Global Academy of Technology, Bengaluru

Scheme of Teaching and Examinations (Effective from the academic year 2024- 25)

I Semester (Mechanical Engineering Stream) (For Physics Group)

Sl. No	Course and Course Code		Course Title	TD/PSB	Teaching Hours/Week				Examination				Credits
					Theory	Tutorial	Practical/ Drawing	SDA	Duration in	CIE Marks	SEE Marks	Total Mark	
					L	T	P	S					
1	*ASC(IC)	BMATM24101	Mathematics- I for Mechanical Engineering Stream (Integrated)	Maths	2	2	2	0	03	50	50	100	04
2	#ASC(IC)	BPHYM24102	Applied Physics for Mechanical Engineering Stream (Integrated)	PHY	2	2	2	0	03	50	50	100	04
3	ESC	BEMEM24103	Elements of Mechanical Engineering	Mechanical	2	2	0	0	03	50	50	100	03
4	ESC-I	BESCK24104x	Engineering Science Course-I	Respective Engg Dept.	3	0	0	0	03	50	50	100	03
5	ETC-I	BETCK24105x	Emerging Technology Course-I	Any Dept	3	0	0	0	03	50	50	100	03
	OR												
	PLC-I	BPLCK24105x	Programming language Course-I		2	0	2	0	03				
6	AEC	BENGK24106	Communicative English	Humanities	1	0	0	0	01	50	50	100	01
		OR											
		BPWSK24106	Professional Writing Skills in English										
7	HSMC	BKSKK24107/ BKBKK24107	Samskrutika Kannada/ Balake Kannada	Humanities	1	0	0	0	01	50	50	100	01
		OR											
		BICOK24107	Indian Constitution										
8	AEC/SDC	BIDTK24108	Innovation and Design Thinking	Any Dept	1	0	0	0	01	50	50	100	01
		OR											
		BSFHK24108	Scientific Foundations of Health		1	0	0	0	01				
TOTAL										400	400	800	20

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Global Academy of Technology, Bengaluru
Scheme of Teaching and Examinations (Effective from the academic year 2024- 25)

II Semester (Mechanical Engineering Stream) (For the students who attend the 1st semester under Physics Group)

Sl. No	Course and Course Code		Course Title	TD/PSB	Teaching Hours/Week				Examination				Credits
					Theory	Tutorial	Practical/ Drawing	SDA	Duration in	CIE Marks	SEE Marks	Total Mark	
					L	T	P	S					
1	*ASC(IC)	BMATM24201	Mathematics-II for Mechanical Engineering Stream (Integrated)	Maths	2	2	2	0	03	50	50	100	04
2	#ASC(IC)	BCHEM24202	Applied Chemistry for Mechanical Engineering Stream (Integrated)	Chemistry	2	2	2	0	03	50	50	100	04
3	ESC	BCEDK24203	Computer Aided Engineering Drawing	Civil/Mech Engg dept	2	0	2	0	03	50	50	100	03
4	ESC-II	BESCK24204x	Engineering Science Course-II	Respective Engg Dept	3	0	0	0	03	50	50	100	03
5	PLC-II	BETCK24205x	Programming Language Course-II	Any Dept	3	0	0	0	03	50	50	100	03
	OR												
	ETC-II	BETCK24205x	Emerging Technology Course-II		3	0	0	0	03				
6	AEC	BPWSK24206	Professional Writing Skills in English	Humanities	1	0	0	0	01	50	50	100	01
		OR											
		BENGK24206	Communicative English										
7	HSMS	BICOK24207	Indian Constitution	Humanities	1	0	0	0	01	50	50	100	01
		OR											
		BKSKK24207 BKBKK24207	Samskrutika Kannada/ Balake Kannada										
8	AEC/SEC	BSFHK24208	Scientific Foundations for Health	Any Dept	1	0	0	0	01	50	50	100	01
	OR												
		BIDTK24208	Innovation and Design Thinking		1	0	0	0	01				
TOTAL										400	400	800	20

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Global Academy of Technology, Bengaluru
Scheme of Teaching and Examinations (Effective from the academic year 2024- 25)

I Semester (Mechanical Engineering Stream) (For Chemistry Group)

SL No	Course and Course Code		Course Title	TD/PSB	Teaching Hours/Week				Examination				Credits
					Theory	Tutorial	Practical/ Drawing	SDA	Duration in	CIE Marks	SEE Marks	Total Mark	
					L	T	P	S					
1	*ASC(IC)	BMATM24101	Mathematics-I for Mechanical Engineering Stream (Integrated)	Maths	2	2	2	0	03	50	50	100	04
2	#ASC(IC)	BCHEM24102	Applied Chemistry for Mechanical Engineering Stream (Integrated)	Chemistry	2	2	2	0	03	50	50	100	04
3	ESC	BCEDK24103	Computer-Aided Engineering Drawing	Civil/Mech Engg dept	2	0	2	0	03	50	50	100	03
4	ESC-I	BESCK24104x	Engineering Science Course-I	Respective Engg Dept	3	0	0	0	03	50	50	100	03
5	ETC-I	BETCK24105x	Emerging Technology Course-I/	Any Dept	3	0	0	0	03	50	50	100	03
	OR												
	PLC-I	BPLCK24105x	Programming Language Course-I		2	0	2	0	03				
6	AEC	BPWSK24106	Professional Writing Skills in English	Humanities	1	0	0	0	01	50	50	100	01
		OR											
		BENGK24106	Communicative English										
7	HSMS	BICOK24107	Indian Constitution	Humanities	1	0	0	0	01	50	50	100	01
	OR												
		BKSK024107 BKBKK24107	Samskrutika Kannada/ Balake Kannada										
8	AEC/SEC	BSFHK24108	Scientific Foundations for Health	Any Dept	1	0	0	0	01	50	50	100	01
	OR												
		BIDTK24108	Innovation and Design Thinking		1	0	0	0	01				
TOTAL										400	400	800	20

Head of Department
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Global Academy of Technology, Bengaluru
Scheme of Teaching and Examinations (Effective from the academic year 2024- 25)

II Semester (Mechanical Engineering Stream) (For the students who have attended 1semster under Chemistry Group)

Sl. No	Course and Course Code		Course Title	TD/PSB	Teaching Hours/Week				Examination				Credits
					Theory	Tutorial	Practical/ Drawing	SDA	Duration in hours	CIE Marks	SEE Marks	Total Mark	
					L	T	P	S					
1	*ASC(IC)	BMATM24201	Mathematics-II for Mechanical Engineering Stream (Integrated)	Maths	3	0	2	0	03	50	50	100	04
2	#ASC(IC)	BPHYM24202	Applied Physics for Mechanical Engineering Stream (Integrated)	PHY	2	2	2	0	03	50	50	100	04
3	ESC	BEME24203	Elements of Mechanical Engineering	Mechanical	2	2	0	0	03	50	50	100	03
4	ESC-II	BESCK24204x	Engineering Science Course-II	Respective Engg Dept	3	0	0	0	03	50	50	100	03
5	PLC-II	BPLCK24205x	Programming Language Course-II	Any Dept	2	0	2	0	03	50	50	100	03
	OR												
	ETC-II	BETCK24205x	Emerging Technology Course-II		3	0	0	0	03				
6	AEC	BENGK24206	Communicative English	Humanities	0	2	0	0	01	50	50	100	01
		OR											
		BPWSK24206	Professional Writing Skills in English										
7	HSMC	BKSKK24207 BKBKK24207	Samskrutika Kannada/ Balake Kannada	Humanities	0	2	0	0	01	50	50	100	01
	OR												
		BICOK24207	Indian Constitution										
8	AEC/SDC	BIDTK24208	Innovation and Design Thinking	Any Dept	0	0	2	0	02	50	50	100	01
	OR												
		BSFHK24208	Scientific Foundations of Health		1	0	0	0	01				
TOTAL										400	400	800	20

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(ESC-I/II) Engineering Science Courses-I/II					(ETC-I/II) Emerging Technology Courses-I/II				
Code	Title	L	T	P	Code	Title	L	T	P
BESCK24104/204A	INTRODUCTION TO CIVIL ENGINEERING	3	0	0	BETCK24105/205A	INTRODUCTION TO ARTIFICIAL INTELLIGENCE	3	0	0
BESCK24104/204B	INTRODUCTION TO ELECTRONICS AND COMMUNICATION	3	0	0	BETCK24105/205B	INTRODUCTION TO EMBEDDED SYSTEM	3	0	0
BESCK24104/204C	INTRODUCTION TO ELECTRICAL ENGINEERING	3	0	0	BETCK24105/205C	SENSOR SYSTEMS	3	0	0
BESCK24104/204D	INTRODUCTION TO C PROGRAMMING (INTEGRATED)	2	0	2	BETCK24105/205D	ELECTROMECHANICAL SYSTEMS & MEASUREMENTS	3	0	0
BESCK24104/204E	INTRODUCTION TO ENGINEERING MECHANICS	3	0	0	BETCK24105/205E	WASTE MANAGEMENT	3	0	0
BESCK24104/204F	ENGINEERING GEOLOGY (INTEGRATED)	2	0	2	BETCK24105/205F	GREEN BUILDINGS	3	0	0
BESCK24104/204G	INTRODUCTION TO AERONAUTICAL ENGINEERING(Integrated)	2	0	2	BETCK24105/205G	SMART MATERIALS AND SYSTEMS	3	0	0
BESCK104H/204H	INTRODUCTION TO MECHANICAL ENGINEERING	2	0	2	BETCK24105/205H	INTRODUCTION TO NANO TECHNOLOGY	3	0	0
					BETCK24105/205I	INTRODUCTION TO SUSTAINABLE ENGINEERING	3	0	0
					BETCK24105/205J	RENEWABLE ENERGY SOURCES	3	0	0
					BETCK24105/205K	EMERGING APPLICATIONS OF BIOSENSORS	3	0	0
					BETCK24105/205L	INTRODUCTION TO INTERNET OF THINGS (IOT)	3	0	0
					BETCK24105/205M	INTRODUCTION TO CYBER SECURITY	3	0	0
					BETCK24105/205N	INTRODUCTION TO EMBEDDED SYSTEMS	3	0	0
(PLC-I/II) Programming Language Courses-I/II									
Code	Title	L	T	P					
BPLCK24105/205A	PROGRAMMING IN C (INTEGRATED)	2	0	2					
BPLCK24105/205B	INTRODUCTION TO PYTHON PROGRAMMING(INTEGRATED)	2	0	2					
BPLCK24105/205C	BASICS OF JAVA PROGRAMMING(INTEGRATED)	2	0	2					
BPLCK24105/205D	ADVANCED PROGRAMMING IN C(INTEGRATED)	2	0	2					
BPLCK24105/205E	INTRODUCTION TO WEB PROGRAMMING	2	0	2					
BPLCK24105/205F	INTRODUCTION TO C++ PROGRAMMING	2	0	2					

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Global Academy of Technology, Bengaluru

Scheme of Teaching and Examinations (Effective from the academic year 2024-25)

I Semester (Electrical & Electronics Engineering Stream) (For Physics Group)

Sl No	Course and Course Code		Course Title	TD/PSB	Teaching Hours/Week				Examination				Credits
					Theory	Tutorial	Practical/ Drawing	SDA	Duration in	CIE Marks	SEE Marks	Total Marks	
					L	T	P	S					
1	*ASC(IC)	BMATE24101	Mathematics-I for EEE Stream (Integrated)	Maths	2	2	2	0	03	50	50	100	04
2	#ASC(IC)	BPHYE24102	Applied Physics for EEE Stream (Integrated)	PHY	2	2	2	0	03	50	50	100	04
3	ESC	BEEE24103	# Elements of Electrical Engineering	EEE/ECE/TCE	2	2	0	0	03	50	50	100	03
		OR			OR								
		BBEE24103	## Basic Electronics		3	0	0	0					
4	ESC-I	BESCK24104x	Engineering Science Course-I	Respective Engg Dept	3	0	0	0	03	50	50	100	03
5	ETC-I	BETCK24105x	Emerging Technology Course-I	Any Dept	3	0	0	0	03	50	50	100	03
	OR												
	PLC-I	BPLCK24105x	Programming Language Course-I		2	0	2	0	03				
6	AEC	BENGK24106	Communicative English	Humanities	1	0	0	0	01	50	50	100	01
		OR											
		BPWSK24106	Professional Writing Skills in English										
7	HSMC	BKSKK24107/ BKBKK24107	Samskrutika Kannada/ Balake Kannada	Humanities	1	0	0	0	01	50	50	100	01
		OR											
		BICOK24107	Indian Constitution		1	0	0	0					
8	AEC/SDC	BIDTK24108	Innovation and Design Thinking	Any Dept	1	0	0	0	01	50	50	100	01
		OR											
		BSFHK24108	Scientific Foundations of Health		1	0	0	0	01				
TOTAL										400	400	800	20

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Global Academy of Technology, Bengaluru

Scheme of Teaching and Examinations (Effective from the academic year 2024- 25)

II Semester (Electrical & Electronics Engineering Stream) (For the students who attended 1st semester under Physics Group)

Sl. No	Course and Course Code		Course Title	TD/PSB	Teaching Hours/Week				Examination				Credits
					Theory	Tutorial	Practical/ Drawing	SDA	Duration in	CIE Marks	SEE Marks	Total Mark	
					L	T	P	S					
1	*ASC(IC)	BMATE24201	Mathematics-II for EEE Stream (Integrated)	Maths	2	2	2	0	03	50	50	100	04
2	#ASC(IC)	BCHEE24202	Applied Chemistry for EEE Stream (Integrated)	Chemistry	2	2	2	0	03	50	50	100	04
3	ESC	BCEDK24203	Computer Aided Engineering Drawing	Civil/Mech Engg dept	2	0	2	0	03	50	50	100	03
4	ESC-II	BESCK24204x	Engineering Science Course-II	Respective Engg Dept	3	0	0	0	03	50	50	100	03
5	PLC-II	BPLCK24205x	Programming Language Course-II	Any Dept	2	0	2	0	03	50	50	100	03
	OR												
	ETC-II	BETCK24205x	Emerging Technology Course-II		03	0	0	0	03				
6	AEC	BPWKS24206	Professional Writing Skills in English	Humanities	1	0	0	0	01	50	50	100	01
			OR										
		BENGK24206	Communicative English										
7	HSMS	BICOK24207	Indian Constitution	Humanities	1	0	0	0	01	50	50	100	01
			OR										
		BKSKK24207/ BKBKK24207	Samskrutika Kannada/ Balake Kannada										
8	HSMS	BSFHK24208	Scientific Foundations of Health	Any Dept.	1	0	0	0	01	50	50	100	01
			OR										
		BIDTK24208	Innovation and Design Thinking		1	0	0	0	01				
				TOTAL						400	400	800	20

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Global Academy of Technology, Bengaluru

Scheme of Teaching and Examinations (Effective from the academic year 2024- 25)

I Semester (Electrical & Electronics Engineering Stream) (For Chemistry Group)

Sl. No	Course and Course Code		Course Title	TD/PSB	Teaching Hours/Week				Examination				Credits
					Theory	Tutorial	Practical/ Drawing	SDA	Duration in	CIE Marks	SEE Marks	Total Mark	
					L	T	P	S					
1	*ASC(IC)	BMATE24101	Mathematics-I for EEE Stream (Integrated)	Maths	2	2	2	0	03	50	50	100	04
2	#ASC(IC)	BCHEE24102	Applied Chemistry for EEE Stream (Integrated)	Chemistry	2	2	2	0	03	50	50	100	04
3	ESC	BCEDK24103	Computer-Aided Engineering Drawing	Mechanical	2	0	2	0	03	50	50	100	03
4	ESC-I	BESCK24104x	Engineering Science Course-I	Respective Engg Dept	3	0	0	0	03	50	50	100	03
5	ETC-I	BETCK24105x	Emerging Technology Course-I	Any Dept	3	0	0	0	03	50	50	100	03
	OR												
	PLC-I	BPLCK24105x	Programming Language Course-I		2	0	2	0	03				
6	AEC	BPWSK24106	Professional Writing Skills in English	Humanities	1	0	0	0	01	50	50	100	01
		OR											
		BENGK24106	Communicative English										
7	HSMS	BICOK24107	Indian Constitution	Humanities	1	0	0	0	01	50	50	100	01
		OR											
		BKSKK24107/ BKBKK24107	Samskrutika Kannada/ Balake Kannada										
8	HSMS	BSFHK24108	Scientific Foundations of Health	Any Dept.	1	0	0	0	01	50	50	100	01
		OR											
		BIDTK24108	Innovation and Design Thinking		1	0	0	0	01				
				TOTAL						400	400	800	20

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Global Academy of Technology, Bengaluru

Scheme of Teaching and Examinations (Effective from the academic year 2024- 25)

II Semester (Electrical & Electronics Engineering Stream) (For students who attended 1st semester under Chemistry Group)

Sl. No	Course and Course Code		Course Title	TD/PSB	Teaching Hours/Week				Examination				Credits
					Theory	Tutorial	Practical/ Drawing	SDA	Duration in hours	CIE Marks	SEE Marks	Total Mark	
					L	T	P	S					
1	*ASC(IC)	BMATE24201	Mathematics-II for EEE Stream (Integrated)	Maths	2	2	2	0	03	50	50	100	04
2	#ASC(IC)	BPHYE24202	Applied Physics for EEE Stream (Integrated)	PHY	2	2	2	0	03	50	50	100	04
3	ESC	BEEE24203	# Elements of Electrical Engineering	EEE/ECE/TCE	2	2	0	0	03	50	50	100	03
		OR											
		BBEE24203	## Basic Electronics		3	0	0	0					
4	ESC-II	BESCK24204x	Engineering Science Course-II	Respective Engg Dept.	3	0	0	0	03	50	50	100	03
5	PLC-II	BPLCK24205x	Programming language Course-II	Any Dept	2	0	2	0	03	50	50	100	03
	OR												
	ETC-II	BETCK24205x	Emerging Technology Course-II		3	0	0	0	03				
6	AEC	BENGK24206	Communicative English	Humanities	1	0	0	0	01	50	50	100	01
		OR											
		BPWSK24206	Professional Writing Skills in English										
7	HSMC	BKSKK24207/ BKBKK24207	Samskrutika Kannada/ Balake Kannada	Humanities	1	0	0	0	01	50	50	100	01
		OR											
		BICOK24207	Indian Constitution		1	0	0	0					
8	AEC/SDC	BIDTK24208	Innovation and Design Thinking	Any Dept	1	0	0	0	01	50	50	100	01
	OR												
		BSFHK24208	Scientific Foundations of Health		1	0	0	0	01				
TOTAL										400	400	800	20

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(ESC-I/II) Engineering Science Courses-I/II				
Code	Title	L	T	P
BESCK24104/204A	INTRODUCTION TO CIVIL ENGINEERING	3	0	0
BESCK24104/204B	INTRODUCTION TO ELECTRONICS AND COMMUNICATION	3	0	0
BESCK24104/204C	INTRODUCTION TO ELECTRICAL ENGINEERING	3	0	0
BESCK24104/204D	INTRODUCTION TO C PROGRAMMING (INTEGRATED)	2	0	2
BESCK24104/204E	INTRODUCTION TO ENGINEERING MECHANICS	3	0	0
BESCK24104/204F	ENGINEERING GEOLOGY (INTEGRATED)	2	0	2
BESCK24104/204G	INTRODUCTION TO AERONAUTICAL ENGINEERING(Integrated)	2	0	2
BESCK104H/204H	INTRODUCTION TO MECHANICAL ENGINEERING	2	0	2

