of object-oriented concepts using Java. (**L2 Understanding)**
CO2	Apply object-oriented programming constructs to solve the given problems. (**L3 Applying)**
CO3	Analyze the concepts of code reusability (**Analysing)**
CO4	Design the solutions for the given real-world problems using concepts of libraries, Error handling, and interfaces L3 (**Applying)**
CO5	Design the solutions for the given real-world problems using concepts of packages, Exception Handling, and Multithread programming L5 (**Creating)**

ASSESSMENT DETAILS (Both CIE and SEE)

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CIE+SEE (A+B+C+D)	**100**	**40**	**Final marks shall be the sum of marks scored in Components A, B, C and D**

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2. 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.
3. The students must answer 5 full questions, selecting one full question from each module.
4. Marks scored by the student shall be proportionally scaled down to 50 Marks

The theory portion of the Integrated Course shall be for both CIE and SEE, whereas the practical portion will have a CIE component only. Questions mentioned in the SEE paper shall include questions from the practical component).

Text Books

1) Herbert Schildt, Java The Complete Reference, 7th Edition, Tata McGraw Hill, 2007.

Reference books

1) Bruce Eckel, Thinking in Java, 4th Edition, Tata McGraw Hill

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

- Conduct on spot problem solving using JAVA concepts
- Develop simple GUI interfaces for a computer program to interact with users

B.E. (Common to All Branches)
Outcome Based Education(OBE) and Choice Based Credit System(CBCS)
SEMESTER – I / II

Course Title:	**Introduction to C++ Programming**		
Course Code:	**BPLCK105D/205D**	**CIE MARKS**	**50**
L : T : P:	**2:0:2**	**SEE MARKS**	**50**
Credits:	**3**	**EXAM HOURS**	**03**

COURSE LEARNING OBJECTIVES:

- Understanding about object oriented programming and Gain knowledge about the capability to
- store information together in an object.
- Understand the capability of a class to rely upon another class and functions.
- Understand about constructors, which are special types of functions.
- Understand about function and operator overloading and dynamic memory allocation

MODULE – 1

What Is Object-Oriented Programming: Encapsulation, Polymorphism, Inheritance.
Some C++ Fundamentals: A Sample C++ Program, A closer look at I/O Operators, Declaring local variable, The bool data type.
Classes and Objects: Classes, Structures and Classes are Related

Textbook 1: Chapter 11, 12

MODULE – 2

Classes and Objects: Inline functions, Parameterized constructors, Static class members, When constructors and destructors are executed, The Scope Resolution Operator, Nested Classes, Passing objects to functions, Returning objects, Object Assignment.

Textbook 1: Chapter 12

MODULE – 3

Arrays, Pointers, References and the Dynamic Allocation Operators: Arrays of Objects, Pointer to Objects, The this pointer
References: Reference parameters, Passing References to Objects, Returning References, Restrictions to References.

Textbook 1: Chapter 13

MODULE – 4

Function Overloading, Copy Constructors and Default Arguments: Function overloading, Overloading Constructor Functions, Copy Constructors, Default Function Arguments, Function overloading and Ambiguity.

Textbook 1: Chapter 14

MODULE – 5

Operator Overloading: Creating a member operator function, Operator overloading using a friend function, Overloading some special operators

Textbook 1: Chapter 15

PRACTICAL COMPONENT OF IPCC
1. Write a C++ program to sort the numbers in ascending and descending order 2. Write a C++ program to find the sum of all the natural numbers from 1 to n. 3. Write a C++ program to swap 2 values by writing a function that uses call by reference technique 4. Write a C++ program to demonstrate function overloading for the following prototypes. void add(int, int); void add(double, double); 5. Write a C++ program to demonstrate the use of operator overloading. 6. Write a C++ program to demonstrate the use of default arguments. 7. Write a C++ program to allocate memory for an array of students using dynamic memory allocation and to release the dynamically acquired memory after its usage. Call accept and display function to read and display values of the student type information. 8. Write a C++ program to copy only real part of a complex number from one object to another using Copy constructor facility. 9. Write a C++ program to overload binary operator + to add two complex numbers. 10. Write a C++ program to facilitate the initialization task of a student object made up of name, usn and marks with different types of constructors and print the same.

COURSE OUTCOMES:

After successfully completing the course, the student will be able to:

CO1	Understanding about object oriented programming and Gain knowledge about the capability to store information together in an object.
CO2	Understand the capability of a class to rely upon another class and functions.
CO3	Understand about constructors, which are special types of functions.
CO4	Understand about function and operator overloading and dynamic memory allocation

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).

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Continuous Internal Evaluation (CIE):

Assessment Type	Maximum Marks	Minimum Passing Marks	Evaluation Details
CIE- IA Tests (A)	20	8	Average of Three Internal Assessment Tests each of 50 marks, scaled down to 20 marks.
Alternate Assessment (B)	10	4	Any one Assessment methods as per 24RNBE4.2 scaled to 10 marks.
Total CIE Theory (A+B)	**30**	**12**	**Marks of Tests and Assignments awarded for a maximum of 30.**
CIE Practical	12	5	Marks awarded for Weekly Conduction of Experiments and Submission of Laboratory records, scaled to 12 marks.

CIE Practical Test	8	3	Average of marks of Two tests, each conducted for 100 marks covering all experiments, scaled to 8.
Total CIE Practical (C)	**20**	**8**	**Marks of Experiments, Record and Test awarded for a maximum of 20 marks.**
CIE: Theory + Practical (A + B + C)	**50**	**20**	**CIE Evaluation is done for a maximum of 50 marks.**
SEE (D)	**50**	**18**	**SEE is a theory exam, conducted for 100 marks and scaled down to 50 marks. Exam duration shall be for 3 hours.**
CIE+SEE (A+B+C+D)	**100**	**40**	**Final marks shall be the sum of marks scored in Components A, B, C and D**
• The minimum marks to be secured in CIE is 20 out of allotted 50 marks to appear for SEE, with minimum 40 % scored in every component of CIE. The laboratory component of the IPCC shall be for CIE only. However, in SEE, the questions from the laboratory component shall be included in their respective modules only.			

SEE for IPCC

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

1. The question paper will have ten questions. Each question is set for 20 marks.
2. 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.
3. The students must answer 5 full questions, selecting one full question from each module.
4. Marks scored by the student shall be proportionally scaled down to 50 Marks

The theory portion of the Integrated Course shall be for both CIE and SEE, whereas the practical portion will have a CIE component only. Questions mentioned in the SEE paper shall include questions from the practical component).

Text Books

1) Herbert schildt, The Complete Reference C++, 4 th edition, TMH, 2005

Reference Books

1) Balagurusamy E, Object Oriented Programming with C++, Tata McGraw Hill
2) Education Pvt.Ltd., Sixth Edition 2016.
3) Bhave , " Object Oriented Programming With C++", Pearson Education , 2004.

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

- Project based

HSMS/AEC/SDC

Humanities and Social Sciences Courses

One Credit Courses – I / II

BENGK106	**Communicative English**
BPWSK206	**Professional Writing Skills in English**
BICOK107/207	**Indian Constitution**
BKSKK107/207	**Samskrutika Kannada**
BKBKK107/207	**Balake Kannada**
BIDTK158/258	**Innovation and Design Thinking**
BSFHK158/258	**Scientific foundations of Health**

B.E. (Common to CSE Allied Branches)
Outcome Based Education (OBE) and Choice Based Credit System (CBCS)
SEMESTER – I / II

Course Title:	**Communicative English**		
Course Code:	**BENGK106**	CIE Marks	50
Course Type (Theory/Practical /Integrated)	Theory	SEE Marks	50
		Total Marks	100
Teaching Hours/Week (L:T:P)	1:0:0	Exam Hours	02 Theory
Total Hours of Pedagogy	15 hours	Credits	01

Course objectives: The course Communicative English **(BENGK)** will enable the students,

1. To know about Fundamentals of Communicative English and Communication Skills in general.
2. To train to identify the nuances of phonetics, intonation and enhance pronunciation skills for better Communication skills.
3. To impart basic English grammar and essentials of important language skills.
4. To enhance with English vocabulary and language proficiency for better communication skills.
5. To learn about Techniques of Information Transfer through presentation.

Teaching-Learning Process :

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

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

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

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

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

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

Module-1 **(03 hours of pedagogy)**

Introduction to Literature: Film Text: The Artist – A quiet movie: The narrative, visual, and audio components that comprise a film are referred to as film texts. This covers the acting, sound design, editing, cinematography, and writing. These elements work together to tell a tale, arouse feelings, and produce a seamless cinematic experience. Understanding cinema texts' artistic and cultural value is aided by analysis. **The silent film "The Artist"** from 2011 takes place in Hollywood between 1927 and 1932. It narrates the tale of a silent film actor who struggles with talkies' ascent and eventually fades away while a budding starlet's career soars. The movie is well known for paying a sentimental tribute to silent cinema

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

Module-2 **(03 hours of pedagogy)**

Introduction to Phonetics : Phonetic Transcription, English Pronunciation, Pronunciation Guidelines to consonants andvowels, Sounds Mispronounced, Silent and Non silent Letters, Syllables and Structure. Word Accent, Stress Shift and Intonation, Spelling Rules and Words often Misspelt. Common Errors in Pronunciation.
Module-3 **(03 hours of pedagogy)**
Basic English Communicative Grammar and Vocabulary PART - I : Grammar: Basic English Grammar and Parts of Speech, Articles and Preposition. Question Tags, One Word Substitutes, Strong and Weak forms of words,Introduction to Vocabulary, All Types of Vocabulary – Exercises on it.
Module-4 **(03 hours of pedagogy)**
Basic English Communicative Grammar and Vocabulary PART - II: Words formation - Prefixes and Suffixes, Contractions and Abbreviations. Word Pairs (Minimal Pairs) – Exercises, Tense and Types of tenses, The Sequence ofTenses (Rules in use of Tenses) and Exercises on it, **Bloom's Taxonomy, definition, types and significance.**
Module-5 **(03 hours of pedagogy)**
Communication Skills for Employment: Information Transfer: Oral Presentation and its Practice. Difference betweenExtempore/Public Speaking, Communication Guidelines. Mother Tongue Influence (MTI), Various Techniques for Neutralization of Mother Tongue Influence. Reading and Listening Comprehensions – Exercises.