(PLC-I/II) Programming Language Courses-I/II				
Code	Title	L	T	P
BPLCK24105/205A	PROGRAMMING IN C (INTEGRATED)	2	0	2
BPLCK24105/205B	INTRODUCTION TO PYTHON PROGRAMMING(INTEGRATED)	2	0	2
BPLCK24105/205C	BASICS OF JAVA PROGRAMMING(INTEGRATED)	2	0	2
BPLCK24105/205D	ADVANCED PROGRAMMING IN C(INTEGRATED)	2	0	2
BPLCK24105/205E	INTRODUCTION TO WEB PROGRAMMING	2	0	2
BPLCK24105/205F	INTRODUCTION TO C++ PROGRAMMING	2	0	2

(ETC-I/II) Emerging Technology Courses-I/II				
Code	Title	L	T	P
BETCK24105/205A	INTRODUCTION TO ARTIFICIAL INTELLIGENCE	3	0	0
BETCK24105/205B	INTRODUCTION TO EMBEDDED SYSTEM	3	0	0
BETCK24105/205C	SENSOR SYSTEMS	3	0	0
BETCK24105/205D	ELECTROMECHANICAL SYSTEMS & MEASUREMENTS	3	0	0
BETCK24105/205E	WASTE MANAGEMENT	3	0	0
BETCK24105/205F	GREEN BUILDINGS	3	0	0
BETCK24105/205G	SMART MATERIALS AND SYSTEMS	3	0	0
BETCK24105/205H	INTRODUCTION TO NANO TECHNOLOGY	3	0	0
BETCK24105/205I	INTRODUCTION TO SUSTAINABLE ENGINEERING	3	0	0
BETCK24105/205J	RENEWABLE ENERGY SOURCES	3	0	0
BETCK24105/205K	EMERGING APPLICATIONS OF BIOSENSORS	3	0	0
BETCK24105/205L	INTRODUCTION TO INTERNET OF THINGS (IOT)	3	0	0
BETCK24105/205M	INTRODUCTION TO CYBER SECURITY	3	0	0
BETCK24105/205N	INTRODUCTION TO EMBEDDED SYSTEMS	3	0	0

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Global Academy of Technology, Bengaluru
Scheme of Teaching and Examinations (Effective from the academic year 2024- 25)

I Semester (CSE Stream) (Physics Group)

Sl. No	Course and course code		Course title	TD/PSB	Teaching Hours/Week				Examination				Credits
					Theory	Tutorial	Practical /	SDA	Duration in	CIE Marks	SEE Marks	Total Marks	
					L	T	P	S					
1	ASC(IC)	BMATS24101	Mathematics-I for CSE Stream(Integrated)	Maths	2	2	2	0	03	50	50	100	04
2	ASC(IC)	BPHYS24102	Applied Physics for CSE stream(Integrated)	Physics	2	2	2	0	03	50	50	100	04
3	ESC	BPOPS24103	Principles of Programming Using C (Integrated)	CSE	2	0	2	0	03	50	50	100	03
4	ESC-I	BESCK24104x	Engineering Science Course-I	Respective Engg Dept	3	0	0	0	03	50	50	100	03
5	ETC-I	BETCK24105x	Emerging Technology Course-I	Any Dept	3	0	0	0	03	50	50	100	03
	OR												
	PLC-I	BPLCK24105x	Programming Languages Course-I		2	0	2	0	03				
6	AEC	BENGK24106	Communicative English	Humanities	1	0	0	0	01	50	50	100	01
			OR										
		BPWSK24106	Professional Writing Skills in English										
7	HSMC	BKSKK24107 BKBKK24107	Samskrutika Kannada/ Balake Kannada	Humanities	1	0	0	0	01	50	50	100	01
			OR										
		BICOK24107	Indian Constitution										
8	AEC/SDC	BIDTK24108	Innovation and Design Thinking	Any Dept	1	0	0	0	01	50	50	100	01
			OR										
		BSFHK24108	Scientific Foundations of Health		1	0	0	0	01				
TOTAL										400	400	800	20

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Global Academy of Technology, Bengaluru
Scheme of Teaching and Examinations (Effective from the academic year 2024- 25)

II Semester(CSE Stream) (For students attended 1st semester under Physics Group)

Sl. No	Course and course code		Course title	TD/PSB	Teaching Hours/Week				Examination				Credits
					Theory	Tutorial	Practical /	SDA	Duration in	CIE Marks	SEE Marks	Total Marks	
					L	T	P	S					
1	*ASC(IC)	BMATS24201	Mathematics-II for CSE Stream(Integrated)	Maths	2	2	2	0	03	50	50	100	04
2	#ASC(IC)	BCHES24202	Applied Chemistry for CSE Stream(Integrated)	Chemistry	2	2	2	0	03	50	50	100	04
3	ESC	BCEDK24203	Computer Aided Engineering Drawing	Civil/Mech Engg dept	2	0	2	0	03	50	50	100	03
4	ESC-II	BESCK24204x	Engineering Science Course-II	Respective Engg. Dept	3	0	0	0	03	50	50	100	03
5	PLC-II	BPLCK24205x	Programming Language Course-II	Any Dept	2	0	2	0	03	50	50	100	03
	OR												
	ETC-II	BETCK24205x	Emerging Technology Course-II		3	0	0	0	03				
6	AEC	BPWSK24206	Professional Writing Skills in English	Humanities	1	0	0	0	01	50	50	100	01
		OR											
		BENGK24206	Communicative English										
7	HSMS	BICOK24207	Indian Constitution	Humanities	1	0	0	0	01	50	50	100	01
	OR												
		BKSKK24207/ BKBKK24207	Samskrutika Kannada/ Balake Kannada		1	0	0	0					
8	HSMS	BSFHK24208	Scientific Foundations of Health	Any Dept	1	0	0	0	01	50	50	100	01
	OR												
		BIDTK24208	Innovation and Design Thinking		1	0	0	0	01				
TOTAL										400	400	800	20

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Global Academy of Technology, Bengaluru
Scheme of Teaching and Examinations (Effective from the academic year 2024- 25)

I Semester (CSE Stream) (For Chemistry Group)

Sl. No	Course and course code		Course title	TD/PSB	Teaching Hours/Week				Examination				Credits
					Theory Lecture	Tutorial	Practical/ Drawing	SDA	Duration in hours	CIE Marks	SEE Marks	Total Mark	
					L	T	P	S					
1	*ASC(IC)	BMATS24101	Mathematics-I for CSE Stream(Integrated)	Maths	2	2	2	0	03	50	50	100	04
2	#ASC(IC)	BCHES24102	Applied Chemistry for CSE Stream(Integrated)	Chemistry	2	2	2	0	03	50	50	100	04
3	ESC	BCEDK24103	Computer Aided Engineering Drawing	Civil/Mech Engg dept	2	0	2	0	03	50	50	100	03
4	ESC-I	BESCK24104x	Engineering Science Course-I	Respective Engg Dept	3	0	0	0	03	50	50	100	03
5	ETC-I	BETCK24105x	Emerging Technology Course-I	Any Dept	3	0	0	0	03	50	50	100	03
	OR												
	PLC-I	BPLCK24105x	Programming Language Course-I		2	0	2	0	03				
6	AEC	BPWSK24106	Professional Writing Skills in English	Humanities	1	0	0	0	01	50	50	100	01
		OR											
		BENGK24106	Communicative English										
7	HSMS	BICOK24107	Indian Constitution	Humanities	1	0	0	0	01	50	50	100	01
	OR												
		BKSKK24107/ BKBKK24107	Samskrutika Kannada/ Balake Kannada		1	0	0	0					
8	HSMS	BSFHK24108	Scientific Foundations of Health	Any Dept	1	0	0	0	01	50	50	100	01
		OR											
		BIDTK24108	Innovation and Design Thinking		1	0	0	0	01				
				TOTAL						400	400	800	20

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Global Academy of Technology, Bengaluru
Scheme of Teaching and Examinations-2024
Outcome-Based Education (OBE)and Choice Based Credit System (CBCS)
(Effective from the academic year 2024-25)

II Semester (CSE Streams) (For students who attended 1st semester under Chemistry Group)

Sl. No	Course and course code		Course title	TD/PSB	Teaching Hours/Week				Examination				Credits
					Theory L	Tutorial T	Practical / P	SDA S	Duration in hours	CIE Marks	SEE Marks	Total Marks	
1	*ASC(IC)	BMATS24201	Mathematics-II for CSE Stream(Integrated)	Maths	2	2	2	0	03	50	50	100	04
2	#ASC(IC)	BPHYS24202	Applied Physics for CSE Stream(Integrated)	Physics	2	2	2	0	03	50	50	100	04
3	ESC	BPOPS24203	Principles of Programming Using C	CSE	2	0	2	0	03	50	50	100	03
4	ESC-II	BESCK24204x	Engineering Science Course-II	Respective Engg dept	3	0	0	0	03	50	50	100	03
5	PLC-II	BPLCK24205x	Programming Language Course-II	Any Dept	2	0	2	0	03	50	50	100	03
	OR												
	ETC-II	BETCK24205x	Emerging Technology Course-II		3	0	0	0	03				
6	AEC	BENGK24206	Communicative English	Humanities	1	0	0	0	01	50	50	100	01
		OR											
		BPWSK24206	Professional Writing Skills in English										
7	HSMC	BKSKK24207 BKBKK24207	Samskrutika Kannada/ Balake Kannada	Humanities	1	0	0	0	01	50	50	100	01
		OR											
		BICOK24207	Indian Constitution										
8	AEC/SDC	BIDTK24208	Innovation and Design Thinking	Any Dept	1	0	0	0	01	50	50	100	01
		OR											
		BSFHK24208	Scientific Foundations of Health		1	0	0	0	01				
TOTAL										400	400	800	20

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(ESC-I/II) Engineering Science Courses-I/II					(ETC-I/II) Emerging Technology Courses-I/II				
Code	Title	L	T	P	Code	Title	L	T	P
BESCK24104/204A	INTRODUCTION TO CIVIL ENGINEERING	3	0	0	BETCK24105/205A	INTRODUCTION TO ARTIFICIAL INTELLIGENCE	3	0	0
BESCK24104/204B	INTRODUCTION TO ELECTRONICS AND COMMUNICATION	3	0	0	BETCK24105/205B	INTRODUCTION TO EMBEDDED SYSTEM	3	0	0
BESCK24104/204C	INTRODUCTION TO ELECTRICAL ENGINEERING	3	0	0	BETCK24105/205C	SENSOR SYSTEMS	3	0	0
BESCK24104/204D	INTRODUCTION TO C PROGRAMMING (INTEGRATED)	2	0	2	BETCK24105/205D	ELECTROMECHANICAL SYSTEMS & MEASUREMENTS	3	0	0
BESCK24104/204E	INTRODUCTION TO ENGINEERING MECHANICS	3	0	0	BETCK24105/205E	WASTE MANAGEMENT	3	0	0
BESCK24104/204F	ENGINEERING GEOLOGY (INTEGRATED)	2	0	2	BETCK24105/205F	GREEN BUILDINGS	3	0	0
BESCK24104/204G	INTRODUCTION TO AERONAUTICAL ENGINEERING(Integrated)	2	0	2	BETCK24105/205G	SMART MATERIALS AND SYSTEMS	3	0	0
BESCK104H/204H	INTRODUCTION TO MECHANICAL ENGINEERING	2	0	2	BETCK24105/205H	INTRODUCTION TO NANO TECHNOLOGY	3	0	0
					BETCK24105/205I	INTRODUCTION TO SUSTAINABLE ENGINEERING	3	0	0
					BETCK24105/205J	RENEWABLE ENERGY SOURCES	3	0	0
					BETCK24105/205K	EMERGING APPLICATIONS OF BIOSENSORS	3	0	0
					BETCK24105/205L	INTRODUCTION TO INTERNET OF THINGS (IOT)	3	0	0
					BETCK24105/205M	INTRODUCTION TO CYBER SECURITY	3	0	0
					BETCK24105/205N	INTRODUCTION TO EMBEDDED SYSTEMS	3	0	0
(PLC-I/II) Programming Language Courses-I/II									
Code	Title	L	T	P					
BPLCK24105/205A	PROGRAMMING IN C (INTEGRATED)	2	0	2					
BPLCK24105/205B	INTRODUCTION TO PYTHON PROGRAMMING(INTEGRATED)	2	0	2					
BPLCK24105/205C	BASICS OF JAVA PROGRAMMING(INTEGRATED)	2	0	2					
BPLCK24105/205D	ADVANCED PROGRAMMING IN C(INTEGRATED)	2	0	2					
BPLCK24105/205E	INTRODUCTION TO WEB PROGRAMMING	2	0	2					
BPLCK24105/205F	INTRODUCTION TO C++ PROGRAMMING	2	0	2					

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Global Academy of Technology, Bengaluru
Scheme of Teaching and Examinations (Effective from the academic year 2024- 25)

I Semester (Civil Engineering Stream) (Physic Group)

Sl. No	Course and Course Code		Course Title	TD/PSB	Teaching Hours/Week				Examination				Credits
					Theory Lectur	Tutorial	Practical/ Drawing	SDA	Duration in hours	CIE Marks	SEE Marks	Total Mark	
					L	T	P	S					
1	*ASC(IC)	BMATC24101	Mathematics-I for Civil Engineering stream (Integrated)	Maths	2	2	2	0	03	50	50	100	04
2	#ASC(IC)	BPHYC24102	Applied Physics for Civil Engineering Stream (Integrated)	PHY	2	2	2	0	03	50	50	100	04
3	ESC	BCIVC24103	Engineering Mechanics	Civil Engineering Dept	2	2	0	0	03	50	50	100	03
4	ESC-I	BESCK24104x	Engineering Science Course-I	Respective Engg dept	3	0	0	0	03	50	50	100	03
5	ETC-I	BETCK24105x	Emerging Technology Course-I	Any Dept	3	0	0	0	03	50	50	100	03
	OR												
	PLC-I	BPLCK24105x	Programming Language Course-I		2	0	2	0	03				
6	AEC AEC	BENGK24106	Communicative English	Humanities	1	0	0	0	01	50	50	100	01
		OR											
		BPWSK24106	Professional Writing Skills in English										
7	HSMC	BKSKK24107/ BKBKK24107	Samskrutika Kannada/ Balake Kannada	Humanities	1	0	0	0	01	50	50	100	01
		OR											
		BICOK24107	Indian Constitution										
8	AEC/SDC	BIDTK24108	Innovation and Design Thinking	Any Dept	1	0	0	0	01	50	50	100	01
	OR				OR								
		BSFHK24108	Scientific Foundations of Health		1	0	0	0	01				
TOTAL										400	400	800	20

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Global Academy of Technology, Bengaluru
Scheme of Teaching and Examinations (Effective from the academic year 2024- 25)

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

Sl. No	Course and Course Code		Course Title	TD/PSB	Teaching Hours/Week				Examination				Credits
					Theory	Tutorial	Practical/ Drawing	SDA	Duration in hours	CIE Marks	SEE Marks	Total Mark	
					L	T	P	S					
1	*ASC(IC)	BMATC24201	Mathematics-II for Civil Engineering Stream (Integrated)	Maths	2	2	2	0	03	50	50	100	04
2	#ASC(IC)	BCHEC24202	Applied Chemistry for Civil Engineering stream (Integrated)	Chemistry	2	2	2	0	03	50	50	100	04
3	ESC	BCEDK24203	Computer Aided Engineering Drawing	Civil/Mech Engg dept	2	0	2	0	03	50	50	100	03
4	ESC-II	BESCK24204x	Engineering Science Course-II	Respective EnggDept	3	0	0	0	03	50	50	100	03
5	PLC-II	BPLCK24205x	Programming Language Course-II	Any. Dept	2	0	2	0	03	50	50	100	03
	OR												
	ETC-II	BETCK24205x	Emerging Technology Course-II		3	0	0	0	03				
6	AEC	BPWSK24206	Professional Writing Skills in English	Humanities	1	0	0	0	01	50	50	100	01
			OR										
		BENGK24206	Communicative English										
7	HSMS	BICOK24207	Indian Constitution	Humanities	1	0	0	0	01	50	50	100	01
		OR											
		BKSKK24207/ BKBKK24207	Samskrutika Kannada/ Balake Kannada										
8	HSMS	BSFHK24208	Scientific Foundations of Health	Any Dept	1	0	0	0	01	50	50	100	01
	OR				OR								
	HSMS	BIDTK24208	Innovation and Design Thinking	Any	1	0	0	0	01	50	50	100	
				TOTAL						400	400	800	20

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Global Academy of Technology, Bengaluru
Scheme of Teaching and Examinations (Effective from the academic year 2024- 25)

I Semester (Civil Engineering Stream) (Chemistry Group)

Sl. No	Course and Course Code		Course Title	TD/PSB	Teaching Hours/Week				Examination				Credits
					Theory	Tutorial	Practical/ Drawing	SDA	Duration in hours	CIE Marks	SEE Marks	Total Mark	
					L	T	P	S					
1	*ASC(IC)	BMATC24101	Mathematics-I for Civil Engineering Stream (Integrated)	Maths	2	2	2	0	03	50	50	100	04
2	#ASC(IC)	BCHEC24102	Applied Chemistry for Civil Engineering Stream (Integrated)	Chemistry	2	2	2	0	03	50	50	100	04
3	ESC	BCEDK24103	Computer Aided engineering Drawing	Civil/Mech Engg dept	2	0	2	0	03	50	50	100	03
4	ESC-I	BESCK24104x	Engineering Science Course-I	Respective Dept	3	0	0	0	03	50	50	100	03
5	ETC-I	BETCK24105x	Emerging Technology Course-I	Any Dept	3	0	0	0	03	50	50	100	03
	OR												
	PLC-I	BPLCK24105x	Programming Language Course-I		2	0	2	0	03				
6	AEC	BPWSK24106	Professional Writing Skills in English	Humanities	1	0	0	0	01	50	50	100	01
			OR										
		BENGK24106	Communicative English										
7	HSMS	BICOK24107	Indian Constitution	Humanities	1	0	0	0	01	50	50	100	01
			OR										
		BKSK24107/ BKBK24107	Samskrutika Kannada/ Balake Kannada										
8	HSMS	BSFHK24108	Scientific Foundations of Health	AnyDept	1	0	0	0	01	50	50	100	01
	OR												
	HSMS	BITDK24108	Innovation and Design Thinking	Any Dept	1	0	0	0	01				
TOTAL					15	06	10	00	27	400	400	800	20

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Global Academy of Technology, Bengaluru
Scheme of Teaching and Examinations (Effective from the academic year 2024- 25)

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

Sl. No	Course and Course Code		Course Title	TD/PSB	Teaching Hours/Week				Examination				Credits
					Theory	Tutorial	Practical/ Drawing	SDA	Duration in hours	CIE	SEE	Total Mark	
					L	T	P	S					
1	*ASC (IC)	BMATC24201	Mathematics-II for Civil Engineering stream (Integrated)	Maths	2	2	2	0	03	50	50	100	04
2	#ASC (IC)	BPHYC24202	Applied Physics for Civil Engineering stream (Integrated)	PHY	2	2	2	0	03	50	50	100	04
3	ESC	BCIVC24203	Engineering Mechanics	Civil Engineering Dept	2	2	0	0	03	50	50	100	03
4	ESC-II	BESCK24204x	Engineering Science Course-II	Respective Engg Dept	3	0	0	0	03	50	50	100	03
5	PLC-II	BPLCK24205x	Programming Language Course-II	Any Dept	2	0	2	0	03	50	50	100	03
	OR												
	ETC-II	BETCK24205x	Emerging Technology Course-II		3	0	0	0	03				
6	AEC	BENGK24206	Communicative English	Humanities	1	0	0	0	01	50	50	100	01
			OR										
		BPWSK24206	Professional Writing Skills in English										
7	HSMC	BKSKK24207 BKBKK24207	Samskrutika Kannada/ Balake Kannada	Humanities	1	0	0	0	01	50	50	100	01
		OR											
		BICOK24207	Indian Constitution										
8	AEC/SDC	BIDTK24208	Innovation and Design Thinking	Any Dept	1	0	0	0	01	50	50	100	01
	OR												
		BSFHK24208	Scientific Foundations of Health		1	0	0	0					
TOTAL										400	400	800	20

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(ESC-I/II) Engineering Science Courses-I/II				
Code	Title	L	T	P
BESCK24104/204A	INTRODUCTION TO CIVIL ENGINEERING	3	0	0
BESCK24104/204B	INTRODUCTION TO ELECTRONICS AND COMMUNICATION	3	0	0
BESCK24104/204C	INTRODUCTION TO ELECTRICAL ENGINEERING	3	0	0
BESCK24104/204D	INTRODUCTION TO C PROGRAMMING (INTEGRATED)	2	0	2
BESCK24104/204E	INTRODUCTION TO ENGINEERING MECHANICS	3	0	0
BESCK24104/204F	ENGINEERING GEOLOGY (INTEGRATED)	2	0	2
BESCK24104/204G	INTRODUCTION TO AERONAUTICAL ENGINEERING(Integrated)	2	0	2
BESCK104H/204H	INTRODUCTION TO MECHANICAL ENGINEERING	2	0	2

(PLC-I/II) Programming Language Courses-I/II				
Code	Title	L	T	P
BPLCK24105/205A	PROGRAMMING IN C (INTEGRATED)	2	0	2
BPLCK24105/205B	INTRODUCTION TO PYTHON PROGRAMMING(INTEGRATED)	2	0	2
BPLCK24105/205C	BASICS OF JAVA PROGRAMMING(INTEGRATED)	2	0	2
BPLCK24105/205D	ADVANCED PROGRAMMING IN C(INTEGRATED)	2	0	2
BPLCK24105/205E	INTRODUCTION TO WEB PROGRAMMING	2	0	2
BPLCK24105/205F	INTRODUCTION TO C++ PROGRAMMING	2	0	2

(ETC-I/II) Emerging Technology Courses-I/II				
Code	Title	L	T	P
BETCK24105/205A	INTRODUCTION TO ARTIFICIAL INTELLIGENCE	3	0	0
BETCK24105/205B	INTRODUCTION TO EMBEDDED SYSTEM	3	0	0
BETCK24105/205C	SENSOR SYSTEMS	3	0	0
BETCK24105/205D	ELECTROMECHANICAL SYSTEMS & MEASUREMENTS	3	0	0
BETCK24105/205E	WASTE MANAGEMENT	3	0	0
BETCK24105/205F	GREEN BUILDINGS	3	0	0
BETCK24105/205G	SMART MATERIALS AND SYSTEMS	3	0	0
BETCK24105/205H	INTRODUCTION TO NANO TECHNOLOGY	3	0	0
BETCK24105/205I	INTRODUCTION TO SUSTAINABLE ENGINEERING	3	0	0
BETCK24105/205J	RENEWABLE ENERGY SOURCES	3	0	0
BETCK24105/205K	EMERGING APPLICATIONS OF BIOSENSORS	3	0	0
BETCK24105/205L	INTRODUCTION TO INTERNET OF THINGS (IOT)	3	0	0
BETCK24105/205M	INTRODUCTION TO CYBER SECURITY	3	0	0
BETCK24105/205N	INTRODUCTION TO EMBEDDED SYSTEMS	3	0	0

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Semester I

Course: Mathematics-I for CSE Stream (Integrated)

Course Code	BMATS24101	CIE Marks	50
Hours/Week (L: T: P)	2:2:2	SEE Marks	50
No. of Credits	4	Examination Hours	03

Course Objectives

To enable students to apply the knowledge of Mathematics in various fields of engineering by making them to learn the following:

CLO1	Polar Curves and Partial Derivatives
CLO2	Linear and Nonlinear differential equations
CLO3	Number Theory
CLO4	System of linear equations and Eigen values and Eigen vectors

Content	No. of Hours/ RBT levels
Module 1 Polar coordinates, Polar curves, angle between the radius vector and the tangent, and angle between two curves. Pedal equations. Curvature and Radius of curvature – Cartesian and Pola forms. Problems.	08 Hours L3
Module 2 Taylor's and Maclaurin's series expansion for one variable (Statement only) – problems. Indeterminate forms - L'Hospital's rule, problems. Partial differentiation, differentiation of composite functions. Jacobian and problems. Maxima and minima for a function of two variables - Problems.	08 Hours L3
Module 3 Linear and Bernoulli's differential equations. Exact and reducible to exact differential equations - Integrating factors on $1/N\ (\partial M/\partial y - \partial N/\partial x)$ and $1/M\ (\partial N/\partial x - \partial M/\partial y)$. Orthogonal trajectories and Newton's law of cooling. Nonlinear differential equations: Introduction to general and singular solutions, Solvable for p only, Clairaut's equations, reducible to Clairaut's equations - Problems	08 Hours L3
Module 4 Introduction to Congruences, Linear Congruences, The Remainder theorem, Solving Polynomials, Linear Diophantine Equation, System of Linear Congruences, Euler's Theorem, Wilson Theorem and Fermat's little theorem. Applications of Congruences-RSA algorithm.	08 Hours L3
Module 5 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 approximate solution by Gauss-Seidel method. Eigenvalues and Eigenvectors.	08 Hours L3

Text books:

1. Higher Engineering Mathematics, B.S. Grewal, Khanna Publishers, 44th Edition, 2017.
2. B.V. Ramana, Higher Engineering Mathematics, Tata McGraw-Hill, 2006
3. David M Burton: "Elementary Number Theory" Mc Graw Hill, 7th Ed.,2017.

References:

1. E. Kreyszig , Advanced Engineering Mathematics, John Wiley & Sons 10th Edition, 2016
2. N.P.Bali and Manish Goyal, A Textbook of Engineering Mathematics, Laxmi Publications 6th Edition, 2014
3. Thomas Koshy: "Elementary Number Theory with Applications "Harcourt Academic Press, 2nd Ed., 2008.

Lab Experiments:

1	2D plots for Cartesian and polar curves
2	Finding angle between polar curves, curvature and radius of curvature of a given curve
3	Finding partial derivatives and Jacobian
4	Applications to Maxima and Minima of two variables
5	Solution of first-order ordinary differential equation and plotting the solution curves
6	Finding GCD using Euclid's Algorithm
7	Solving linear congruences $ax \equiv b(mod\ m)$
8	Numerical solution of system of linear equations, test for consistency and graphical representation
9	Solution of system of linear equations using Gauss-Seidel iteration
10	Compute eigenvalues and eigenvectors.

Course Outcomes

Upon completion of this course, student will be able to:

CO1	• Solve problems on Polar curves and radius of curvature
CO2	• Expand functions using Taylor's and Maclaurin's Series • Apply L' Hospital rule to solve indeterminate forms • Solve problems using partial derivatives
CO 3	• Solve linear differential equations of first order and first degree • Solve non-linear differential equations
CO 4	• Demonstrate the understanding of congruences, arithmetic functions and primitive roots. • Solve linear congruence equations and Diophantine equations • Use the Chinese Reminder Theorem to solve systems of linear congruences • Apply Fermat's Little and Wilson Theorems in modular arithmetic
CO5	• Solve system of linear equations • Evaluate Eigen values and Eigen vectors of a given matrix

Scheme of Examination:

Semester End Examination (SEE):

SEE Question paper is to be set for 100 marks and the marks scored will be proportionately reduced to 50. There will be two full questions (with a maximum of three sub questions) from each module carrying 20 marks each. Students are required to answer any **five full questions** choosing at least **one full question from each module.**

Continuous Internal Evaluation (CIE):

Component		Marks	Total Marks
CIE	CIE Test-1	**30**	**(Average of 3 CIE + Lab) 50**
	CIE Test-2	**30**	
	CIE Test-3	**30**	
	Lab Record + CIE	**20**	
SEE	Semester End Examination	**100**	**50**
Grand Total			**100**

CO/PO Mapping				
CO/PO	PO1	PO2	PO3	PO12
CO1	3	2	1	3
CO2	3	2	1	3
CO 3	3	2	1	3
CO 4	3	2	1	3
CO5	3	2	1	3
Average	3	2	1	3

Low-1: Medium-2: High-3

Semester II

Course: Mathematics-II for CSE Stream (Integrated)

Course Code	**BMATS24201**	**CIE Marks**	**50**
Hours/Week (L: T: P)	**2:2:2**	**SEE Marks**	**50**
No. of Credits	**4**	**Examination Hours**	**03**

Course Objectives

To enable students to apply the knowledge of Mathematics in various fields of engineering by making them to learn the following:

CLO1	Multiple Integrals
CLO2	Vector Calculus
CLO3	Vector Space
CLO4	Numerical methods

Content	No. of Hours/ RBT levels
Module 1 Multiple Integrals: Evaluation of double and triple integrals, evaluation of double integrals by change of order of integration, changing into polar coordinates. Problems. Beta and Gamma functions: Definitions, properties, relation between Beta and Gamma functions. Problems.	**08 Hours** **L3**
Module 2 Scalar and vector fields. Gradient, directional derivative, curl and divergence - physical interpretation, solenoidal and irrotational vector fields. Problems. Curvilinear coordinates: Scale factors, base vectors, Cylindrical polar coordinates, Spherical polar coordinates, transformation between cartesian and curvilinear systems, orthogonality. Problems	**08 Hours** **L3**
Module 3 Vector spaces: Definition and examples, subspace, linear span, Linearly independent and dependent sets, Basis and dimension. Problems. Linear transformations: Definition and examples, Algebra of transformations, Matrix of a linear transformation. Change of coordinates, Rank and nullity of a linear operator, rank-nullity theorem. Inner product spaces and orthogonality.	**08 Hours** **L3**
Module 4 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.	**08 Hours** **L3**
Module 5	**08 Hours** **L3**

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

Text books:

1. Higher Engineering Mathematics, B.S. Grewal, Khanna Publishers, 44th Edition, 2017.
2. David C Lay: "Linear Algebra and its Applications", Pearson Publishers, 4th Ed., 2018.
3. B.V. Ramana, Higher Engineering Mathematics, Tata McGraw-Hill, 2006

References:

1. E. Kreyszig , Advanced Engineering Mathematics, John Wiley & Sons 10th Edition, 2016
2. N.P.Bali and Manish Goyal, A Textbook of Engineering Mathematics, Laxmi Publications 6th Edition, 2014
3. Gilbert Strang: "Linear Algebra and its Applications", Cengage Publications, 4th Ed., 2022.

Lab Experiments:

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

Course Outcomes

Upon completion of this course, student will be able to:

CO1	• Evaluate double integrals using direct integration, by changing the order of integration and by changing the variables • Evaluate triple integrals by iterating the integration with respect to each variable • Evaluate integrals using Beta and Gamma functions
CO2	• Understand the concept of the gradient of a scalar field and its geometric interpretation • Compute the directional derivative of a scalar field, divergence and curl of a vector field. • Understand the properties of orthogonal coordinate systems, including scale factors and base vectors • Convert vector and scalar fields between Cartesian and cylindrical/spherical coordinate systems
CO3	• Determine if a set of vectors forms a subspace of a given vector space • Determine if a set of vectors is linearly independent and Construct bases for vector spaces and subspaces. • Represent vectors in different coordinate systems and understand the change of basis. • Compute inner products, norms, and distances between vectors in an inner product space.
CO4	• Solve algebraic and transcendental equations • Apply numerical techniques for interpolation of data • Evaluate definite integrals using numerical techniques
CO5	• Solve ordinary differential equations of first order using numerical techniques.

Scheme of Examination:

Semester End Examination (SEE):

SEE Question paper is to be set for 100 marks and the marks scored will be proportionately reduced to 50. There will be two full questions (with a maximum of three sub questions) from each module carrying 20 marks each. Students are required to answer any **five full questions** choosing at least **one full question from each module.**

Continuous Internal Evaluation (CIE):

Component		Marks	Total Marks
CIE	CIE Test-1	30	(Average of 3 CIE + Lab) 50
	CIE Test-2	30	
	CIE Test-3	30	
	Lab Record + CIE	20	
SEE	Semester End Examination	100	50
Grand Total			100

CO/PO Mapping				
CO/PO	PO1	PO2	PO3	PO12
CO1	3	2	1	3
CO2	3	2	1	3
CO3	3	2	1	3
CO4	3	2	1	3
CO5	3	2	1	3
Average	3	2	1	3

Low-1: Medium-2: High-3

Semester I

Course: Mathematics-I for Mechanical Engineering Stream (Integrated)

Course Code	BMATM24101	CIE Marks	50
Hours/Week (L: T: P)	2:2:2	SEE Marks	50
No. of Credits	4	Examination Hours	03

Course Objectives

To enable students to apply the knowledge of Mathematics in various fields of engineering by making them to learn the following:

CLO1	Polar Curves and Partial Derivatives
CLO2	Linear and Nonlinear differential equations
CLO3	System of linear equations
CLO4	Eigen Values and Eigen Vectors

Content	No. of Hours/ RBT levels
Module 1 Polar coordinates, Polar curves, angle between the radius vector and the tangent, and angle between two curves. Pedal equations. Curvature and Radius of curvature – Cartesian and Polar forms. Problems.	08 Hours L3
Module 2 Taylor's and Maclaurin's series expansion for one variable (Statement only) – problems. Indeterminate forms - L'Hospital's rule, problems. Partial differentiation, differentiation of composite functions. Jacobian and problems. Maxima and minima for a function of two variables - Problems.	08 Hours L3
Module 3 Linear and Bernoulli's differential equations. Exact and reducible to exact differential equations - Integrating factors on $1/N\ (\partial M/\partial y - \partial N/\partial x)$ and $1/M\ (\partial N/\partial x - \partial M/\partial y)$. Orthogonal trajectories and Newton's law of cooling. Nonlinear differential equations: Introduction to general and singular solutions, Solvable for p only, Clairaut's equations, reducible to Clairaut's equations - Problems	08 Hours L3
Module 4 Higher-order linear ODEs with constant coefficients - Inverse differential operator, method of variation of parameters, Cauchy's and Legendre's homogeneous differential equations -Problems.	08 Hours L3
Module 5 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 approximate solution by Gauss-Seidel method. Eigenvalues and Eigenvectors.	08 Hours L3

Text books:

1. Higher Engineering Mathematics, B.S. Grewal, Khanna Publishers, 44th Edition, 2017.
2. B.V. Ramana, Higher Engineering Mathematics, Tata McGraw-Hill, 2006

References:

1. E. Kreyszig , Advanced Engineering Mathematics, John Wiley & Sons 10th Edition, 2016
2. N.P.Bali and Manish Goyal, A Textbook of Engineering Mathematics, Laxmi Publications 6th Edition, 2014
3. Higher Engineering Mathematics, H.K. Dass and Er. Rajnish Verma, S. Chand publishing, 1st edition, 2011.

Lab Experiments:

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

Course Outcomes

Upon completion of this course, student will be able to:

CO 1	• Solve problems on Polar curves and radius of curvature
CO 2	• Expand functions using Taylor's and Maclaurin's Series • Apply L' Hospital rule to solve indeterminate forms • Solve problems using partial derivatives
CO 3	• Solve linear differential equations of first order and first degree • Solve non-linear differential equations
CO 4	• Solve higher order differential equations
CO 5	• Solve system of linear equations • Evaluate Eigen values and Eigen vectors of a given matrix

Scheme of Examination:

Semester End Examination (SEE):

SEE Question paper is to be set for 100 marks and the marks scored will be proportionately reduced to 50. There will be two full questions (with a maximum of three sub questions) from each module carrying 20 marks each. Students are required to answer any **five full questions** choosing at least **one full question from each module.**

Continuous Internal Evaluation (CIE):

Component		Marks	Total Marks
CIE	CIE Test-1	30	**(Average of 3 CIE + Lab) 50**
	CIE Test-2	30	
	CIE Test-3	30	
	Lab Record + CIE	20	
SEE	Semester End Examination	100	50
Grand Total			100

CO/PO Mapping				
CO/PO	PO1	PO2	PO3	PO12
CO 1	3	2	1	3
CO 2	3	2	1	3
CO 3	3	2	1	3
CO 4	3	2	1	3
CO 5	3	2	1	3
Average	3	2	1	3

Low-1: Medium-2: High-3

Semester II

Course: Mathematics-II for Mechanical Engineering Stream (Integrated)

Course Code	BMATM24201	CIE Marks	50
Hours/Week (L: T: P)	2:2:2	SEE Marks	50
No. of Credits	4	Examination Hours	03

Course Objectives

To enable students to apply the knowledge of Mathematics in various fields of engineering by making them to learn the following:

CLO1	Multiple Integrals
CLO2	Vector Calculus
CLO3	Partial differential equations
CLO4	Numerical methods

Content	No. of Hours/ RBT levels
Module 1 Multiple Integrals: Evaluation of double and triple integrals, evaluation of double integrals by change of order of integration, changing into polar coordinates. Problems. Beta and Gamma functions: Definitions, properties, relation between Beta and Gamma functions. Problems.	08 Hours L3
Module 2 Vector Differentiation: Scalar and vector fields. Gradient, directional derivative, curl and divergence - physical interpretation, solenoidal and irrotational vector fields. Vector Integration: Line integrals, Surface integrals. Statement of Green's theorem and Stoke's theorem. Problems.	08 Hours L3
Module 3 Formation of PDE's by elimination of arbitrary constants and functions. Solution of nonhomogeneous PDE by direct integration. Homogeneous PDEs involving derivatives with respect to one independent variable only. Solution of Lagrange's linear PDE. Derivation of one-dimensional heat equation and wave equation.	08 Hours L3
Module 4 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.	08 Hours L3
Module 5 Numerical solution of ordinary differential equations of first order and first degree - Taylor's series method, Modified Euler's method, Runge-Kutta method	08 Hours L3

of fourth order and Milne's predictor-corrector formula (No derivations of formulae). Problems	

Text books:

1. Higher Engineering Mathematics, B.S. Grewal, Khanna Publishers, 44th Edition, 2017.
2. B.V. Ramana, Higher Engineering Mathematics, Tata McGraw-Hill, 2006

References:

1. E. Kreyszig , Advanced Engineering Mathematics, John Wiley & Sons 10th Edition, 2016
2. N.P.Bali and Manish Goyal, A Textbook of Engineering Mathematics, Laxmi Publications 6th Edition, 2014
3. Higher Engineering Mathematics, H.K. Dass and Er. Rajnish Verma, S. Chand publishing, 1st edition, 2011.

Lab Experiments:

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

Course Outcomes

Upon completion of this course, student will be able to:

CO1	• Evaluate double integrals using direct integration, by changing the order of integration and by changing the variables • Evaluate triple integrals by iterating the integration with respect to each variable • Evaluate integrals using Beta and Gamma functions
CO2	• Understand the concept of the gradient of a scalar field and its geometric interpretation • Compute the directional derivative of a scalar field, divergence and curl of a vector field. • Solve surface integrals using Green's and Stoke's theorem.
CO3	• Understand how PDEs arise from modelling physical phenomena involving multiple independent variables • Recognize when a PDE can be solved by direct integration and Apply the method of direct integration to solve first-order linear PDEs • Solve linear first-order PDEs using Lagrange method • Solve homogeneous linear equations with constant coefficients • Derive one dimensional heat and wave equations.
CO4	• Solve algebraic and transcendental equations • Apply numerical techniques for interpolation of data • Evaluate definite integrals using numerical techniques
CO5	• Solve ordinary differential equations of first order using numerical techniques.

Scheme of Examination:

Semester End Examination (SEE):

SEE Question paper is to be set for 100 marks and the marks scored will be proportionately reduced to 50. There will be two full questions (with a maximum of three sub questions) from each module carrying 20 marks each. Students are required to answer any **five full questions** choosing at least **one full question from each** module.