Course outcome (Course Skill Set)
At the end of the course Communicative English (24BENGK) the student will be able to:

CO1	Understand writing and speaking errors, read technical proposals, write reports, and gain workplace communication skills.
CO2	Adopt the Techniques of Information Transfer through presentation.

Assessment Details (both CIE and SEE)

Assessment Type	Maximum Marks	Minimum Passing Marks	Evaluation Details
CIE - IA Tests (A)	30	12	Average of Three Internal Assessment Tests (MCQs) each conducted for 30 marks.
Alternate Assessment (B)	20	8	Any two Assessment methods as per 24RNBE4.2, scaled to 20 marks.
Total CIE (A+B)	**50**	**20**	**CIE Evaluation is done for a maximum of 50 marks.**
SEE (C)	**50**	**18**	**Question papers having 50 MCQs with each question carrying 01 mark, and Examination duration is 2 hours.**

CIE + SEE (A+B+C)	**100**	**40**	Final marks shall be the sum of marks scored in Components **A, B and C.**

- The minimum marks to be secured in CIE is 20 out of allotted 50 marks to appear for SEE, with minimum 40 % scored in every component of CIE.

Semester End Examinations (SEE)

SEE paper shall be set for **50 questions, each of the 01 mark**. The pattern of the **question paper is MCQ** (multiple choice questions). The time allotted for SEE is **02 hours.** The student must secure a minimum of 40% of the maximum marks for SEE.

Suggested Learning Resources:

Film Text: The Artist

Textbook:

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

Reference Books:

1. **Technical Communication** by Gajendra Singh Chauhan and Et al, (ISBN-978-93-5350-050-4), Cengage learningIndia Pvt Limited [Latest Revised Edition] - 2019.
2. **English for Engineers** by N.P.Sudharshana and C.Savitha, Cambridge University Press – 2018.
3. **English Language Communication Skills – Lab Manual cum Workbook,** Cengage learning India Pvt Limited[Latest Revised Edition] – (ISBN-978-93-86668-45-5), 2019.
4. **A Course in Technical English – D Praveen Sam, KN Shoba,** Cambridge University Press – 2020.
5. **Practical English Usage** by Michael Swan, Oxford University Press – 2016.

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

- Contents related activities (Activity-based discussions)
- For active participation of students instruct the students to prepare Flowcharts and Handouts
- Organizing Group wise discussions Connecting to placement activities
- Quizzes and Discussions, Seminars and assignments
- **Interpretation of the text through Audio-Visual Media**

B.E. (Common to CSE Allied Branches)
Outcome Based Education (OBE) and Choice Based Credit System (CBCS)
SEMESTER – I / II

Course Title:	**Professional Writing Skills in English**		
Course Code:	**BPWSK206**	CIE Marks	50
Course Type (Theory/Practical /Integrated)	Theory	SEE Marks	50
		Total Marks	100
Teaching Hours/Week (L:T:P)	1:0:0	Exam Hours	02 Theory
Total Hours of Pedagogy	15 hours	Credits	01

Course objectives:
The course Professional Writing Skills in English (24PWSK) will enable the students,

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

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

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

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

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

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

Module-1 **(03 hours of pedagogy)**

Scholarly Analysis: Critically analyzing a topic is known as scholarly analysis, and it frequently makes use of conceptual frameworks and empirical techniques. It seeks to offer in-depth comprehension, interpret importance, and advance scholarly conversation. These studies, which are usually published in various journals, undergo extensive peer assessment to guarantee their validity and academic worth.

Identifying Common Errors in Writing and Speaking English : Common errors identification in parts of speech, Use of verbs and phrasal verbs, Auxiliary verbs and their forms, Subject Verb Agreement (Concord Rules), Common errors in Subject-verb agreement, Sequence of Tenses and errors identification in Tenses. Words Confused/Misused.

Module-2 **(03 hours of pedagogy)**

Nature and Style of sensible writing: Organizing Principles of Paragraphs in Documents, Writing Introduction and Conclusion, Importance of Proper Punctuation, Precise writing and Techniques in Essay writing, Sentence arrangements
and Corrections activities. Misplaced modifiers, Contractions, Collocations, Word Order, Errors due to the Confusion of words.

Module-3 **(03 hours of pedagogy)**

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

Module-4 **(03 hours of pedagogy)**

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

Module-5 **(03 hours of pedagogy)**

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

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

CO1	Identify writing errors, improve technical writing, and learn effective presentation techniques.
CO2	Acquire Employment and Workplace communication skills.

Assessment Type	Maximum Marks	Minimum Passing Marks	Evaluation Details
CIE - IA Tests (A)	30	12	Average of Three Internal Assessment Tests (MCQs) each conducted for 30 marks.
Alternate Assessment (B)	20	8	Any two Assessment methods as per 24RNBE4.2, scaled to 20 marks.
Total CIE (A+B)	**50**	**20**	**CIE Evaluation is done for a maximum of 50 marks.**
SEE (C)	**50**	**18**	**Question papers having 50 MCQs with each question carrying 01 mark, and Examination duration is 1 hour.**
CIE + SEE (A+B+C)	**100**	**40**	Final marks shall be the sum of marks scored in Components **A, B and C.**

Semester End Examinations (SEE)
SEE paper shall be set for **50 questions, each of the 01 mark**. The pattern of the **question paper is MCQ** (multiple choice questions). The time allotted for SEE is **02 hours.** The student must secure a minimum of 40% of the maximum marks for SEE.

Suggested Learning Resources:

Textbook:

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

Reference Books:

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

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

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

B.E. (Common to CSE Allied Branches)
Outcome Based Education (OBE) and Choice Based Credit System (CBCS)
SEMESTER – I / II

Course Title:	**Indian Constitution**		
Course Code:	BICOK107/207	CIE Marks	50
Course Type (Theory/Practical /Integrated)	Theory	SEE Marks	50
		Total Marks	100
Teaching Hours/Week (L:T:P)	1:0:0	Exam Hours	02 Theory
Total Hours of Pedagogy	15 hours	Credits	01

Course objectives:

The course **INDIAN CONSTITUTION** will enable the students,

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

Teaching-Learning Process

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

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

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

Module-1 (03 hours of pedagogy)

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

Module-2 (03 hours of pedagogy)

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

Module-3 (03 hours of pedagogy)

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

Module-4 (03 hours of pedagogy)

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

Module-5 (03 hours of pedagogy)

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

Course outcome (Course Skill Set)

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

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

Assessment Details (both CIE and SEE)

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

Assessment details: Both CIE & SEE

Assessment Type	Maximum Marks	Minimum Passing Marks	Evaluation Details
CIE - IA Tests (A)	30	12	Average of Three Internal Assessment Tests (MCQs) each conducted for 30 marks.
Alternate Assessment (B)	20	8	Any two Assessment methods as per 24RNBE4.2, scaled to 20 marks.
Total CIE (A+B)	**50**	**20**	**CIE Evaluation is done for a maximum of 50 marks.**
SEE (C)	**50**	**18**	**Question papers having 50 MCQs with each question carrying 01 mark, and Examination duration is 1 hour.**
CIE + SEE (A+B+C)	**100**	**40**	Final marks shall be the sum of marks scored in Components **A, B and C.**
• The minimum marks to be secured in CIE is 20 out of allotted 50 marks to appear for SEE, with minimum 40 % scored in every component of CIE.			

Semester End Examinations (SEE)

SEE paper shall be set for **50 questions, each of the 01 mark**. The pattern of the **question paper is MCQ** (multiple choice questions). The time allotted for SEE is **02 hours.** The student must secure a minimum of 40% of the maximum marks for SEE.

Suggested Learning Resources:

Textbook:

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

Reference Books:

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

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

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

B.E. (Common to All Branches)
Outcome Based Education(OBE) and Choice Based Credit System(CBCS)
SEMESTER – I / II

Course Title:	**Samskrutika Kannada**		
Course Code:	**BKSKK107/207**	**CIE MARKS**	**50**
L : T : P:	1:0:0	**SEE MARKS**	**50**
Credits:	**1**	**EXAM HOURS**	02 Theory
Teaching Pedagogy	15 hours	**TOTAL MARKS**	100