Continuous Internal Evaluation (CIE):

Component		Marks	Total Marks
CIE	CIE Test-1	30	(Average of 3 CIE + Lab) 50
	CIE Test-2	30	
	CIE Test-3	30	
	Lab Record + CIE	20	
SEE	Semester End Examination	100	50
Grand Total			100

CO/PO Mapping				
CO/PO	PO1	PO2	PO3	PO12
CO1	3	2	1	3
CO2	3	2	1	3
CO3	3	2	1	3
CO4	3	2	1	3
CO5	3	2	1	3
Average	3	2	1	3

Low-1: Medium-2: High-3

Semester I

Course: Mathematics-I for EEE Stream (Integrated)

Course Code	BMATE24101	CIE Marks	50
Hours/Week (L: T: P)	2:2:2	SEE Marks	50
No. of Credits	4	Examination Hours	03

Course Objectives

To enable students to apply the knowledge of Mathematics in various fields of engineering by making them to learn the following:

CLO1	Polar Curves and Partial Derivatives
CLO2	Linear and Nonlinear differential equations
CLO3	Multiple Integrals
CLO4	System of linear Equations, Eigen Values and Eigen Vectors

Content	No. of Hours/ RBT levels
Module 1 Polar coordinates, Polar curves, angle between the radius vector and the tangent, and angle between two curves. Pedal equations. Curvature and Radius of curvature – Cartesian and Polar forms. Problems.	**08 Hours** **L3**
Module 2 Taylor's and Maclaurin's series expansion for one variable (Statement only) – problems. Indeterminate forms - L'Hospital's rule, problems. Partial differentiation, differentiation of composite functions. Jacobian and problems. Maxima and minima for a function of two variables - Problems.	**08 Hours** **L3**
Module 3 Linear and Bernoulli's differential equations. Exact and reducible to exact differential equations - Integrating factors on $1/N\ (\partial M/\partial y - \partial N/\partial x)$ *and* $1/M\ (\partial N/\partial x - \partial M/\partial y)$. Orthogonal trajectories and Newton's law of cooling. Nonlinear differential equations: Introduction to general and singular solutions, Solvable for p only, Clairaut's equations, reducible to Clairaut's equations - Problems	**08 Hours** **L3**
Module 4 Multiple Integrals: Evaluation of double and triple integrals, evaluation of double integrals by change of order of integration, changing into polar coordinates. Problems. Beta and Gamma functions: Definitions, properties, relation between Beta and Gamma functions. Problems.	**08 Hours** **L3**
Module 5 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 approximate solution by Gauss-Seidel method. Eigenvalues and Eigenvectors.	**08 Hours** **L3**

Text books:

1. Higher Engineering Mathematics, B.S. Grewal, Khanna Publishers, 44th Edition, 2017.
2. B.V. Ramana, Higher Engineering Mathematics, Tata McGraw-Hill, 2006

References:

1. E. Kreyszig , Advanced Engineering Mathematics, John Wiley & Sons 10th Edition, 2016
2. N.P.Bali and Manish Goyal, A Textbook of Engineering Mathematics, Laxmi Publications 6th Edition, 2014
3. Higher Engineering Mathematics, H.K. Dass and Er. Rajnish Verma, S. Chand publishing, 1st edition, 2011.

Lab Experiments:

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

Course Outcomes

Upon completion of this course, student will be able to:

CO 1	• Solve problems on Polar curves and radius of curvature
CO 2	• Expand functions using Taylor's and Maclaurin's Series • Apply L' Hospital rule to solve indeterminate forms • Solve problems using partial derivatives
CO 3	• Solve linear differential equations of first order and first degree • Solve non-linear differential equations
CO 4	• Evaluate double integrals using direct integration, by changing the order of integration and by changing the variables • Evaluate triple integrals by iterating the integration with respect to each variable • Evaluate integrals using Beta and Gamma functions
CO 5	• Solve system of linear equations • Evaluate Eigen values and Eigen vectors of a given matrix

Scheme of Examination:

Semester End Examination (SEE):

SEE Question paper is to be set for 100 marks and the marks scored will be proportionately reduced to 50. There will be two full questions (with a maximum of three sub questions) from each module carrying 20 marks each. Students are required to answer any **five full questions** choosing at least **one full question from each module.**

Continuous Internal Evaluation (CIE):

Component		Marks	Total Marks
CIE	CIE Test-1	**30**	**(Average of 3 CIE + Lab)**

	CIE Test-2	30	50
	CIE Test-3	30	
	Lab Record + CIE	20	
SEE	Semester End Examination	100	50
Grand Total			100

CO/PO Mapping				
CO/PO	PO1	PO2	PO3	PO12
CO 1	3	2	1	3
CO 2	3	2	1	3
CO 3	3	2	1	3
CO 4	3	2	1	3
CO 5	3	2	1	3
Average	3	2	1	3

Low-1: Medium-2: **High-3**

Semester II

Course: Mathematics-II for EEE Stream (Integrated)

Course Code	BMATE24201	CIE Marks	50
Hours/Week (L: T: P)	2:2:2	SEE Marks	50
No. of Credits	4	Examination Hours	03

Course Objectives

To enable students to apply the knowledge of Mathematics in various fields of engineering by making them to learn the following:

CLO1	Vector Calculus
CLO2	Higher order Linear Differential Equations
CLO3	Vector Space
CLO4	Numerical methods

Content	No. of Hours/ RBT levels
Module 1 Vector Differentiation: Scalar and vector fields. Gradient, directional derivative, curl and divergence - physical interpretation, solenoidal and irrotational vector fields. Problems. Vector Integration: Line integrals, Surface integrals. Statement of Green's theorem and Stoke's theorem. Problems.	08 Hours L3
Module 2 Higher-order linear ODEs with constant coefficients - Inverse differential operator, problems. Linear differential equations with variable Coefficients- Cauchy's and Legendre's differential equations – Problems, Application of linear differential equations to L-C-R circuit.	08 Hours L3
Module 3 Vector spaces: Definition and examples, subspace, linear span, Linearly independent and dependent sets, Basis and dimension. Linear transformations: Definition and examples, Algebra of transformations, Matrix of a linear transformation. Change of coordinates, Rank and nullity of a linear operator, Rank-Nullity theorem. Inner product spaces and orthogonality.	08 Hours L3
Module 4 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.	08 Hours L3
Module 5 Numerical solution of ordinary differential equations of first order and first degree - Taylor's series method, Modified Euler's method, Runge-Kutta method	08 Hours L3

of fourth order and Milne's predictor-corrector formula (No derivations of formulae). Problems	

Text books:

1. Higher Engineering Mathematics, B.S. Grewal, Khanna Publishers, 44th Edition, 2017.
2. B.V. Ramana, Higher Engineering Mathematics, Tata McGraw-Hill, 2006

References:

1. E. Kreyszig , Advanced Engineering Mathematics, John Wiley & Sons 10th Edition, 2016
2. N.P.Bali and Manish Goyal, A Textbook of Engineering Mathematics, Laxmi Publications 6th Edition, 2014
3. Higher Engineering Mathematics, H.K. Dass and Er. Rajnish Verma, S. Chand publishing, 1st edition, 2011.

Lab Experiments:

1	Finding gradient, divergent, curl and their geometrical interpretation and Verification of Green's theorem
2	Computation of basis and dimension for a vector space and Graphical representation of linear transformation
3	Visualization in time and frequency domain of standard functions
4	Solutions of Second-order ordinary differential equations with initial/boundary conditions
5	Solution of a differential equation of LC and LCR Circuits
6	Solution of algebraic and transcendental equations by Regula-Falsi and Newton-Raphson method
7	Interpolation/Extrapolation using Newton's forward and backward difference formula
8	Computation of area under the curve using Trapezoidal, Simpson's (1/3)rd and (3/8)th rule
9	Solution of ODE of first order and first degree by Taylor's series and Modified Euler's method
10	Solution of ODE of first order and first degree by Runge-Kutta 4th order and Milne's predictor-corrector method

Course Outcomes

Upon completion of this course, student will be able to:

CO2	• Understand the concept of the gradient of a scalar field and its geometric interpretation • Compute the directional derivative of a scalar field, divergence and curl of a vector field. • Solve surface integrals using Green's and Stoke's theorem.
CO2	• Solve higher order linear differential equations • Solve problems on LCR circuits
CO3	• Determine if a set of vectors forms a subspace of a given vector space • Determine if a set of vectors is linearly independent and Construct bases for vector spaces and subspaces. • Represent vectors in different coordinate systems and understand the change of basis. • Compute inner products, norms, and distances between vectors in an inner product space.
CO4	• Solve algebraic and transcendental equations • Apply numerical techniques for interpolation of data • Evaluate definite integrals using numerical techniques
CO5	• Solve ordinary differential equations of first order using numerical techniques.

Scheme of Examination:

Semester End Examination (SEE):

SEE Question paper is to be set for 100 marks and the marks scored will be proportionately reduced to 50. There will be two full questions (with a maximum of three sub questions) from each module

carrying 20 marks each. Students are required to answer any **five full questions** choosing at least **one full question from each module.**

Continuous Internal Evaluation (CIE):

Component		Marks	Total Marks
CIE	CIE Test-1	**30**	**(Average of 3 CIE + Lab) 50**
	CIE Test-2	**30**	
	CIE Test-3	**30**	
	Lab Record + CIE	**20**	
SEE	Semester End Examination	**100**	**50**
Grand Total			**100**

CO/PO Mapping				
CO/PO	PO1	PO2	PO3	PO12
CO1	3	2	1	3
CO2	3	2	1	3
CO3	3	2	1	3
CO4	3	2	1	3
CO5	3	2	1	3
Average	3	2	1	3

Low-1: Medium-2: High-3

Semester I

Course: Mathematics-I for Civil Engineering Stream (Integrated)

Course Code	BMATC24101	CIE Marks	50
Hours/Week (L: T: P)	2:2:2	SEE Marks	50
No. of Credits	4	Examination Hours	03

Course Objectives

To enable students to apply the knowledge of Mathematics in various fields of engineering by making them to learn the following:

CLO1	Polar Curves and Partial Derivatives
CLO2	Linear and Nonlinear differential equations
CLO3	System of linear equations
CLO4	Eigen Values and Eigen Vectors

Content	No. of Hours/ RBT levels
Module 1 Polar coordinates, Polar curves, angle between the radius vector and the tangent, and angle between two curves. Pedal equations. Curvature and Radius of curvature – Cartesian and Polar forms. Problems.	08 Hours L3
Module 2 Taylor's and Maclaurin's series expansion for one variable (Statement only) – problems. Indeterminate forms - L'Hospital's rule, problems. Partial differentiation, differentiation of composite functions. Jacobian and problems. Maxima and minima for a function of two variables - Problems.	08 Hours L3
Module 3 Linear and Bernoulli's differential equations. Exact and reducible to exact differential equations - Integrating factors on $1/N\ (\partial M/\partial y - \partial N/\partial x)$ *and* $1/M\ (\partial N/\partial x - \partial M/\partial y)$. Orthogonal trajectories and Newton's law of cooling. Nonlinear differential equations: Introduction to general and singular solutions, Solvable for p only, Clairaut's equations, reducible to Clairaut's equations - Problems	08 Hours L3
Module 4 Higher-order linear ODEs with constant coefficients - Inverse differential operator, method of variation of parameters, Cauchy's and Legendre's homogeneous differential equations -Problems.	08 Hours L3
Module 5 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 approximate solution by Gauss-Seidel method. Eigenvalues and Eigenvectors.	08 Hours L3

Text books:

1. Higher Engineering Mathematics, B.S. Grewal, Khanna Publishers, 44th Edition, 2017.

2. B.V. Ramana, Higher Engineering Mathematics, Tata McGraw-Hill, 2006

References:

1. E. Kreyszig , Advanced Engineering Mathematics, John Wiley & Sons 10th Edition, 2016
2. N.P.Bali and Manish Goyal, A Textbook of Engineering Mathematics, Laxmi Publications 6th Edition, 2014
3. Higher Engineering Mathematics, H.K. Dass and Er. Rajnish Verma, S. Chand publishing, 1st edition, 2011.

Lab Experiments:

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

Course Outcomes

Upon completion of this course, student will be able to:

CO 1	• Solve problems on Polar curves and radius of curvature
CO 2	• Expand functions using Taylor's and Maclaurin's Series • Apply L' Hospital rule to solve indeterminate forms • Solve problems using partial derivatives
CO 3	• Solve linear differential equations of first order and first degree • Solve non-linear differential equations
CO 4	• Solve higher order differential equations
CO 5	• Solve system of linear equations • Evaluate Eigen values and Eigen vectors of a given matrix

Scheme of Examination:

Semester End Examination (SEE):

SEE Question paper is to be set for 100 marks and the marks scored will be proportionately reduced to 50. There will be two full questions (with a maximum of three sub questions) from each module carrying 20 marks each. Students are required to answer any **five full questions** choosing at least **one full question from each module.**

Continuous Internal Evaluation (CIE):

Component		Marks	Total Marks
CIE	CIE Test-1	**30**	**(Average of 3 CIE + Lab) 50**
	CIE Test-2	**30**	
	CIE Test-3	**30**	
	Lab Record + CIE	**20**	
SEE	Semester End Examination	**100**	**50**
Grand Total			**100**

CO/PO Mapping				
CO/PO	PO1	PO2	PO3	PO12
CO 1	3	2	1	3
CO 2	3	2	1	3
CO 3	3	2	1	3
CO 4	3	2	1	3
CO 5	3	2	1	3
Average	3	2	1	3

Low-1: Medium-2: High-3

Semester II

Course: Mathematics-II for Civil Engineering Stream (Integrated)

Course Code	BMATC24201	CIE Marks	50
Hours/Week (L: T: P)	2:2:2	SEE Marks	50
No. of Credits	4	Examination Hours	03

Course Objectives

To enable students to apply the knowledge of Mathematics in various fields of engineering by making them to learn the following:

CLO1	Multiple Integrals
CLO2	Vector Calculus
CLO3	Partial differential equations
CLO4	Numerical methods

Content	No. of Hours/ RBT levels
Module 1 Multiple Integrals: Evaluation of double and triple integrals, evaluation of double integrals by change of order of integration, changing into polar coordinates. Problems. Beta and Gamma functions: Definitions, properties, relation between Beta and Gamma functions. Problems.	08 Hours L3
Module 2 Vector Differentiation: Scalar and vector fields. Gradient, directional derivative, curl and divergence - physical interpretation, solenoidal and irrotational vector fields. Vector Integration: Line integrals, Surface integrals. Statement of Green's theorem and Stoke's theorem. Problems.	08 Hours L3
Module 3 Formation of PDE's by elimination of arbitrary constants and functions. Solution of nonhomogeneous PDE by direct integration. Homogeneous PDEs involving derivatives with respect to one independent variable only. Solution of Lagrange's linear PDE. Derivation of one-dimensional heat equation and wave equation.	08 Hours L3
Module 4 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.	08 Hours L3
Module 5 Numerical solution of ordinary differential equations of first order and first degree - Taylor's series method, Modified Euler's method, Runge-Kutta method	08 Hours L3

of fourth order and Milne's predictor-corrector formula (No derivations of formulae). Problems	

Text books:

1. Higher Engineering Mathematics, B.S. Grewal, Khanna Publishers, 44th Edition, 2017.
2. B.V. Ramana, Higher Engineering Mathematics, Tata McGraw-Hill, 2006

References:

1. E. Kreyszig , Advanced Engineering Mathematics, John Wiley & Sons 10th Edition, 2016
2. N.P.Bali and Manish Goyal, A Textbook of Engineering Mathematics, Laxmi Publications 6th Edition, 2014
3. Higher Engineering Mathematics, H.K. Dass and Er. Rajnish Verma, S. Chand publishing, 1st edition, 2011.

Lab Experiments:

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

Course Outcomes

Upon completion of this course, student will be able to:

CO1	• Evaluate double integrals using direct integration, by changing the order of integration and by changing the variables • Evaluate triple integrals by iterating the integration with respect to each variable • Evaluate integrals using Beta and Gamma functions
CO2	• Understand the concept of the gradient of a scalar field and its geometric interpretation • Compute the directional derivative of a scalar field, divergence and curl of a vector field. • Solve surface integrals using Green's and Stoke's theorem.
CO3	• Understand how PDEs arise from modelling physical phenomena involving multiple independent variables • Recognize when a PDE can be solved by direct integration and Apply the method of direct integration to solve first-order linear PDEs • Solve linear first-order PDEs using Lagrange method • Solve homogeneous linear equations with constant coefficients • Derive one dimensional heat and wave equations.
CO4	• Solve algebraic and transcendental equations • Apply numerical techniques for interpolation of data • Evaluate definite integrals using numerical techniques
CO5	• Solve ordinary differential equations of first order using numerical techniques.

Scheme of Examination:

Semester End Examination (SEE):

SEE Question paper is to be set for 100 marks and the marks scored will be proportionately reduced to 50. There will be two full questions (with a maximum of three sub questions) from each module carrying 20 marks each. Students are required to answer any **five full questions** choosing at least **one full question from each module.**

Continuous Internal Evaluation (CIE):

Component		Marks	Total Marks
CIE	CIE Test-1	**30**	**(Average of 3 CIE + Lab) 50**
	CIE Test-2	**30**	
	CIE Test-3	**30**	
	Lab Record + CIE	**20**	
SEE	Semester End Examination	**100**	**50**
Grand Total			**100**

CO/PO Mapping				
CO/PO	PO1	PO2	PO3	PO12
CO1	3	2	1	3
CO2	3	2	1	3
CO3	3	2	1	3
CO4	3	2	1	3
CO5	3	2	1	3
Average	3	2	1	3

Low-1: Medium-2: High-3

Semester-I/II

APPLIED PHYSICS FOR CIVIL ENGINEERING STREAM (INTEGRATED)

Course Code	BPHYC24102/202	CIE Marks	50
Hours/Week (L: T: P)	2:2:2	SEE Marks	50
No. of Credits	4	Examination Hours	03

Course Objectives: The course will enable the students to

1	Learn the basic concepts in Physics which are very much essential in understanding and solving Engineering related challenges.
2	Make the students gain practical knowledge to correlate with the theoretical studies.
3	Achieve perfectness in experimental skills and ability to develop and fabricate engineering and technical equipment.

Content		No. of Hours/ RBT levels
Module 1 **LASERs & Optical fibers** **LASERs**: Interaction of radiation with matter, Energy density with Einstein's coefficients, Requisites and condition for lasing action, He-Ne LASER, application of lasers in measurement of pollutants in the atmosphere, road profiling, distance measurement, numerical problems. **Optical fibers**: Total internal reflection, angle of acceptance and numerical aperture (NA). Modes of propagation, V number and types of optical fibers. Attenuation mechanisms, attenuation coefficient, applications, merits and de-merits, numerical problems.		8 hrs/L3
Pedagogy	Chalk & Talk, multimedia presentation	
Module 2 **Rigid bodies and Elasticity** **Rigid bodies:** Moment of inertia, centre of mass, radius of gyration, moment of inertia of a rectangular lamina, thin circular disc. **Elasticity**: Concept of stress, strain, stress-strain curve, moduli of elasticity, Relation between Y, n & σ. Types of beams, applications of beams, bending moment (no derivation), expression for Young's modulus using single cantilever, torsional oscillations, applications, numerical problems.		8hrs/L3
Pedagogy	Chalk & Talk, multimedia presentation	

Module 3 **Oscillations and shock waves** **Oscillations** Free oscillation: Introduction, SHM, differential equation of SHM, expression for force constant in series & parallel combination of springs, numerical problems Damped oscillation: Theory of damped oscillations (no derivation) with examples, types of damping (graphical approach), numerical problems. Forced oscillation: Theory of forced oscillations(derivation) and resonance, numerical problems. **Shock waves** Mach number and Mach angle, characteristics of shock waves, construction and working of Reddy shock tube, applications of shock waves, numerical problems.		8hrs/L3
Pedagogy	Chalk & Talk, multimedia presentation	
Module 4 **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 acoustics & remedial measures. Noise & its measurements, impact of noise in multistoried buildings. **Natural hazards & safety:** Introduction, earthquake (general characteristics, physics of earthquake, Ritcher scale of measurement & earthquake resistant measures), Tsunami (causes for Tsunami, characteristics, adverse effects, risk, reduction measures, engineering structures to withstand Tsunami).		8hrs/L3
Pedagogy	Chalk & Talk, multimedia presentation	
Module 5 **Physics of Nanoscience & Material characterization** Physics of Nanoscience: Introduction, Top-down approach, Bottom-up approach, Density of states 3D, 2D, 1D & 0D. Synthesis: Ball milling, arc discharge method, applications. **Material characterization**: Principle, construction, working of Scanning Tunneling Microscope (STM), Scanning Electron Microscope (SEM), X-ray Diffractometer (XRD), applications.		8 hrs/L2
Pedagogy	Chalk & Talk, multimedia presentation	

SL. No.	Experiments	No. of Hours/ RBT levels
1	Spring constants in series and parallel combination	2 /L3
2	Moment of inertia of irregular body using torsional pendulum	2/L3
3	Acceptance angle and numerical aperture of an optical fiber	2/L3
4	Rigidity modulus using torsional pendulum	2/ L2
5	Wavelength of LASER using diffraction grating	2/ L2
6	Young's modulus using single cantilever	2/L2
7	Young's modulus using uniform bending	2/ L2
8	Photo diode characteristics	2/ L3
9	Frequency response in series LCR circuit	2/ L3
10	Frequency response in parallel LCR circuit	2/ L2

Course Outcomes: The students will be able to:

CO1	Apply the concepts of LASERs, optical fibers and elasticity in various applications.
CO2	Interpret the concepts of oscillations in acoustics and natural hazards.
CO3	Illustrate the steps involved in the synthesis and characterization of materials.