: ಸಾಂಸ್ಕೃತಿಕ ಕನ್ನಡ ಪಠ್ಯ ಕಲಿಕೆಯ ಉದ್ದೇಶಗಳು: COURSE LEARNING OBJECTIVES

1. ವೃತ್ತಿಪರ ಪದವಿ ವಿದ್ಯಾರ್ಥಿಗಳಾಗಿರುವುದರಿಂದ ಕನ್ನಡ ಭಾಷೆ, ಸಾಹಿತ್ಯ ಮತ್ತು ಕನ್ನಡದ ಸಂಸ್ಕೃತಿಯ ಪರಿಚಯ ಮಾಡಿಕೊಡುವುದು.
2. ಕನ್ನಡ ಸಾಹಿತ್ಯದ ಪ್ರಧಾನ ಭಾಗವಾದ ಆಧುನಿಕ ಪೂರ್ವ ಮತ್ತು ಆಧುನಿಕ ಕಾವ್ಯಗಳನ್ನು ಸಾಂಕೇತಿಕವಾಗಿ ಪರಿಚಯಿಸಿವುದು.
3. ವಿದ್ಯಾರ್ಥಿಗಳಲ್ಲಿ ಸಾಹಿತ್ಯ ಮತ್ತು ಸಂಸ್ಕೃತಿಯ ಬಗ್ಗೆ ಅರಿವು ಹಾಗೂ ಆಸಕ್ತಿಯನ್ನು ಮೂಡಿಸುವುದು.
4. ತಾಂತ್ರಿಕ ವ್ಯಕ್ತಿಗಳ ಪರಿಚಯವನ್ನು ಹಾಗೂ ಅವರುಗಳ 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 : ಅದರಿಂದೇನು ಫಲ ಇದರಿಂದೇನು ಫಲ – ಪುರಂದರದಾಸರು
   ತಲ್ಲಣಿಸದಿರು ಕಂಡ್ಯ ತಾಳು ಮನವೇ - ಕನಕದಾಸರು
3. ತತ್ವಪದಗಳು : ಸಾವಿರ ಕೊಡಗಳ ಸುಟ್ಟು - ಶಿಶುನಾಳ ಶರೀಫ

ಘಟಕ -3 ಆಧುನಿಕ ಕಾವ್ಯಭಾಗ (03 hours of pedagogy)
1. ಡಿವಿಜಿ 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. ಪತ್ರ ವ್ಯವಹಾರ / ಪತ್ರ - ಅರ್ಜಿಯ ವಿವಿಧ ಬಗೆಗಳು

Course outcome (Course Skill Set)

ಸಾಂಸ್ಕೃತಿಕ ಕನ್ನಡ **BKSKK207** ಪಠ್ಯ ಕಲಿಕೆಯ ನಂತರ ವಿದ್ಯಾರ್ಥಿಗಳಲ್ಲಿ :

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:

CO1	ಕನ್ನಡ ಭಾಷೆ, ಸಾಹಿತ್ಯ ಮತ್ತು ಕನ್ನಡದ ಸಂಸ್ಕೃತಿಯ ಕುರಿತು ಅರಿವು ಮೂಡಿರುತ್ತದೆ.
CO2	ಕನ್ನಡ ಸಾಹಿತ್ಯದ ಪ್ರಧಾನ ಭಾಗವಾದ ಆಧುನಿಕ ಪೂರ್ವ ಮತ್ತು ಆಧುನಿಕ ಕಾವ್ಯಗಳನ್ನು ಸಾಂಕೇತಿಕವಾಗಿ ಕಲಿತು ಹೆಚ್ಚಿನ ಓದಿಗೆ ಮತ್ತು ಜ್ಞಾನಕ್ಕೆ ಸ್ಪೂರ್ತಿ ಮೂಡುತ್ತದೆ.
CO3	ವಿದ್ಯಾರ್ಥಿಗಳಲ್ಲಿ ಸಾಹಿತ್ಯ ಮತ್ತು ಸಂಸ್ಕೃತಿಯ ಬಗ್ಗೆ ಅರಿವು ಹಾಗೂ ಆಸಕ್ತಿಯನ್ನು ಹೆಚ್ಚಾಗುತ್ತದೆ.
CO4	ತಾಂತ್ರಿಕ ವ್ಯಕ್ತಿಗಳ ಪರಿಚಯ ಹಾಗೂ ಅವರುಗಳ ಸಾಧಿಸಿದ ವಿಷಯಗಳನ್ನು ತಿಳಿದುಕೊಂಡು ನಾಡಿನ ಇನ್ನಿತರ ವ್ಯಕ್ತಿಗಳ ಬಗ್ಗೆ ತಿಳಿದುಕೊಳ್ಳಲು ಕೌತುಕತೆ ಹೆಚ್ಚಾಗುತ್ತದೆ.

A. ಪಠ್ಯ ಪುಸ್ತಕ:

1. ಡಾ.ಹಿ.ಸಿ.ಬೋರಲಿಂಗಯ್ಯ
2.ಡಾ. ಎಲ್. ತಿಮ್ಮೇಶ್

B. ಉಲ್ಲೇಖ ಪುಸ್ತಕ

1. ಡಾ. ಎಲ್. ತಿಮ್ಮೇಶ್
2. ಪ್ರೊ. ವಿ ಕೇಶವ ಮೂರ್ತಿ

Assessment details: Both CIE & SEE

Assessment Type	Maximum Marks	Minimum Passing Marks	Evaluation Details
CIE - IA Tests (A)	30	12	Average of Three Internal Assessment Tests (MCQs) each conducted for 30 marks.
Alternate Assessment (B)	20	8	Any two Assessment methods as per 24RNBE4.2, scaled to 20 marks.
Total CIE (A+B)	**50**	**20**	**CIE Evaluation is done for a maximum of 50 marks.**
SEE (C)	**50**	**18**	**Question papers having 50 MCQs with each question carrying 01 mark, and Examination duration is 1 hour.**
CIE + SEE (A+B+C)	**100**	**40**	Final marks shall be the sum of marks scored in Components **A, B and C.**
• The minimum marks to be secured in CIE is 20 out of allotted 50 marks to appear for SEE, with minimum 40 % scored in every component of CIE.			