CO-PO MAPPING

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
BPHYC24102/202	3						1					

Textbooks:

1. Avadhanulu M N, Kshirasagar P G & Arun Murthy TVS, A text book of Engineering Physics, 11th edition, S Chand Ltd, New Delhi (2018).
2. Basavaraju S P, A detailed textbook of Engineering Physics, Subhas Publishers (2018).
3. Gaur & Gupta, Engineering Physics, Dhanpath Rai publications (2017)
4. Building Science: Lighting and Acoustics, B. P. Singh and Devaraj Singh, Dhanpat Rai Publications (P) Ltd. (2016)
5. Natural Hazards, Edward Bryant, Cambridge University, Press, 2nd Edition (2005)

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Reference books:

1. Arthur Beiser, Shobhit Mahajan, Rai Choudhury S, Concepts of Modern Physics (SIE) | 7th Edition Paperback Tata Mc Graw Hill Edu Pvt. Ltd, New Delhi (2017).
2. Pillai S O, Solid State Physics, Multicolour Ed, New Age International publishers (2020).
3. Laud B B, Lasers & non-linear optics, 3rd Ed., New Age International publishers (2011).
4. Applied Physics lab manual – Department of Physics, Global Academy of Technology
5. Shock waves made simple by Chintoo S Kumar, K Takayama and K P J Reddy: Willey India Pvt. Ltd, Delhi 2014

Web links and Video Lectures (e-Resources):

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

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

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

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

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

Fracture in materials: https://www.youtube.com/watch?v=x47nky4MbK8

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

Earthquakes: www.asc-india.org

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

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

Material characterization: https://onlinecourses.nptel.ac.in/noc20_mm14/preview

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Semester-I/II

APPLIED PHYSICS FOR MECHANICAL ENGINEERING STREAM (INTEGRATED)

Course Code	BPHYM24102/202	CIE Marks	50
Hours/Week (L: T: P)	2:2:2	SEE Marks	50
No. of Credits	4	Examination Hours	03

Course Objectives: The course will enable the students to

1	Learn the basic concepts in Physics which are very much essential in understanding and solving Engineering related challenges.
2	Make the students gain practical knowledge to correlate with the theoretical studies.
3	Achieve perfectness in experimental skills and ability to develop and fabricate engineering and technical equipment.

Content	No. of Hours/ RBT levels
Module 1 **LASERs & Optical fibers** **LASERs**: Interaction of radiation with matter, Energy density with Einstein's coefficients, Requisites and condition for lasing action, He-Ne LASER, application of lasers in measurement of pollutants in the atmosphere, LASER welding, drilling, cutting, numerical problems. **Optical fibers**: Total internal reflection, angle of acceptance and numerical aperture (NA). Modes of propagation, V number and types of optical fibers. Attenuation mechanisms, attenuation coefficient, applications, merits and de-merits, numerical problems.	8 hrs/L3
Pedagogy: Chalk & Talk, multimedia presentation	
Module 2 **Oscillations and shock waves** **Oscillations** Free oscillation: Introduction, SHM, differential equation of SHM, expression for force constant in series & parallel combination of springs, numerical problems Damped oscillation: Theory of damped oscillations (no derivation) with examples, types of damping, numerical problems.	8hrs/L3

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Forced oscillation: Theory of forced oscillations(derivation) and resonance, numerical problems. **Shock waves** Mach number and Mach angle, characteristics of shock waves, construction and working of Reddy shock tube, applications of shock waves, numerical problems.		
Pedagogy	Chalk & Talk, multimedia presentation	
Module 3 **Thermo electric materials**: Thermo emf & thermo current, Seebeck effect, Peltier effect, Seebeck & Peltier coefficients, laws of thermoelectricity, variation of thermos emf with temperature, expression for thermo emf in terms of T_1 and T_2(no derivation), thermo couples and thermopile. Applications: Exhaust of automobiles, numerical problems. **Modern engineering materials:** Types, properties, applications of metallic glasses. Shape Memory Alloys – two phases, advantages & disadvantages, applications. Biomaterials – types & applications.		8hrs/L3
Pedagogy	Chalk & Talk, multimedia presentation	
Module 4 **Cryogenics:** Modes of heat transfer, Production of low temperature – Joule Thomson effect (Derivation with 3 cases), Porous plug experiment with theory, thermodynamical analysis of Joule Thomson effect, Liquefication of oxygen by cascade process, Lindey's air liquefier, liquefication of Helium and its properties, application of cryogenics in aerospace, tribology and food processing(qualitative), numerical problems.		8hrs/L3
Pedagogy	Chalk & Talk, multimedia presentation	
Module 5 **Physics of Nanoscience & Material characterization** **Physics of Nanoscience**: Introduction, Top-down approach, Bottom-up approach, Density of states 3D, 2D, 1D & 0D. Synthesis: Ball milling, arc discharge method, applications. **Material characterization**: Principle, construction, working of Scanning Tunneling Microscope (STM), Scanning Electron Microscope (SEM), X-ray Diffractometer (XRD), applications.		8 hrs/L2
Pedagogy	Chalk & Talk, multimedia presentation	

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SL. No.	Experiments	No. of Hours/ RBT levels
1	Spring constants in series and parallel combination	2 /L3
2	Moment of inertia of irregular body using torsional pendulum	2/L3
3	Acceptance angle and numerical aperture of an optical fiber	2/L3
4	Rigidity modulus using torsional pendulum	2/ L2
5	Wavelength of LASER using diffraction grating	2/ L2
6	Young's modulus using single cantilever	2/L2
7	Young's modulus using uniform bending	2/ L2
8	Determination of See beck coefficient	2/ L3
9	Determination of Peltier coefficient	2/ L3
10	Photo diode characteristics	2/ L2

Course Outcomes: The students will be able to:

CO1	Apply the concepts of LASERs, optical fibers and thermoelectricity in various applications.
CO2	Interpret the concepts with applications of oscillations and cryogenics.
CO3	Illustrate the steps involved in the synthesis and characterization of materials.

CO-PO MAPPING

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
BPHYM24102/202	3						1					

Textbooks:

1. Avadhanulu M N, Kshirasagar P G & Arun Murthy TVS, A text book of Engineering Physics, 11th edition, S Chand Ltd, New Delhi (2018).
2. Basavaraju S P, A detailed textbook of Engineering Physics, Subhas Publishers (2018).
3. Gaur & Gupta, Engineering Physics, Dhanpath Rai publications (2017)
4. Physics of cryogenics – Bahman Zohuri, Elsevier, 2018
5. Nanoscience and nanotechnology – Fundamentals of Frontiers, M S Ramachandra Rao and Shubra singh, Wiley India Pvt Ltd.

Reference books:

1. Arthur Beiser, Shobhit Mahajan, Rai Choudhury S, Concepts of Modern Physics (SIE) | 7th Edition Paperback Tata Mc Graw Hill Edu Pvt. Ltd, New Delhi (2017).
2. Pillai S O, Solid State Physics, Multicolour Ed, New Age International publishers (2020).
3. Laud B B, Lasers & non-linear optics, 3rd Ed., New Age International publishers (2011).
4. Shock waves made simple by Chintoo S Kumar, K Takayama and K P J Reddy: Willey India Pvt. Ltd, Delhi 2014.
5. Heat thermodynamics and statistical Physics, Brij Lal and Subramanyam, S Chand & company Limited, revised edition 2018.
6. Applied Physics lab manual – Department of Physics, Global Academy of Technology.

Web links and Video Lectures (e-Resources):

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

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

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

Thermoelectricity: https://www.youtube.com/watch?v=2w7NBuu5w9c

Thermoelectric generator and coolers: https://www.youtube.com/watch?v=NruYdb31xk8

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

Cryogenics: https://cevgroup.org/cryogenics-basics-applications

Liquefaction of gases: https://www.youtube.com/watch?v=aMelwOsGpIs

Material characterization: https://onlinecourses.nptel.ac.in/noc20_mm14/preview

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Semester-I/II

APPLIED PHYSICS FOR CSE STREAM (INTEGRATED)

Course Code	BPHYS24102/202	CIE Marks	50
Hours/Week (L: T: P)	2:2:2	SEE Marks	50
No. of Credits	4	Examination Hours	03

Course Objectives: The course will enable the students to

1	Learn the basic concepts in Physics which are very much essential in understanding and solving Engineering related challenges.
2	Make the students gain practical knowledge to correlate with the theoretical studies.
3	Achieve perfectness in experimental skills and ability to develop and fabricate engineering and technical equipment.

Content		No. of Hours/ RBT levels
Module 1 **LASERs & Optical fibers** **LASERs**: Interaction of radiation with matter, Energy density with Einstein's coefficients, Requisites and condition for lasing action, semiconductor LASER, application of lasers in measurement of pollutants in the atmosphere, bar code, numerical problems. **Optical fibers**: Total internal reflection, angle of acceptance and numerical aperture (NA). Modes of propagation, V number and types of optical fibers. Attenuation mechanisms, attenuation coefficient, applications, merits and de-merits, numerical problems.		8 hrs/L3
Pedagogy	Chalk & Talk, multimedia presentation	
Module 2 **Quantum mechanics** Wave-particle dualism, de Broglie hypothesis, de Broglie wavelength of an accelerated electron, Heisenberg's uncertainty principle, application of HUP (Non-existence of electrons inside the nucleus), significance and properties of wave function, Schrodinger's time independent wave equation, eigen functions & eigen values for a particle in one dimensional potential well of infinite height, numerical problems.		8hrs/L3
Pedagogy	Chalk & Talk, multimedia presentation	

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Module 3 **Introduction to quantum computing** Distinction between classical and quantum computing. Young's double slit experiment. Need for quantum computers. Moore's law & its end. Concept of qubit and its properties. Representation of qubit by Bloch sphere. Single and two qubits. Extension to N qubits. Dirac representation and matrix operations: Matrix representation of 0 & 1 states, Pauli matrices and their operations on |0> and |1> states. Conjugate and transpose of a matrix. Probability, quantum superposition, normalization rule. Orthogonality, orthonormality. Numerical problems **Single qubit gates**: Quantum NOT gate, Pauli – X, Y & Z gates, Hadamard gate, T gate, S gate		8 hrs/L3
Pedagogy	Chalk & Talk, multimedia presentation	
Module 4 **Multiple Qubit gates, superconductivity** **Multiple qubit gates:** CNOT, Swap gate, Toffoli gate, Fredkin gate, controlled Z-gate (C Phase gate) **Superconductivity:** Introduction, Temperature dependence of resistivity, Meissner's effect, critical field, Temperature dependence of critical field. BCS theory, Types of superconductors, DC & RF SQUIDs(qualitative), Maglev vehicles, application in quantum computing: charge, flux qubits, numerical problems		8 hrs/L3
Pedagogy	Chalk & Talk, multimedia presentation	
Module 5 **Semiconductors & devices:** Fermi level in intrinsic & extrinsic semiconductors, expression for conductivity. Hall effect, expression for Hall coefficient, and its applications. Photodiode and power responsivity, four probe method to determine resistivity, phototransistor, photoelectric sensor, Charge coupled (CCD) sensors and detectors, Thermal-based optical sensors, Passive IR sensors, numerical problems.		8 hrs/L2
Pedagogy	Chalk & Talk, multimedia presentation	

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SL. No.	Experiments	No. of Hours/ RBT levels
1	Verification of Stefan's law	2 /L3
2	Wavelength of light emitted by LEDs	2/L3
3	Frequency response in series and parallel LCR circuits	2/L3
4	Energy gap of a semiconductor	2 / L2
5	Acceptance angle and numerical aperture of an optical fiber	2 / L2
6	Transistor characteristics of a npn transistor	2/L2
7	Fermi energy of a conductor	2 / L2
8	Dielectric constant of a dielectric material	2 / L3
9	Photo diode characteristics	2 / L3
10	Wavelength of LASER using diffraction grating	2 / L2

Course Outcomes: The students will be able to:

CO1	Apply the concepts of LASERs and optical fibers and, their applications.
CO2	Interpret the concepts of quantum mechanics & utilize in quantum computing and superconductivity.
CO3	Illustrate the steps involved in the working of semiconducting devices.

CO-PO MAPPING

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
BPHYS24102/202	3						1					

Textbooks:

1. A text book of Engineering Physics, Avadhanulu M N, Kshirasagar P G & Arun Murthy TVS, 11th edition, S Chand Ltd, New Delhi (2018).
2. A detailed textbook of Engineering Physics, Basavaraju S P, Subhas Publishers (2018).
3. Gaur & Gupta, Engineering Physics, Dhanpath Rai publications (2017)
4. Quantum Computation and Quantum Information, Michael A. Nielsen & Isaac L. Chuang, Cambridge Universities Press (2010).
5. Quantum Computing for Everyone, Chris Bernhardt, The MIT Press Cambridge, Massachusetts London, England (2019).
6. Sensors, actuators and their interfaces: A multidisciplinary introduction (1st Edition), Nathan Ida, Scitech (2013).

Reference books:

1. Arthur Beiser, Shobhit Mahajan, Rai Choudhury S, Concepts of Modern Physics (SIE) | 7th Edition Paperback Tata Mc Graw Hill Edu Pvt. Ltd, New Delhi (2017).
2. Pillai S O, Solid State Physics, Multicolour Ed, New Age International publishers (2020).
3. David Griffiths, Introduction to Electrodynamics, 4th Ed. Cambridge Univ. Press (2017).
4. Laud B B, Lasers & non-linear optics, 3rd Ed., New Age International publishers (2011).
5. Quantum computing "A gentle introduction" – Rieffel MIT press
6. Quantum Computing – A Beginner's Introduction, Parag K Lala, Indian Edition, Mc Graw Hill (2020).
7. Applied Physics lab manual – Department of Physics, Global Academy of Technology

Web links and Video Lectures (e-Resources):

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

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

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

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

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

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

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

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

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

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

Semester-I/II

APPLIED PHYSICS FOR EEE STREAM (INTEGRATED)

Course Code	BPHYE24102/202	CIE Marks	50
Hours/Week (L: T: P)	2:2:2	SEE Marks	50
No. of Credits	4	Examination Hours	03

Course Objectives: The course will enable the students to

1	Learn the basic concepts in Physics which are very much essential in understanding and solving Engineering related challenges.
2	Make the students gain practical knowledge to correlate with the theoretical studies.
3	Achieve perfectness in experimental skills and ability to develop and fabricate engineering and technical equipment.

Content		No. of Hours/ RBT levels
Module 1 **LASERs & Optical fibers** **LASERs**: Interaction of radiation with matter, Energy density with Einstein's coefficients, Requisites and condition for lasing action, semiconductor LASER, application of lasers in measurement of pollutants in the atmosphere, bar code, numerical problems. **Optical fibers**: Total internal reflection, angle of acceptance and numerical aperture (NA). Modes of propagation, V number and types of optical fibers. Attenuation mechanisms, attenuation coefficient, applications, merits and de-merits, numerical problems.		8 hrs/L3
Pedagogy	Chalk & Talk, multimedia presentation	
Module 2 **Quantum mechanics** Wave-particle dualism, de Broglie hypothesis, de Broglie wavelength of an accelerated electron, Heisenberg's uncertainty principle, application of HUP (Non-existence of electrons inside the nucleus), significance and properties of wave function, Schrodinger's time independent wave equation, eigen functions & eigen values for a particle in one dimensional potential well of infinite height, numerical problems.		8hrs/L3
Pedagogy	Chalk & Talk, multimedia presentation	

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Module 3 **Electrical properties of materials** **Quantum free electron theory**: Assumptions of quantum free electron theory, Density of states(qualitative), expression for Fermi energy, Fermi factor & its temperature dependence, success of quantum free electron theory, numerical problems. **Superconductivity:** Introduction, Temperature dependence of resistivity, Meissner's effect, critical field, Temperature dependence of critical field. Types of superconductors, SQUIDs, Maglev vehicles.		8 hrs/L3
Pedagogy	Chalk & Talk, multimedia presentation	
Module 4 **Semiconductors & Dielectric materials:** **Semiconductors:** Fermi level in intrinsic & extrinsic semiconductors, expression for conductivity. Hall effect, expression for Hall coefficient, and its applications. LED, Photodiode, numerical problems. **Dielectric materials:** Polar and non-polar dielectrics, types of polarization, expression for internal field in solids & liquids, dielectric constant of a dielectric material, applications, numerical problems.		8 hrs/L3
Pedagogy	Chalk & Talk, multimedia presentation	
Module 5 **Maxwell's equations and EM waves** **Maxwell's equations** Fundamentals of vector calculus, Gauss divergence theorem, Stokes' theorem, Ampere's law, Biot-Savart's law and Faraday's laws of electromagnetic induction. Maxwell-Ampere's law, Maxwell's equations in differential form and in vacuum. Numerical problems. **EM waves** Wave equation in differential form in free space, plane electromagnetic waves in vacuum, their transverse nature.		8 hrs/L2
Pedagogy	Chalk & Talk, multimedia presentation	

SL. No.	Experiments	No. of Hours/ RBT levels
1	Magnetic field along the axis of the coil	2 /L3
2	Wavelength of light emitted by LEDs	2/L3
3	Frequency response in series and parallel LCR circuits	2/L3
4	Energy gap of a semiconductor	2 / L2
5	Acceptance angle and numerical aperture of an optical fiber	2 / L2
6	Transistor characteristics of a npn transistor	2/L2
7	Fermi energy of a conductor	2 / L2
8	Dielectric constant of a dielectric material	2 / L3
9	Photo diode characteristics	2 / L3
10	Wavelength of LASER using diffraction grating	2 / L2

Course Outcomes: The students will be able to:

CO1	Apply the concepts of LASERs and optical fibers and, their applications.
CO2	Interpret the concepts of quantum mechanics & utilize in electrical properties of materials.
CO3	Illustrate the relation between electric-magnetic fields, and transverse nature of electromagnetic waves.

CO-PO MAPPING

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
BPHYE24102/202	3						1					

Textbooks:

1. A text book of Engineering Physics, Avadhanulu M N, Kshirasagar P G & Arun Murthy TVS, 11th edition, S Chand Ltd, New Delhi (2018).
2. A detailed textbook of Engineering Physics, Basavaraju S P, Subhas Publishers (2018), (2014).
3. Gaur & Gupta, Engineering Physics, Dhanpath Rai publications (2017)

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Reference books:

1. Arthur Beiser, Shobhit Mahajan, Rai Choudhury S, Concepts of Modern Physics (SIE) | 7th Edition Paperback Tata Mc Graw Hill Edu Pvt. Ltd, New Delhi (2017).
2. Pillai S O, Solid State Physics, Multicolour Ed, New Age International publishers (2020).
3. David Griffiths, Introduction to Electrodynamics, 4th Ed. Cambridge Univ. Press (2017).
4. Laud B B, Lasers & non-linear optics, 3rd Ed., New Age International publishers (2011).
5. Applied Physics lab manual – Department of Physics, Global Academy of Technology

Web links and Video Lectures (e-Resources):

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

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

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

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

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

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

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

SEMESTER I/II

APPLIED CHEMISTRY FOR MECHANICAL ENGINEERING STREAM

(INTEGRATED)

Academic Year 2024-25

Course Code	BCHEM24102/202	CIE Marks	50
Hours/Week (L: T: P)	3:0:2	SEE Marks	50
No of Credits	04	Examination Hours	03

Course Learning Objectives: The course will enable the students to

CLO1	Know the fundamental concepts of Chemistry which are very much **essential in** day-to-day life, in industries and in research and development **to solve Engineering related challenges.**
CLO2	Advance knowledge and educate the students in the area of **Material Science** that will meet the **Mechanical Engineering** aspects.

Content	No. of Hours/ RBT levels
Module-1: Electrochemistry and electrochemical sensors **Electrochemistry:** Introduction, Electrode potential, EMF, expression of Nernst equation, numerical problems on Electrode potential Classification of cells - primary, secondary and concentration cells. Reference Electrodes – Calomel electrode, Ion selective electrodes-Glass electrode. Application of glass electrode in P^{H} determination. Numerical problems on concentration Cells. **Sensors** Definition, Electrochemical Sensors- Potentiometric sensors: Theory, Principle, instrumentation, working and their application in the estimation of iron. Conductometric sensors: Theory, Principle, instrumentation, working and its application (weak acid v/s strong base)	08 Hours/ L2
Pedagogy: Chalk and talk method, power point presentation, Videos. **Display of electrodes model in class.**	
Self-study: Construction & working of Zinc Air battery	
Module-2: Energy devices and Chemical & sustainable energy sources **Energy Devices**: Basic concepts, classification, Battery operation, and characteristics of battery (Voltage, Capacity & Shelf life). Construction, working and applications of Lithium-ion batteries and Sodium-ion battery. **Chemical Energy Sources**: Fuels - Introduction, Classification, Calorific value-GCV & NCV, Determination of Calorific value by Bomb Calorimeter, Numerical problems. Petroleum cracking-Fluidized bed cracking. Knocking- Mechanism of knocking in IC- petrol engine, Octane number and cetane number.	08 Hours/ L2

and its advantages, CNG & Biogas (properties and applications), Solar cells (PV cell): construction working, and applications of Si based PV cell.	
Pedagogy: Chalk and talk method, power point presentation.	
Self-study: Galvanic **series & Concept of biosensors**	
Module 3: Corrosion engineering and Materials for Engineering Applications **Corrosion**: Introduction, Electrochemical theory of corrosion. Types of corrosion- Differential metal corrosion (Galvanic corrosion), differential aeration corrosion (Pitting and water line corrosion) and stress corrosion, Corrosion control: Metal coating–Galvanization, Cathodic Protection-sacrificial anode method and impressed current method. **Structural Materials: Metals and Alloys:** Introduction, composition, Properties and application of stainless steel, solders and brass. **Refractories:** Introduction, classification, properties, Manufacturing, and application of refractory materials. **Glass:** Introduction, synthesis, properties and applications of Soda-lime glass.	08 Hours/ L2,L3
Pedagogy: Chalk and talk method, power point presentation. **Seminar by students on topic Environmental Chemistry.** .	
Self-study: Composition, properties & industrial applications of Alnico, Gun metal & bell metal.	
Module 4: Material Chemistry: Polymers and Nano materials **Polymer Chemistry:** Introduction, Synthesis, properties, and applications of PMMA and Polyurethane. Polymer composites -Kevlar Fibre and carbon fibre-Synthesis & applications. Conducting Polymers: Mechanism of conduction in conducting poly aniline. **Nanomaterials:** Introduction to nanomaterials, synthesis: top-down and bottom-up approaches. Synthesis of nano materials-solution combustion, hydrothermal methods, sol-gel method, CVD. Applications of nanomaterials, Characterization- SEM, XRD	08 Hours/ L2, L3
Pedagogy: Chalk and talk method, power point presentation. **Display of bomb calorimeter model in class**	
Self-study: Preparation & utilization of methanol blended diesel in automobile industry.	
Module 5: Environmental chemistry and Water technology **Environmental Chemistry:** Air Pollutants: Sources, effects and control of Primary air pollutants-Carbon monoxide, Oxides of nitrogen by using catalytic converter (construction, working and relevant reactions should be emphasized) and Sulphur by calsox process. E-waste management: Introduction, sources, effects of e-waste on environment and human health, methods of disposal (scientific land filling, composting, and recycling). Extraction of copper from e-waste. **Water technology:** Introduction, hardness of water (Definition), Determination of total hardness by EDTA method. Desalination (definition), Reverse osmosis (Definition, Process, Diagram, and explanation). Chemical oxygen Demand – definition, Determination of COD, numerical problems.	08 Hours/ L2, L3

Pedagogy: Chalk and talk method, power point presentation. Conduction of live experiments in laboratory.	
Self-study: Concept of Polymer nano composites & ceramic metal composites-	

PRACTICAL MODULE

SL. No.	Experiments	No. of Hours/ RBT levels
	Part-C: Demonstration (any Three) - Offline/ Virtual	
1	Estimation of strong acid using Conductometric sensors.	2/L3
2	Determination of calorific value of solid fuel using bomb calorimeter	2/L3
3	Synthesis of Biodiesel	2/L3
4	Synthesis of ZnO Nanomaterial by Sol-Gel/Solution combustion method	2/L3
5	Electroplating of copper on metallic objects.	2/L3

SL. No.	Experiments	No. of Hours/ RBT levels
	Part- A: Instrumental Experiments	
1	Determination of pKa of vinegar using pH sensor (Membrane electrode - Glass electrode)	2/L3
2	Potentiometric estimation of iron by electrochemical sensors.	2/L3
3	Determination of Viscosity coefficient of lubricating oil using viscometer.	2/L3
4	Estimation of Copper in the Electroplating effluent using optical sensors.	2/L3
	Part-B: Volumetric Experiments	
1	Determination of Chemical oxygen demand of industrial waste water.	2/L3
2	Determination of percentage of copper in brass by Iodometric method.	2/L3
3	Determination of Total hardness of given water sample by rapid EDTA method.	2/L3
4	Determination of percentage of Iron in TMT bar by external indicator method.	2/L3

Course Outcomes: Upon successful completion of this course, student will be able to:

CO1	**Understand** the concept of electrochemical energy systems, Corrosion and applications of Polymers in engineering filed.
CO2	**Investigate** chemical properties of materials and conventional & non-conventional energy systems for environmental issues.
CO3	**Analyze** the knowledge of sensors, Nano materials & concept of water for various technological applications.
CO4	**Apply** the knowledge of chemistry to investigate engineering materials by volumetric and instrumental methods

Textbooks:

1. Wiley Engineering Chemistry, Wiley India Pvt. Ltd. New Delhi,2013-2nd Edition.

2. Engineering Chemistry, Satya Prakash &Manisha Agrawal, Khanna Book Publishing, Delhi

3.A Textbook of Eng. Chemistry, Shashi Chawla, Dhanpat Rai &Co.(P)Ltd.

4.Essentials of Physical Chemistry, Bahl & Tuli, S. Chand Publishing.

5. Applied Chemistry, Sunita Rattan, Kataria 5. Engineering Chemistry, Baskar, Wiley

6. Engineering Chemistry-I,D. Grour Krishana, Vikas Publishing

7.A Textbook of Engineering Chemistry, SS Dara & Dr. SS Umare, S Chand &Company Ltd., 12th Edition, 2011.

8.A Textbook of Engineering Chemistry, R.V. Gadag and Nityananda Shetty, I.K. International Publishing house. 2nd Edition,2016.

9.Text Book of Polymer Science, F.W.Billmeyer, John Wiley & Sons, 4th Edition,1999.

10.Nanotechnology A Chemical Approach to Nanomaterials, G.A.Ozin & A.C.Arsenault,RSC Publishing,2 005.

11.Corrosion Engineering, M.G. Fontana,N.D. Greene, McGraw Hill Publications, NewYork,3rd Edition, 1996.

12. Linden's Handbook of Batteries, Kirby W. Beard, Fifth Edition, McGrawHill,2019.

13. OLED Display Fundamentals and Applications, Takatoshi Tsujimura, Wiley–Blackwell,2012 14. Supercapacitors: Materials, Systems, and Applications, MaxLu, Francois Beguin, Elzbieta Frackowiak, Wiley-VCH;1st edition,2013.

15."Handbook on Electroplating with Manufacture of Electrochemicals", ASIAPACIFICBUSINESSPRE SS Inc., 2017.

16. Dr. H. Panda. Expanding the Vision of Sensor Materials. National Research Council 1995, Washington, DC: The National Academies Press. doi:10.17226/4782.

17.Engineering Chemistry, Edited by Dr. Mahesh B and Dr.Roopashree B,Sunstar Publisher, Bengaluru, ISBN 978-93-85155-70-3, 2022.

18. High Performance Metallic Materials for Cost Sensitive Applications, F.H.Froes, et al. John Wiley & So ns, 2010.

19. Instrumental Methods of Analysis, Dr. K.R. Mahadik and Dr.L. Sathiya Narayanan, Nirali Prakashan,2020.

20.Polymer Science, VR Gowariker, NV Viswanathan, Jayadev, Sreedhar, NewageInt.Publishers,4th

Edition, 2021

22. Engineering Chemistry, PC Jain & Monica Jain, Dhanpat Rai Publication,2015-16th Edition.

23. Nanostructured materials and nanotechnology, Hari Singh, Nalwa, academic press, 1st Edition,2002.

24. Nanotechnology Principles and Practices, SulabhaK Kulkarni, Capital Publishing Company,3rd

Edition 2014.

25. Principles of nanotechnology, Phanikumar, Sci tech publications, 2nd Edition,2010.

26. Chemistry for Engineering Students, B.S. Jai Prakash, R. Venugopal, Sivakumaraiah & Pushpa Iyengar., Subash Publications, 5th Edition, 2014

27. "Engineering Chemistry", O.G. Palanna, Tata McGraw Hill Education Pvt. Ltd. New Delhi, Fourth Reprint, 2015.

28. Chemistry of Engineering materials, MaliniS, KS Anantha Raju, CBS publishers Pvt Ltd.,
29. Laboratory Manual Engg. Chemistry, Anupma Rajput, Dhanpat Ra I &Co.

Reference books:

1. F.W. Billmeyer, Text Book of Polymer Science, John Wiley & Sons, 4th Edition, 1999.
2. M.G. Fontana, N.D. Greene, Corrosion Engineering, McGraw Hill Publications, New York, 3rd Edition, 1996.
3. Principles of Physical Chemistry, B.R. Puri, L.R. Sharma & M.S. Pathania, S. Nagin Chand & Co., 41 Edition, 2004.
4. G.A. Ozin& A.C. Arsenault, "Nanotechnology A Chemical Approach to Nanomaterials". RSC Publishing, 2005.
5. Bansal R.K., A Text Book of Engineering Mechanics, Laxmi Publications; 6th edition, 2015.
6. G.H Jeffery, J Bassett, J Mendham and R.C. Denney Vogel's A.I. A text book of quantitative analysis, Dorling Kindersley (India) Pvt., Ltd. 35th edition, 2012.
7. Gary D Christian, Analytical Chemistry, Wiley India, 6th edition, 2015.
8. T. Pradeep, A Textbook of Nanoscience and Nanotechnology, McGraw Hill Education (India) Pvt., Ltd., 1st edition, 2015.

Weblinks and Video Lectures (e-Resources):

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

SEMESTER I/II

APPLIED CHEMISTRY FOR CIVIL ENGINEERING STREAM (INTEGRATED)

Academic Year 2024-25

Course Code	BCHEV24102/202	CIE Marks	50
Hours/Week (L: T: P)	3:0:2	SEE Marks	50
No of Credits	04	Examination Hours	03

Course Learning Objectives: The course will enable the students to

CLO1	Know the fundamental concepts of Chemistry which are very much **essential in** day-to-day life, in industries and in research and development **to solve Engineering related challenges.**
CLO2	Impart Practical skills to demonstrate the important role of **Advanced Chemistry** to the design, construction and operation of **Civil Engineering**.

Contents	No. of Hours/ RBT levels
Module-1: Electrochemistry and Sensors **Electrochemistry:** Introduction, Electrode potential, EMF, expression of Nernst equation, numerical problems on Electrode potential. Classification of cells - primary, secondary and concentration cells. Reference Electrodes – Calomel electrode, Ion selective electrodes- Glass electrode. Application of glass electrode in pH determination. Numerical problems on concentration Cells. **Sensors:** Definition, Electrochemical Sensors- Potentiometric sensors: Theory, Principle, instrumentation, working and their application in the estimation of iron. Conductometric sensors: Theory, Principle, instrumentation, working and its application (weak acid v/s strong base). and Optical Sensors - Colorimeter: Theory, Principle, instrumentation, working and its application in the estimation of Cu ions.	08 Hours/ L2
Pedagogy: Chalk and talk method, power point presentation, Videos. **Display of electrodes model in class.**	
Self-study: Construction and working of Ag-AgCl electrode.	
Module-2: Energy devices: Chemical and Sustainable energy sources **Energy Devices**: Basic concepts, classification, Battery operation, and characteristics of battery (Voltage, Capacity & Shelf life). Construction, working and applications of Lithium-ion batteries. Battery Recycling process. **Chemical Energy Sources**: Fuels - Introduction, Classification, Calorific value-GCV & NCV, Determination of Calorific value by Bomb Calorimeter, Numerical problems. Petroleum	08 Hours/ L2

cracking-Fluidized bed cracking. Knocking- Mechanism of knocking in IC- petrol engine, Octane number and cetane number. **Sustainable Energy sources**: Biodiesel -Production & applications of Biodiesel, Power alcohol-importance of ethanol blended gasoline, Production of H_2 by electrolysis of water and its advantages, CNG & Biogas (properties and applications), Solar cells (PV cell): construction working, and applications of Si based PV cell.	
Pedagogy: Chalk and talk method, power point presentation.	
Self-study: Construction & working of Zinc Air battery Preparation & utilization of methanol blended diesel in automobile industry.	
Module 3: Corrosion Science and Structural materials **Corrosion**: Introduction, Electrochemical theory of corrosion. Types of corrosion-Differential metal corrosion (Galvanic corrosion), differential aeration corrosion (Pitting and water line corrosion) and stress corrosion, Corrosion control: Metal coating–Galvanization, Cathodic Protection-sacrificial anode method and impressed current method. **Structural Materials:** Metals and Alloys- Introduction, composition, Properties and application of Iron and its alloys (stainless steel and cast iron), copper and its alloys (brass and bronze). **Refractories and Cement:** Introduction, classification, properties, Manufacturing, and application of refractory materials. Manufacturing of Portland cement by wet process and its applications. **Lubricants:** Introduction, Classifications, Properties- Flash point, Drop point test and industrial applications of lubricants.	08 Hours/ L2, L3
Pedagogy: Chalk and talk method, power point presentation. **Seminar by students on topic Environmental Chemistry.**	
Self-study: Corrosion resistance: Electroplating and electroless plating	

Module 4: Material Science: Polymer Chemistry and Nano materials **Polymer Chemistry:** Introduction, polymerization – Definition, Molecular weight (number and weight average), PDI-numerical problems. Synthesis, properties, and applications of PMMA and Polyurethane. Polymer composites -Kevlar Fibre and carbon fibre-Synthesis & applications. Conducting Polymers: Mechanism of conduction in conducting poly aniline. **Nanomaterials:** Introduction – Definition, size dependant properties (surface area and catalytic) and synthesis- top-down and bottom-up approach. synthesis of ZnO nano material by solution combustion method & synthesis of TiO_2 nano material by sol gel method. Introduction, properties and applications of graphene, carbon nanotubes, and fullerenes.	08 Hours/ L2, L3

Pedagogy: Chalk and talk method, power point presentation. **Display of bomb calorimeter model in class**	
Self-study: Concept of Polymer nano composites & ceramic metal composites	
Module 5: Environmental Chemistry and Water technology **Environmental Chemistry:** Air Pollutants: Types, Sources, effects and control of Primary air pollutants- Construction and working of Catalytic converter (CO & Oxides of nitrogen) and Calsox method (SO_2). **Waste Management:** characteristics and disposal of e-waste & Biomedical waste (scientific land filling, composting, and recycling). Recycling of water and Rainwater harvesting (Surface run-off and Roof top method). **Water technology:** Introduction, hardness of water (Definition), Determination of total hardness by EDTA method. Softening of water by ion exchange method, Desalination- Reverse osmosis (Definition, Process, Diagram, and explanation). Chemical oxygen Demand – definition, Determination of COD, numerical problems.	08 Hours/ L2, L3
Pedagogy: Chalk and talk method, power point presentation. **Conduction of live experiments in laboratory.**	
Self-study: Global warming, Greenhouse effect, and e-waste recycling	

PRACTICAL MODULE

SL. No.	Experiments	No. of Hours/ RBT levels
	Part-C: Demonstration (any Three) - Offline/ Virtual	
1	Determination of Organic impurities in sand.	2/L3
2	Determination of calorific value of solid fuel using bomb calorimeter.	2/L3
3	Determination of moisture content of a given soil sample.	2/L3
4	Determination of fineness of cement	2/L3
5	Determination of percentage of Iron in TMT bar by volumetric method.	2/L3

SL. No.	Experiments	No. of Hours/ RBT levels
	Part- A: Instrumental Experiments	
1	Determination of pKa of vinegar using pH sensor (Membrane electrode - Glass electrode)	2/L3
2	Potentiometric estimation of iron by electrochemical sensors.	2/L3
3	Estimation of strong acid using Conductometric sensors.	2/L3
4	Estimation of Copper in the Electroplating effluent using optical sensors.	2/L3
	Part-B: Volumetric Experiments	
1	Determination of Chemical oxygen demand of industrial wastewater.	2/L3
2	Determination of percentage of copper in brass by Iodometric method.	2/L3
3	Determination of Total hardness of given water sample by rapid EDTA method.	2/L3
4	Determination of percentage of Calcium Oxide in Cement solution.	2/L3

Course Outcomes: Upon successful completion of this course, student will be able to:

CO1	**Understand** the concept of electrochemical energy systems, Corrosion and applications of Polymers in engineering filed.
CO2	**Investigate** chemical properties of materials and conventional & non-conventional energy systems for environmental issues.
CO3	**Analyze** the knowledge of sensors, Nano materials & concept of water for various technological applications.
CO4	**Apply** the knowledge of chemistry to investigate engineering materials by volumetric and instrumental methods

Textbooks:

1. Wiley Engineering Chemistry, Wiley India Pvt. Ltd. New Delhi,2013-2nd Edition.

2. Engineering Chemistry, Satya Prakash &Manisha Agrawal, Khanna Book Publishing, Delhi

3.A Textbook of Eng. Chemistry, Shashi Chawla, Dhanpat Rai &Co.(P)Ltd.

4.Essentials of Physical Chemistry, Bahl & Tuli, S. Chand Publishing.