Semester End Examinations (SEE)

SEE paper shall be set for **50 questions, each of the 01 mark**. The pattern of the **question paper is MCQ** (multiple choice questions). The time allotted for SEE is **02 hours.** The student must secure a minimum of 40% of the maximum marks for SEE.

B.E. (Common to All Branches) Outcome Based Education(OBE) and Choice Based Credit System(CBCS) SEMESTER – I / II			
Course Title:	**ಬಳಕೆ ಕನ್ನಡ - baLake Kannada**		
Course Code:	BKBKK107/207	**CIE MARKS**	50
L : T : P:	1:0:0	**SEE MARKS**	50
Credits:	1	**EXAM HOURS**	02 Theory
Teaching Pedagogy	15 hours	**Total marks**	100

Course objectives : ಬಳಕೆ ಕನ್ನಡ ಪಠ್ಯ ಕಲಿಕೆಯ ಉದ್ದೇಶಗಳು:

The course (BKBKK 107/207) 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 conservation.
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

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 conservation, 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 ಮತು 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**

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:

CO1	To understand the necessity of learning of local language for comfortable life.
CO2	To speak, read and write Kannada language as per requirement.
CO3	To communicate (converse) in Kannada language in their daily life with kannada speakers.
CO4	To Listen and understand the Kannada language properly.
CO5	To speak in polite conservation.

Assessment type: Both SEE and CIE

Assessment Type	Maximum Marks	Minimum Passing Marks	Evaluation Details
CIE - IA Tests (A)	30	12	Average of Three Internal Assessment Tests (MCQs) each conducted for 30 marks.
Alternate Assessment (B)	20	8	Any two Assessment methods as per 24RNBE4.2, scaled to 20 marks.
Total CIE (A+B)	**50**	**20**	**CIE Evaluation is done for a maximum of 50 marks.**
SEE (C)	**50**	**18**	**Question papers having 50 MCQs with each question carrying 01 mark, and Examination duration is 1 hour.**
CIE + SEE (A+B+C)	**100**	**40**	Final marks shall be the sum of marks scored in Components **A, B and C.**
• The minimum marks to be secured in CIE is 20 out of allotted 50 marks to appear for SEE, with minimum 40 % scored in every component of CIE.			

Semester End Examinations (SEE)

SEE paper shall be set for **50 questions, each of the 01 mark**. The pattern of the **question paper is MCQ** (multiple choice questions). The time allotted for SEE is **02 hours.** The student must secure a minimum of 40% of the maximum marks for SEE.

University Prescribed Textbook :

ಬಳಕೆ ಕನ್ನಡ

ಡಾ. ಎಲ್. ತಿಮ್ಮೇಶ

ಪ್ರಕಟಣೆ : ಪ್ರಸಾರಾಂಗ,

ವಿಶ್ವೇಶ್ವರಯ್ಯ ತಾಂತ್ರಿಕ ವಿಶ್ವವಿದ್ಯಾಲಯ, ಬೆಳಗಾವಿ.

ಸೂಚನೆ :

1. ಹೆಚ್ಚಿನ ಮಾಹಿತಿ ಮತ್ತು ವಿವರಣೆಗಳಿಗೆ ಡಾ. ಎಲ್. ತಿಮ್ಮೇಶ (9900832331) ಇವರನ್ನು ಸಂಪರ್ಕಿಸಿ.
2. 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

B.E. (Common to All Branches)
Outcome Based Education (OBE) and Choice Based Credit System (CBCS)
SEMESTER – I / II

Course Title:	**Innovation and Design Thinking**		
Course Code:	**BIDTK158/258**	**CIE MARKS**	**50**
L : T : P	**1:0:0**	**SEE MARKS**	**50**
Credits:	**01**	**EXAM HOURS**	**02**

COURSE LEARNING OBJECTIVES:

Teaching-Learning Process (General Instructions)
These are sample Strategies, which teacher can use to accelerate the attainment of the various course outcomes.