5. Applied Chemistry, Sunita Rattan, Kataria 5. Engineering Chemistry, Baskar, Wiley

6. Engineering Chemistry-I,D. Grour Krishana, Vikas Publishing

7.A Textbook of Engineering Chemistry, SS Dara & Dr. SS Umare, S Chand &Company Ltd., 12th Edition, 2011.

8.A Textbook of Engineering Chemistry, R.V. Gadag and Nityananda Shetty, I.K. International Publishing house. 2nd Edition,2016.

9.Text Book of Polymer Science, F.W.Billmeyer, John Wiley & Sons, 4th Edition,1999.

10.Nanotechnology A Chemical Approach to Nanomaterials, G.A.Ozin & A.C.Arsenault,RSC Publishing,2 005.

11.Corrosion Engineering, M.G. Fontana,N.D. Greene, McGraw Hill Publications, NewYork,3rd Edition, 1996.

12. Linden's Handbook of Batteries, Kirby W. Beard, Fifth Edition, McGrawHill,2019.

13. OLED Display Fundamentals and Applications, Takatoshi Tsujimura, Wiley–Blackwell,2012

14. Supercapacitors: Materials, Systems, and Applications, MaxLu, Francois Beguin, Elzbieta Frackowiak, Wiley-VCH;1st edition,2013.

15."Handbook on Electroplating with Manufacture of Electrochemicals", ASIAPACIFICBUSINESSPRE SS Inc., 2017.

16. Dr. H. Panda. Expanding the Vision of Sensor Materials. National Research Council 1995, Washington, DC: The National Academies Press. doi:10.17226/4782.

17.Engineering Chemistry, Edited by Dr. Mahesh B and Dr.Roopashree B,Sunstar Publisher, Bengaluru, ISBN 978-93-85155-70-3, 2022.

18. High Performance Metallic Materials for Cost Sensitive Applications, F.H.Froes, et al. John Wiley & So ns, 2010.

19. Instrumental Methods of Analysis, Dr. K.R. Mahadik and Dr.L. Sathiya Narayanan, Nirali Prakashan,2020.

20.Polymer Science, VR Gowariker, NV Viswanathan, Jayadev, Sreedhar, NewageInt.Publishers,4th Edition, 2021

22. Engineering Chemistry, PC Jain & Monica Jain, Dhanpat Rai Publication,2015-16th Edition.

23. Nanostructured materials and nanotechnology, Hari Singh, Nalwa, academic press, 1st Edition,2002.

24. Nanotechnology Principles and Practices, SulabhaK Kulkarni, Capital Publishing Company,3rd Edition 2014.

25. Principles of nanotechnology, Phanikumar, Sci tech publications, 2nd Edition,2010.

26. Chemistry for Engineering Students, B.S. Jai Prakash, R. Venugopal, Sivakumaraiah & Pushpa Iyengar., Subash Publications, 5th Edition, 2014

27. "Engineering Chemistry", O.G. Palanna, Tata McGraw Hill Education Pvt. Ltd. New Delhi, Fourth Reprint, 2015.

28. Chemistry of Engineering materials, MaliniS, KS Anantha Raju, CBS publishers Pvt Ltd., 29. Laboratory Manual Engg. Chemistry, Anupma Rajput, Dhanpat Ra I &Co.

Reference books:

1. F.W. Billmeyer, Text Book of Polymer Science, John Wiley & Sons, 4th Edition, 1999.
2. M.G. Fontana, N.D. Greene, Corrosion Engineering, McGraw Hill Publications, New York, 3rd Edition, 1996.
3. Principles of Physical Chemistry, B.R. Puri, L.R. Sharma & M.S. Pathania, S. Nagin Chand & Co., 41 Edition, 2004.
4. G.A. Ozin& A.C. Arsenault, "Nanotechnology A Chemical Approach to Nanomaterials". RSC Publishing, 2005.
5. Bansal R.K., A Text Book of Engineering Mechanics, Laxmi Publications; 6th edition, 2015.
6. G.H Jeffery, J Bassett, J Mendham and R.C. Denney Vogel's A.I. A text book of quantitative analysis, Dorling Kindersley (India) Pvt., Ltd. 35th edition, 2012.
7. Gary D Christian, Analytical Chemistry, Wiley India, 6th edition, 2015.

8. T. Pradeep, A Textbook of Nanoscience and Nanotechnology, McGraw Hill Education (India) Pvt., Ltd., 1st edition, 2015.

Weblinks and Video Lectures (e-Resources):

- http://libgen.rs/
- https://nptel.ac.in/downloads/122101001/
- https://nptel.ac.in/courses/104/103/104103019/
- https://ndl.iitkgp.ac.in/
- https://www.youtube.com/watch?v=faESCxAWR9k
- https://www.youtube.com/watch?v=j5HmI6KN4TI
- https://www.youtube.com/watch?v=X9GHBdyYcyo
- https://www.youtube.com/watch?v=1xWBPZnEJk8
- https://www.youtube.com/watch?v=wRAo-M8xBHM

SEMESTER I/II

APPLIED CHEMISTRY FOR EEE STREAM (INTEGRATED)

Course Code	BCHEE24102/202	CIE Marks	50
Hours/Week (L: T: P)	3:0:2	SEE Marks	50
No of Credits	04	Examination Hours	03

Course Learning Objectives: The course will enable the students to

CLO1	Know the fundamental concepts of Chemistry which are very much **essential in** day-to-day life, in industries and in research and development **to solve Engineering related challenges.**
CLO2	Understand the progression from **microscopic electrons to macroscopic materials** that form systems, devices and innovations in the **Electrical and Electronics industry.**

Contents	No. of Hours/ RBT levels
Module-1: Electrode system and Corrosion Chemistry **Electrochemistry:** Introduction, Electrode potential, EMF, expression of Nernst equation, numerical problems on Electrode potential. Ion selective electrode – definition, construction, working and applications of glass electrode. Determination of pH using glass electrode. Reference electrode - Introduction, calomel electrode – construction, working and applications of calomel electrode. Concentration cell– Definition, construction and Numerical problems **Corrosion Engineering:** Definition, Electrochemical theory of corrosion, Types of corrosion-differential metal, differential aeration corrosion, Factors affecting the rate of corrosion (Ratio of anode & cathode, Nature of corrosion product, pH & Temperature), Corrosion Control-Cathodic protection-sacrificial anode & Impressed current method.	08 Hours/ L2
Pedagogy: Chalk and talk method, power point presentation, Videos. **Display of electrodes model in class.**	
Self-study: Galvanic series, Tinning, Galvanising **Metal finishing**-introduction, technological importance, Electroplating, Electroless plating.	
Module-2: Renewable and Conventional Energy systems **Energy Devices**: Introduction, Basic concepts, battery Characteristics (Voltage, Capacity & Shelf life), Classification of Batteries-Primary, Secondary, and reserve batteries. Construction, working and applications of Sodium battery and Li-Ion battery (Lithium batteries). Battery Recycling process.	08 Hours/ L2

Sustainable Energy sources: Production of Biodiesel and its advantages, properties and applications of CNG and Biogas, Generation of energy (green hydrogen) by electrolysis of water and its advantages. **Solar cells (PV cell):** Conductors, Semiconductors and Insulators: Fundamental concepts, Band theory. Solar cells: construction working, and applications of Si based PV cell. Production of electronic grade silicon by Czochralski process, Refining- Zone refining process. **Super Capacitors**:- Introduction, types (pseudo and asymmetric capacitor), applications	
Pedagogy: Chalk and talk method, power point presentation.	
Self-study: Construction & working of Zinc Air battery, Regenerative fuel cells	
Module 3: Sensors and Display Systems **Electro chemical Sensors:** Definition, Electrochemical Sensors- Potentiometric sensors: Theory, Principle, instrumentation, working and their application in the estimation of iron. Conductometric sensors: Theory, Principle, instrumentation, working and its application (acid mixture Vs strong base) and Optical Sensors - Colorimeter: Theory, Principle, instrumentation, working and its application in the estimation of Cu ions. **Display Systems**: Liquid crystals (LC's) - Introduction, classification, difference between thermotropic and lyotropic LC, properties and application of Liquid Crystal Displays (LCD's), molecular ordering in nematic, smectic and columnar type liquid crystals Photoactive and electroactive materials (definition and applications), Construction, working and applications of-Light emitting electrochemical cells. Nanomaterials (QLED's) and organic materials (OLED's) used in optoelectronic devices.	08 Hours/ L2, L3
Pedagogy: Chalk and talk method, power point presentation.	
Self-study: Concept of biosensors, fabrication of sensors	
Module 4: Material Chemistry: Polymers and Nano materials **Polymer Chemistry:** Introduction, polymerization. Synthesis, properties, and applications of PMMA and Polyurethane. Polymer composites -Kevlar Fibre and carbon fibre-Synthesis & applications. Conducting Polymers: Mechanism of conduction in conducting poly aniline. **Nanomaterials:** Introduction to nanomaterials, synthesis: top-down and bottom-up approaches. Synthesis of nano materials-solution combustion, hydrothermal methods, sol-gel method, CVD. Applications of nanomaterials, electronic applications of nano materials-foldable electronics-properties and applications of graphene. Characterization- SEM, XRD	08 Hours/ L2, L3
Pedagogy: Chalk and talk method, power point presentation.	
Self-study: Concept of Polymer nano composites & ceramic metal composites	

Module 5: Environmental Chemistry and Water technology **Environmental Chemistry:** Air Pollutants: Sources, effects and control of Primary air pollutants-Carbon monoxide, Oxides of nitrogen and Sulphur. **Waste Management:** e-waste & Biomedical waste (scientific land filling, composting, and recycling), Chemical composition of e-waste, sources (precious metals from e-waste), types, effects of e-waste on environment and human health. Recycling and Recovery of precious metals from e-waste by-Hydrometallurgical extraction & Pyro metallurgical methods. **Water technology:** Introduction, hardness of water (Definition), Determination of total hardness by EDTA method. Softening of water by ion exchange method, Desalination - Reverse osmosis (Definition, Process, Diagram, and explanation). Chemical oxygen Demand – definition, Determination of COD, numerical problems.	08 Hours/ L2, L3
Pedagogy: Chalk and talk method, power point presentation **Seminar by students on topic Environmental Chemistry.**	
Self-study: Global warming, Greenhouse effect, and e-waste recycling	

PRACTICAL MODULE

SL. No.	Experiments	No. of Hours/ RBT levels
	Part-C: Demonstration (any Three) - Offline/ Virtual	
1	Determination of Viscosity coefficient of a liquid using viscometer.	2/L3
2	Determination of calorific value of solid fuel using bomb calorimeter	2/L3
3	Synthesis of Biodiesel	2/L3
4	Synthesis of ZnO Nanomaterial by Sol-Gel/Solution combustion method	2/L3
5	Determination of pH of the given Soil Sample.	2/L3

SL. No.	Experiments	No. of Hours/ RBT levels
	Part- A: Instrumental Experiments	
1	Determination of pKa of vinegar using pH sensor (Membrane electrode - Glass electrode)	2/L3
2	Potentiometric estimation of iron by electrochemical sensors.	2/L3
3	Estimation of acid mixtures using Conductometric sensors.	2/L3
4	Estimation of Copper in the Electroplating effluent using optical sensors.	2/L3
	Part-B: Volumetric Experiments	
1	Determination of Chemical oxygen demand of industrial waste water.	2/L3
2	Determination of percentage of copper in brass by Iodometric method.	2/L3
3	Determination of Total hardness of given water sample by rapid EDTA method.	2/L3
4	Determination of percentage of Calcium Oxide in Cement solution.	2/L3

Course Outcomes: Upon successful completion of this course, student will be able to

Textbooks:

CO1	**Understand** the concept of electrochemical energy systems, Corrosion and applications of Polymers in engineering filed.
CO2	**Investigate** chemical properties of materials and conventional & non-conventional energy systems for environmental issues.
CO3	**Analyze** the knowledge of sensors, Nano materials & concept of water for various technological applications.
CO4	**Apply** the knowledge of chemistry to investigate engineering materials by volumetric and instrumental methods

1. Wiley Engineering Chemistry, Wiley India Pvt. Ltd. New Delhi,2013-2nd Edition.

2. Engineering Chemistry, Satya Prakash &Manisha Agrawal, Khanna Book Publishing, Delhi

3.A Textbook of Eng. Chemistry, Shashi Chawla, Dhanpat Rai &Co.(P)Ltd.

4.Essentials of Physical Chemistry, Bahl & Tuli, S. Chand Publishing.

5. Applied Chemistry, Sunita Rattan, Kataria 5. Engineering Chemistry, Baskar, Wiley

6. Engineering Chemistry-I,D. Grour Krishana, Vikas Publishing

7.A Textbook of Engineering Chemistry, SS Dara & Dr. SS Umare, S Chand &Company Ltd., 12th Edition, 2011.

8.A Textbook of Engineering Chemistry, R.V. Gadag and Nityananda Shetty, I.K. International Publishing house. 2nd Edition,2016.

9.Text Book of Polymer Science, F.W.Billmeyer, John Wiley & Sons, 4th Edition,1999.

10.Nanotechnology A Chemical Approach to Nanomaterials, G.A.Ozin & A.C.Arsenault,RSC Publishing,2 005.

11.Corrosion Engineering, M.G. Fontana,N.D. Greene, McGraw Hill Publications, NewYork,3rd Edition, 1996.

12. Linden's Handbook of Batteries, Kirby W. Beard, Fifth Edition, McGrawHill,2019.

13. OLED Display Fundamentals and Applications, Takatoshi Tsujimura, Wiley–Blackwell,2012
14. Supercapacitors: Materials, Systems, and Applications, MaxLu, Francois Beguin, Elzbieta Frackowiak, Wiley-VCH;1st edition,2013.

15."Handbook on Electroplating with Manufacture of Electrochemicals", ASIAPACIFICBUSINESSPRE SS Inc., 2017.

16. Dr. H. Panda. Expanding the Vision of Sensor Materials. National Research Council 1995, Washington, DC: The National Academies Press. doi:10.17226/4782.

17.Engineering Chemistry, Edited by Dr. Mahesh B and Dr.Roopashree B,Sunstar Publisher, Bengaluru, ISBN 978-93-85155-70-3, 2022.

18. High Performance Metallic Materials for Cost Sensitive Applications, F.H.Froes, et al. John Wiley & So ns, 2010.

19. Instrumental Methods of Analysis, Dr. K.R. Mahadik and Dr.L. Sathiya Narayanan, Nirali Prakashan,2020.

20.Polymer Science, VR Gowariker, NV Viswanathan, Jayadev, Sreedhar, NewageInt.Publishers,4th Edition, 2021

22. Engineering Chemistry, PC Jain & Monica Jain, Dhanpat Rai Publication,2015-16th Edition.

23. Nanostructured materials and nanotechnology, Hari Singh, Nalwa, academic press, 1st Edition,2002.

24. Nanotechnology Principles and Practices, SulabhaK Kulkarni, Capital Publishing Company,3rd

Edition 2014.

25. Principles of nanotechnology, Phanikumar, Sci tech publications, 2nd Edition,2010.

26. Chemistry for Engineering Students, B.S. Jai Prakash, R. Venugopal, Sivakumaraiah & Pushpa Iyengar., Subash Publications, 5th Edition, 2014

27. "Engineering Chemistry", O.G. Palanna, Tata McGraw Hill Education Pvt. Ltd. New Delhi, Fourth Reprint, 2015.

28. Chemistry of Engineering materials, MaliniS, KS Anantha Raju, CBS publishers Pvt Ltd., 29. Laboratory Manual Engg. Chemistry, Anupma Rajput, Dhanpat Ra I &Co.

Reference books:

1. F.W. Billmeyer, Text Book of Polymer Science, John Wiley & Sons, 4th Edition, 1999.
2. M.G. Fontana, N.D. Greene, Corrosion Engineering, McGraw Hill Publications, New York, 3rd Edition, 1996.
3. Principles of Physical Chemistry, B.R. Puri, L.R. Sharma & M.S. Pathania, S. Nagin Chand & Co., 41 Edition, 2004.
4. G.A. Ozin& A.C. Arsenault, "Nanotechnology A Chemical Approach to Nanomaterials". RSC Publishing, 2005.
5. Bansal R.K., A Text Book of Engineering Mechanics, Laxmi Publications; 6th edition, 2015.
6. G.H Jeffery, J Bassett, J Mendham and R.C. Denney Vogel's A.I. A text book of quantitative analysis, Dorling Kindersley (India) Pvt., Ltd. 35th edition, 2012.
7. Gary D Christian, Analytical Chemistry, Wiley India, 6th edition, 2015.
8. T. Pradeep, A Textbook of Nanoscience and Nanotechnology, McGraw Hill Education (India) Pvt., Ltd., 1st edition, 2015.

Weblinks and Video Lectures (e-Resources):

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

SEMESTER I/II

APPLIED CHEMISTRY FOR CSE STREAM (INTEGRATED)

Course Code	BCHES24102/202	CIE Marks	50
Hours/Week (L: T: P)	3:0:2	SEE Marks	50
No of Credits	04	Examination Hours	03

Course Learning Objectives: The course will enable the students to

CL01	Know the fundamental concepts of Chemistry which are very much **essential in** day-to-day life, in industries and in research and development **to solve Engineering related challenges.**
CL02	Know to comprehend how computers function at their most basic level.