1) The course has been designed with an aim to introduce hands-on activities
2) Lectures will be through powerpoint presentations, discussions and case studies
3) The faculty will mentor students and facilitate the conduction of three to four hands-on activities to reinforce the learnings during lectures

MODULE – 1

Understanding Design Thinking: Visualization of Persona, Visualization of the Team, User profile canvas, Empathy map, Review of Persona, Future User.
Textbook 1: Section 1.1 (Pages 16-35)

Teaching Learning Process: Chalk and Talk / PPT

MODULE – 2

Design Thinking process: Macro cycle and Micro cycle, How to get a good problem statement: Finding aproblem, Finding Design Challenge. How to Discover user needs.
Case Study: Building a Smart Phone for Elders/Seniors

Textbook 1: Sections 1.2, 1.3 & 1.4 (Pages 38-69)
Teaching Learning Process: Chalk and Talk / PPT / Hands-on Activity

MODULE – 3

How to build Empathy with User, How to find the right focus, Empathy in UX design and Digital environment,How to generate ideas: Roles for a good Brain Storming session, Creativity Techniques, How to structure andselect ideas
Case Study/Activity: Build an Autonomous Car with creative features.**Case Study/Activity**: **Poster Design in Canva/any other tool Textbook 1:** Sections 1.5 to 1.8 (Pages 72-107)
Teaching Learning Process: Chalk and Talk / PPT / Hands-on Activity

MODULE – 4

How to structure and select ideas, How to create a good prototype.
Case Study/Activity: Use STORYBOARD/other platform to design a Smart class room

Textbook 1: Sections 1.8 and 1.9 (Pages 98-117)

Teaching Learning Process: Chalk and Talk / PPT / Hands-on Activity

MODULE – 5

Benefits of Inter-disciplinary Teams, Simple rules for collaboration, Recruiting teams with T-Profiles, How tovisualize ideas and stories: Flip Charts and User Screens, How to design a good story, Digital Story Telling **Case Study/Activity: Design a Smart City using Chart Paper.**
Case Study/Activity: Design an intelligent electronic voting system

Textbook 1: Sections 2.2 to 2.4 (Pages 144-179)

Teaching Learning Process: Chalk and Talk / PPT / Hands-on Activity

COURSE OUTCOMES:

After successfully completing the course, the student will be able to:

CO1	Understand the philosophy of Design Thinking
CO2	Conduct brain storming sessions to foster creativity
CO3	Design and execute Activities to demonstrate the key elements of empathy with users and emotional aspects, using modern tools.
CO4	Understand the techniques to create prototypes to visualize the features, especially in inter-disciplinary domains.

ASSESSMENT DETAILS (Both CIE and SEE)

Assessment Type	**Maximum Marks**	**Minimum Passing Marks**	**Evaluation Details**
CIE - IA Tests (A)	30	12	Average of Three Internal Assessment Tests (MCQs) each conducted for 30 marks.
Alternate Assessment (B)	20	8	Any two Assessment methods as per 24RNBE4.2, scaled to 20 marks.
Total CIE (A+B)	**50**	**20**	**CIE Evaluation is done for a maximum of 50 marks.**
SEE (C)	**50**	**18**	**Question papers having 50 MCQs with each question carrying 01 mark, and Examination duration is 1 hour.**
CIE + SEE (A+B+C)	**100**	**40**	Final marks shall be the sum of marks scored in Components **A, B and C.**
• The minimum marks to be secured in CIE is 20 out of allotted 50 marks to appear for SEE, with minimum 40 % scored in every component of CIE.			

CIE-B (marks 20)

CIE-Alternative Assessment is through Hands-on Activities. A Minimum of three activities (along with presentations) will be conducted.

Semester End Examination (50 Marks)

Mode of conduction: Multiple Choice Questions

Suggested Learning Resources:

Textbook: Michael Lewrick, Patrick Link and Larry Leifer, “Design Thinking Playbook”, John Wiley and Sons, 2018

Reference Books:

1. John.R.Karsnitz, Stephen O’Brien and John P. Hutchinson, “Engineering Design”, Cengage learning(International edition) Second Edition, 2013.
2. Roger Martin, "The Design of Business: Why Design Thinking is the Next Competitive Advantage", HarvardBusiness Press , 2009.

B.E. (Common to CSE Allied Branches)
Outcome Based Education (OBE) and Choice Based Credit System (CBCS)
SEMESTER – I / II

Course Title:	**Scientific Foundations Of Health**		
Course Code:	**BSFHK158/258**	CIE Marks	50
Course Type (Theory/Practical /Integrated)	Theory	SEE Marks	50
		Total Marks	100
Teaching Hours/Week (L:T:P)	1:0:0	Exam Hours	02 Theory
Total Hours of Pedagogy	15 hours	Credits	01

Course objectives:

The course BSFHK258 will enable the students:

- To know about Health and wellness (and its Beliefs)
- To acquire Good Health & It's balance for positive mind-set
- To Build the healthy lifestyles for good health for their better future
- To Create of Healthy and caring relationships to meet the requirements of MNC and LPG world
- To learn about Avoiding risks and harmful habits in their campus and outside the campus for their bright future
- To Prevent and fight against harmful diseases for good health through positive mindset

Teaching-Learning Process (General Instructions)

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

- Teachers shall adopt suitable pedagogy for effective teaching - learning process.
  The pedagogy shall involve the combination of different methodologies which suit modern technological tools and software's to meet the present requirements of the Global employment market.
  (i) Direct instructional method (Low /Old Technology),
  (ii) Flipped classrooms (High/advanced Technological tools),
  (iii) Blended learning (combination of both),
  (iv) Enquiry and evaluation based learning,
  (v) Personalized learning,
  (vi) Problems based learning through discussion,
  (vii) Following the method of expeditionary learning Tools and techniques,
- Apart from conventional lecture methods, various types of innovative teaching techniques through videos, animation films may be adapted so that the delivered lesson can progress the students In theoretical applied and practical skills in teaching of the concepts of Health and Wellness in general.

Module-1 (03 hours of pedagogy)

Good Health & It's balance for positive mindset:

Health -Importance of Health, Influencing factors of Health, Health beliefs, Advantages of good health, Health & Behavior, Health & Society, Health & family, Health & Personality, Psychological disorders-Methods to improve good psychological health, Changing health habits for good health.

Module-2 (03 hours of pedagogy)
Building of healthy lifestyles for better future: Developing healthy diet for good health, Food & health, Nutritional guidelines for good health, Obesity & overweight disorders and its management, Eating disorders, Fitness components for health, Wellness and physical function, How to avoid exercise injuries. Recommended dietary Allowance.
Module-3 (03 hours of pedagogy)
Creation of Healthy and caring relationships : Building communication skills, Friends and friendship - Education, the value of relationship and communication skills, Relationships for Better or worsening of life, understanding of basic instincts of life (more than a biology), Changing health behaviours through social engineering.
Module-4 (03 hours of pedagogy)
Avoiding risks and harmful habits : Characteristics of health compromising behaviours, Recognizing and avoiding of addictions, How addiction develops, Types of addictions, influencing factors of addictions, Differences between addictive people and non addictive people & their behaviors. Effects of addictions Such as..., how to recovery from addictions.
Module-5 03 hours of pedagogy)
Preventing & fighting against diseases for good health: How to protect from different types of infections, How to reduce risks for good health, Reducing risks & coping with chronic conditions, Management of chronic illness for Quality of life, Health & Wellness of youth :a challenge for upcoming future, Measuring of health & wealth status.

Course outcomes (Course Skill Set) :

At the end of the course Scientific Foundations of Health (22SFH18/28) the student will be able to:

CO1 To understand and analyse about Health and wellness (and its Beliefs) & It's balance for positive mindset.
CO2 Develop the healthy lifestyles for good health for their better future.
CO3 Build a Healthy and caring relationships to meet the requirements of good/social/positive life.
CO4 To learn about Avoiding risks and harmful habits in their campus and outside the campus for their bright future.
CO5 Prevent and fight against harmful diseases for good health through positive mind set.

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.

Assessment Type	Maximum Marks	Minimum Passing Marks	Evaluation Details
CIE - IA Tests (A)	30	12	Average of Three Internal Assessment Tests (MCQs) each conducted for 30 marks.
Alternate Assessment (B)	20	8	Any two Assessment methods as per 24RNBE4.2, scaled to 20 marks.
Total CIE (A+B)	**50**	**20**	**CIE Evaluation is done for a maximum of 50 marks.**
SEE (C)	**50**	**18**	**Question papers having 50 MCQs with each question carrying 01 mark, and Examination duration is 1 hour.**
CIE + SEE (A+B+C)	**100**	**40**	Final marks shall be the sum of marks scored in Components **A, B and C.**
• The minimum marks to be secured in CIE is 20 out of allotted 50 marks to appear for SEE, with minimum 40 % scored in every component of CIE.			

Semester End Examinations (SEE)

SEE paper shall be set for 50 questions, each of the 01 mark. The pattern of the question paper is MCQ (multiple choice questions). The time allotted for SEE is 02 hours. The student must secure a minimum of 40% of the maximum marks for SEE.

Suggested Learning Resources:

Textbook:

1.“Scientific Foundations of Health” – Study Material Prepared by Dr. L Thimmesha, Published in VTU - University Website.

2. “Scientific Foundations of Health”, (ISBN-978-81-955465-6-5) published by Infinite Learning Solutions, Bangalore – 2022.

3.Health Psychology - A Textbook, FOURTH EDITION by Jane Ogden McGraw Hill Education (India) Private Limited - Open University Press.

Reference Books:

1.Health Psychology (Second edition) by Charles Abraham, Mark Conner, Fiona Jones and Daryl O'Connor – Published by Routledge 711 Third Avenue, New York, NY 10017.

2.HEALTH PSYCHOLOGY (Ninth Edition) by SHELLEY E. TAYLOR - University of California, Los Angeles, McGraw Hill Education (India) Private Limited - Open University Press.

3.SWAYAM / NPTL/ MOOCS/ We blinks/ Internet sources/ YouTube videos and other materials / notes.

4.Scientific Foundations of Health (Health & Wellness) - General Books published for university and colleges references by popular authors and published by the reputed publisher.

5.Nutrition science by B-Srilakshmi-8th Edition