Contents	No. of Hours/ RBT levels
Module-1: Electrochemistry and Corrosion Engineering **Electrochemistry:** Introduction, Electrode potential, EMF, expression of Nernst equation, numerical problems on Electrode potential. Ion selective electrode – definition, construction, working and applications of glass electrode. Determination of pH using glass electrode. Reference electrode - Introduction, calomel electrode – construction, working and applications of calomel electrode. Concentration cell– Definition, construction and Numerical problems **Corrosion Engineering:** Definition, Electrochemical theory of corrosion, Types of corrosion-differential metal, differential aeration corrosion, Factors affecting the rate of corrosion (Ratio of anode & cathode, Nature of corrosion product, pH & Temperature), Corrosion control-Cathodic protection-sacrificial anode & Impressed current method.	08 Hours/ L2
Pedagogy: Chalk and talk method, power point presentation, Videos. **Display of electrodes model in class.**	
Self-study: Galvanic series, Tinning, Galvanising, Metal finishing-introduction, technological importance, Electroplating, Electroless plating.	
Module-2: Conventional and Green Energy systems **Energy Devices:** Introduction, Basic concepts, battery Characteristics (Voltage, Capacity & Shelf life), Classification of Batteries-Primary, Secondary, and reserve batteries. Construction, working and applications of Sodium battery and Li-Ion battery (Lithium batteries). Battery Recycling process. **Sustainable Energy sources:** Production of Biodiesel and its advantages, properties and applications of CNG and Biogas, Generation of energy (green hydrogen) by electrolysis of water and its advantages.	08 Hours/ L2

Semiconductors: Conductors, Semiconductors and Insulators: Introduction, Band theory and examples production of electronic grade silicon by Czochralski process, Refining- Zone refining process. Solar cells (PV cell): construction working, and applications of Si based PV cell. **Super Capacitors**:- Introduction, types (pseudo and asymmetric capacitor), applications	
Pedagogy: Chalk and talk method, power point presentation.	
Self study: Construction & working of Zinc Air battery	
Module 3: Materials for Memory and Display Systems **Memory Devices:** Introduction, Basic concepts of electronic memory, History of organic/polymer electronic memory devices, Classification of electronic memory devices, types of organic memory devices (organic molecules, polymeric materials, organic-inorganic hybrid materials). **Display Systems:** Liquid crystals (LC's) - Introduction, classification, difference between thermotropic and lyotropic LC, properties and application of Liquid Crystal Displays (LCD's), molecular ordering in nematic, smectic and columnar type liquid crystals Photoactive and electroactive materials (definition and applications), Construction, working and applications of-Light emitting electrochemical cells. Nanomaterials (QLED's) and organic materials (OLED's) used in optoelectronic devices.	08 Hours/ L2, L3
Pedagogy: Chalk and talk method, power point presentation. **Seminar by students on topic Environmental Chemistry.** .	
Self-study: Brominated flame retardants in computers.	
Module 4: Material Science: Polymers and Nano materials **Polymer Chemistry:** Introduction, polymerization. Synthesis, properties, and applications of PMMA and Polyurethane. Polymer composites -Kevlar Fibre and carbon fibre-Synthesis & applications. Conducting Polymers: Mechanism of conduction in conducting poly aniline. **Nanomaterials:** Introduction to nanomaterials, synthesis: top-down and bottom-up approaches. Chemical methods of synthesis-solution combustion and hydrothermal methods. Carbon based nano Materials-Graphene, Carbon nano tubes & Fullerenes. Applications of nanomaterials.	08 Hours/ L2, L3
Pedagogy: Chalk and talk method, power point presentation. **Display of bomb calorimeter model in class**	
Self-study: Concept of Polymer nano composites & ceramic metal composites	
Module 5: Environmental Chemistry and Water technology **Environmental Chemistry:** Air Pollutants: Sources, effects and control of Primary air pollutants-Carbon monoxide, Oxides of nitrogen and Sulphur. Waste Management: e-waste & Biomedical waste (scientific land filling, composting, and recycling). Introduction, Chemical composition of E-waste, sources, types, effects of e-waste on environment and	08 Hours/ L2, L3

human health. Recycling and Recovery of precious metals by-Hydrometallurgical extraction & Pyro metallurgical methods. **Water technology:** Introduction, hardness of water (Definition), Determination of total hardness by EDTA method. Desalination - Reverse osmosis (Definition, Process, Diagram, and explanation). Chemical oxygen Demand – definition, Determination of COD, numerical problems.	
Pedagogy: Chalk and talk method, power point presentation	
Self-study: Global warming, Greenhouse effect, and e-waste recycling	

PRACTICAL MODULE

SL. No.	Experiments	No. of Hours/ RBT levels
	Part- A: Instrumental Experiments	
1	Determination of pKa of vinegar using pH sensor (Membrane electrode - Glass electrode)	2/L3
2	Potentiometric estimation of iron by electrochemical sensors.	2/L3
3	Estimation of acid mixtures using Conductometric sensors.	2/L3
4	Estimation of Copper in the Electroplating effluent using optical sensors.	2/L3
	Part-B: Volumetric Experiments	
1	Determination of Chemical oxygen demand of industrial waste water.	2/L3
2	Determination of percentage of copper in brass by Iodometric method.	2/L3
3	Determination of Total hardness of given water sample by rapid EDTA method.	2/L3
4	Determination of percentage of Calcium Oxide in Cement solution.	2/L3

SL. No.	Experiments	No. of Hours/ RBT levels
	Part-C: Demonstration (any Three) - Offline/ Virtual	
1	Determination of Viscosity coefficient of a liquid using viscometer.	2/L3
2	Determination of calorific value of solid fuel using bomb calorimeter	2/L3
3	Synthesis of Biodiesel	2/L3
4	Synthesis of ZnO Nanomaterial by Sol-Gel/Solution combustion method	2/L3
5	Determination of pH of the given Soil Sample.	2/L3

Course Outcomes: Upon successful completion of this course, student will be able to

Textbooks:

1. Wiley Engineering Chemistry, Wiley India Pvt. Ltd. New Delhi,2013-2nd Edition.

CO1	**Understand** the concept of electrochemical energy systems, Corrosion and applications of Polymers in engineering filed.
CO2	**Investigate** chemical properties of materials and conventional & non-conventional energy systems for environmental issues.
CO3	**Analyze** the knowledge of sensors, Nano materials & concept of water for various technological applications.
CO4	**Apply** the knowledge of chemistry to investigate engineering materials by volumetric and instrumental methods

2. Engineering Chemistry, Satya Prakash &Manisha Agrawal, Khanna Book Publishing, Delhi

3.A Textbook of Eng. Chemistry, Shashi Chawla, Dhanpat Rai &Co.(P)Ltd.

4.Essentials of Physical Chemistry, Bahl & Tuli, S. Chand Publishing.

5. Applied Chemistry, Sunita Rattan, Kataria 5. Engineering Chemistry, Baskar, Wiley

6. Engineering Chemistry-I,D. Grour Krishana, Vikas Publishing

7.A Textbook of Engineering Chemistry, SS Dara & Dr. SS Umare, S Chand &Company Ltd., 12th Edition, 2011.

8.A Textbook of Engineering Chemistry, R.V. Gadag and Nityananda Shetty, I.K. International Publishing house. 2nd Edition,2016.

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16. Dr. H. Panda. Expanding the Vision of Sensor Materials. National Research Council 1995, Washington, DC: The National Academies Press. doi:10.17226/4782.

17.Engineering Chemistry, Edited by Dr. Mahesh B and Dr.Roopashree B,Sunstar Publisher, Bengaluru, ISBN 978-93-85155-70-3, 2022.

18. High Performance Metallic Materials for Cost Sensitive Applications, F.H.Froes, et al. John Wiley & So ns, 2010.

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20.Polymer Science, VR Gowariker, NV Viswanathan, Jayadev, Sreedhar, NewageInt.Publishers,4th Edition, 2021

22. Engineering Chemistry, PC Jain & Monica Jain, Dhanpat Rai Publication,2015-16th Edition.

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27. "Engineering Chemistry", O.G. Palanna, Tata McGraw Hill Education Pvt. Ltd. New Delhi, Fourth Reprint, 2015.

28. Chemistry of Engineering materials, MaliniS, KS Anantha Raju, CBS publishers Pvt Ltd., 29. Laboratory Manual Engg. Chemistry, Anupma Rajput, Dhanpat Ra I &Co.

Reference books:

1. F.W. Billmeyer, Text Book of Polymer Science, John Wiley & Sons, 4th Edition, 1999.
2. M.G. Fontana, N.D. Greene, Corrosion Engineering, McGraw Hill Publications, New York, 3rd Edition, 1996.
3. Principles of Physical Chemistry, B.R. Puri, L.R. Sharma & M.S. Pathania, S. Nagin Chand & Co., 41 Edition, 2004.
4. G.A. Ozin& A.C. Arsenault, "Nanotechnology A Chemical Approach to Nanomaterials". RSC Publishing, 2005.
5. Bansal R.K., A Text Book of Engineering Mechanics, Laxmi Publications; 6th edition, 2015.
6. G.H Jeffery, J Bassett, J Mendham and R.C. Denney Vogel's A.I. A text book of quantitative analysis, Dorling Kindersley (India) Pvt., Ltd. 35th edition, 2012.
7. Gary D Christian, Analytical Chemistry, Wiley India, 6th edition, 2015.
8. T. Pradeep, A Textbook of Nanoscience and Nanotechnology, McGraw Hill Education (India) Pvt., Ltd., 1st edition, 2015.

Weblinks and Video Lectures (e-Resources):

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

SEMESTER – I/II

Course: BASIC ELECTRONICS

Course Code	BBEE24203	CIE Marks	50
Hours/Week (L: T: P)	3:0:0	SEE Marks	50
Credits	03	Examination Hours	03

Course Learning Objectives: Students will be taught;

CLO1	Operation of Semiconductor diode and Zener diode
CLO2	Biasing circuits for transistor (BJT) as an amplifier and oscillators.
CLO3	Op-amps and its applications.
CLO4	Logic circuits and their optimization.
CLO5	Basic of Sequential Logic Circuits and Communication system.

Content	No. of Hours/RBT levels
Module 1 **Semiconductor Diode and Applications:** Introduction to semiconductor diode, Block diagram of DC regulated power supply, Half wave rectifier, and full wave rectifier - Centre tapped rectifier, Bridge Rectifier. Performance analysis of rectifiers in terms of ripple factor and efficiency. Filters, Classification of filters and Capacitor filter. **Zener diode:** Reverse characteristic and Voltage Regulator. (Text 1: 8-1 to 8-27, 8-29 7-2, 7-3, 7-4 & 31-2, 31-6).	8 Hours L3
Module 2 **BJT Biasing:** Introduction, DC operating point and Load Line, Condition for proper Biasing of a Transistor, Methods of Transistor Biasing - Fixed/Base Bias, Voltage Divider Bias. (Text 1: 12-1 to 12-4, 12-9, 12-10, 12-11, 12-17). **Single Stage BJT amplifier:** Introduction, Classification of amplifier and Transistor as an Amplifier, RC Coupled amplifier- Operation, frequency response, advantages and Disadvantages. (Text 1: 16-1, 16-2, 16-3, 18-4, 18-6, 18.7). **Feedback amplifiers:** Introduction, Principles of Feedback, Properties/Advantages of negative feedback. (Text 1: 24-1, 24-2, 24-3) **Sinusoidal Oscillators:** Introduction, Classification of Oscillators, Tuned oscillators – BJT based Hartley and Colpitts. (Text 1: 25-1, 25-3, 25-10).	8 Hours L2

Module 3 **Op-Amps and its Applications:** Introduction, modes of operation, Op-Amp parameters - Gain, input resistance, Output resistance, CMRR, slew rate, Bandwidth, input offset voltage, Input bias Current and Input Offset Current. Applications- Inverting amplifier, Non-Inverting Amplifier, Voltage Follower, Summer, Differential/Difference amplifier, Integrator and Differentiator. (Text 1:29-1 to 29-13, 30-3 & 30-5)	8 Hours L3
Module 4 **Binary Systems:** Binary numbers, Number Base Conversion, octal & Hexa Decimal Numbers, 1's and 2's Complements. (Text 2: 1.2, 1.3, 1.4 & 1.5) **Boolean Algebra and Logic Circuits:** 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, Realization of Boolean expressions. (Text 2: 2.1, 2.2, 2.3, 2.4, 2.5, 2.6 & 2.7) Combinational logic: Adders- Half adder, Full adder (Text 2: 4.3.1 & 4.3.2)	8 Hours L3
Module 5 **Sequential Logic:** Introduction, SR Latch, Flip Flops using NOR/NAND gates, Clocked RS - Flip Flop, D - Flip Flop, JK- Flip Flop and Clocked T - Flip Flop. (Text 2: 6.1, 6.2 & 6.3) **Communication Systems:** Introduction, Carrier wave, Radio frequency Spectrum, Sound, Modulation, Need for modulation, Methods of Modulation (schemes), Amplitude Modulation – Percentage Modulation, Upper and Lower frequencies and side bands, Mathematical analysis of a Modulated Carrier Wave,Power relation in an AM Wave. (Text 1:32-1 to 32-14)	8 Hours L2

COURSE OUTCOMES: Upon completion of this course, student will be able to:

CO1	Apply the knowledge of diode for rectifiers and regulators.
CO2	Analyze the biasing circuit for transistor as an amplifier and the importance of feedback.
CO3	Explain the operation of Op-Amp circuits for various applications.
CO4	Apply Boolean algebra in logic circuits synthesis.
CO5	Explain the concept of Sequential Circuits and Communication system.

Textbooks:

1. Dr. R.S. Sedha, "Electronic Circuits", S Chand and Company Pvt Ltd, 3rd Revised edition, Reprint 2020.
2. Morris Mano, "Digital Logic and Computer Design", Prentice Hall India Publication, Second Impression-2017.

Reference books:

1. Robert L. Boylestad, "Electronic Devices and Circuit Theory", Prentice Hall of India Pvt Ltd., 11th edition,2015, 2020 reprint.
2. David A Bell, "Electronic Devices and Circuits", Oxford University Press, Fifth Edition.

Scheme of Examination:

Semester End Examination (SEE):

SEE Question paper is to be set for 100 marks and the marks scored will be proportionately reduced to 50. There will be two full questions (with a maximum of three sub questions) from each module carrying 20 marks each. Students are required to answer any **five full questions** choosing at least **one full question** from each module.

Continuous Internal Evaluation (CIE):

Three Tests are to be conducted for 40 marks each. Average of Marks scored in all three tests is added to test component. CIE is executed by way of quizzes / Alternate Assessment Tools (AATs), and three tests. **Some possible AATs:** Seminar/assignments/ mini-projects/ concept videos/ partial reproduction of research work/ group activity/ any other. Typical Evaluation pattern for regular courses is shown in Table 1

Table 1: Distribution of weightage for CIE & SEE of Regular courses

	Component	Marks	Total Marks
CIE	CIE Test-1	40	50
	CIE Test-2	40	
	CIE Test-3	40	
	Assignments	10	
SEE	Semester End Examination	50	50
Grand Total			100

CO-PO and PSO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	-	-	-	-	-	-	-	1	-	1	-	-
CO2	3	2	-	-	-	-	-	-	-	1	-	1	-	-
CO3	3	2	-	-	-	-	-	-	-	1	-	1	-	-
CO4	3	2	-	-	-	-	-	-	-	1	-	1	-	-
CO5	3	2	-	-	-	-	-	-	-	1	-	1	-	-
Average	3	2	-	-	-	-	-	-	-	1	-	1	-	-

SEMESTER –I

SUBJECT: Elements of Electrical Engineering

Subject Code	BEEE24103	CIE Marks	50
Hours /Week	3:0:0	SEE Marks	50
Total Hours	40	Examination Hours	03
No. of Credits: 3			

Course Learning Objectives:

CLO 1	Analysis of DC circuits.
CLO 2	Analysis of single phase AC circuits.
CLO 3	Explain the three phase circuit and three phase Synchronous Generators .
CLO 4	Understand the principle of operation, construction of single-phase transformer and three phase Induction motor.
CLO 5	Understand the importance of illumination and Electric vehicles.

Contents	No. of Hours / RBT Levels
Module – 1: DC Circuits: Basics concepts, Ohm's law, Kirchhoff's laws, analysis of series, parallel and series parallel circuits excited by independent voltage sources only. Power and energy in resistor. Analysis of Two loop circuits by Loop or mesh current method and Nodal Analysis **(Two loops and Two nodes only)**	8/ L3
Module – 2: Single Phase AC Circuits **Basics Terminology:** Generation of sinusoidal voltage, frequency of generated voltage, average value, root mean square value, form and peak factors. **Analysis of Circuits:** Voltage and current relationship, with phasor diagrams, inR, L, C, R-L, R-C and R-L-C series and parallel circuits. Concept of apparent, real, and reactivepowers. Significance of power factor.	8/ L4
Module – 3: Three Phase AC Circuits and Synchronous Generator Three Phase AC Circuits: Advantages of three phase systems, Generation of three phase voltages, meaning of phase sequence, Relationship between line and phase quantities for balanced star and delta connections for balanced loads. **Synchronous Generator**: Principle of operation and construction of Synchronous Generator, types and EMF equation **(Excluding the derivation and Calculation of winding factors)**.	8/ L2
Module – 4: Single-phase Transformer and Three Phase Induction Motor **Single-phase Transformer:** Principle of operation and construction, types, EMF equation, losses and efficiency calculations (Condition for maximum efficiency excluded). **Three phase Induction Motor:** Principle of operation and construction, types, concept of rotating magnetic field, slip and significance of slip, Advantages and applications. **(Numerical problems on slip calculations only)**	8/ L2
Module – 5: Illumination and Electric vehicles **Illumination:** Sources of illumination: Electric arc, Incandescent, gaseous discharge and Fluorescent lamps, Factors affecting design of lighting schemes **Introduction to Electric vehicles:** Overview and block diagram approach to electric vehicles.	8/ L2

Text Books				
1.	Basic Electrical Engineering	Kulshreshtha. D.C	Tata McGrawHill	2012
Reference Books				
1.	Basic Electrical Engineering	V. K. Mehta, Rohit Mehta	S Chand	2017
2.	Fundamentals of Electrical and Electronics Engineering	Samarjit Ghosh	PHI Learning	2007
3.	Hughes Electrical and Electronic Technology	John Hiley, Keith Brown, Ian Mckenzie Smith	Pearson Education	Tenth Edition Revised 2020
4.	Basic Electrical and Electronics Engineering	S. K. Bhattacharya	Pearson Education	2011
5.	A Text Book of Electrical Technology – Volume 1 (Basic Electrical Engineering) in SI system of units BL Theraja	BL. Theraja AK. Theraja	S. Chand	1999
6.	Electrical Engineering Fundamentals	Vincent Deltoro	Pearson	2015
7.	Non -Conventional Energy Resources	Sobh Nath Singh	Pearson Education	2017

COs	Statement	Bloom's Cognitive level	POs/PSOs
CO1	Apply fundamental laws to DC circuits.	Apply	PO1, PO2, PO12
CO2	Analyze the behaviour of single phase AC circuits.	Analyze	PO1, PO2, PO12
CO3	Explain three phase AC circuits and synchronous generator.	Understand	PO1, PO2, PO12
CO4	Explain the constructional features, working of single phase transformer and three phase induction motor.	Understand	PO1, PO2, PO12
CO5	Discuss different sources of illumination and basic principle of electric vehicles.	Understand	PO1, PO2, PO12

Scheme of Examination:

Semester End Examination (SEE):

SEE Question paper is to be set for 100 marks and the marks scored will be proportionately reduced to 50.

There will be two full questions (with a maximum of four sub questions) from each module carrying 20 marks each. Students are required to answer any **five full questions** choosing at least **one full question from each module.**

Continuous Internal Evaluation (CIE):

Three Tests are to be conducted for 40 marks each. The average of the three tests are taken for computation of CIE final marks.

CIE is executed by way of quizzes / Alternate Assessment Tools (AATs), and three tests.

Some possible AATs: seminar/ assignments/term paper/ open ended experiments/ mini-projects/

concept videos/ partial reproduction of research work/ oral presentation of research work/ group activity/ developing a generic toolbox for problem solving/ report based on participation in create-athon/ make-a-thon/ code-a-thon/ hack-a-thon conducted by reputed organizations/ any other.

Table 2: Distribution of weightage for CIE & SEE of Regular courses

	Component	Marks	Total Marks
CIE	CIE Test – 1	40	50
	CIE Test – 2	40	
	CIE Test – 3	40	
	Quiz / assignment/group discussion/presentation/mini projects	10	
SEE	Semester End Examination	100	50
Grand Total			100

CO/PO Mapping												
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	-	-	-	-	-	-	-	-	-	2
CO2	3	2	-	-	-	-	-	-	-	-	-	2
CO3	3	2	-	-	-	-	-	-	-	-	-	2
CO4	3	2	-	-	-	-	-	-	-	-	-	2
CO5	3	-	-	-	-	-	-	-	-	-	-	2
Average	3	2	-	-	-	-	-	-	-	-	-	2

SEMESTER – I/II

PRINCIPLES OF PROGRAMMING USING C (Integrated)

Course Code:	BPOPS24103/203	CIE Marks	50
Hours/Week (L: T: P)	2:0:2	SEE Marks	50
Total Hours	40	Examination Hours	3
No. of Credits	3		

Course Learning Objectives:

The course will enable students to:

CLO1	Elucidate the basic architecture and functionalities of a Computer
CLO2	Apply programming constructs of C language to solve the real-world problems
CLO3	Explore user-defined data structures like arrays, structures and pointers in implementing solutions to problems
CLO4	Design and Develop Solutions to problems using modular programming constructs such as functions and procedures

CONTENTS	# of Hours
MODULE 1 **Introduction to C:** Introduction to computers, input and output devices, designing efficient programs. Introduction to C, Structure of C program, Files used in a C program, Compilers, Compiling and executing C programs, variables, constants, Input/output statements in C.	08
MODULE 2 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.	08
MODULE 3 **Functions:** Introduction using functions, Function definition, function declaration, function call, return statement, passing parameters to functions, scope of variables, storage classes, recursive functions. **Arrays:** Declaration of arrays, accessing the elements of an array, storing values in arrays, Operations on arrays, Passing arrays to functions, two dimensional arrays, operations on two-dimensional arrays, two dimensional arrays to functions, multidimensional arrays, applications of arrays.	08
MODULE 4 **Strings and Pointers:** Introduction, string taxonomy, operations on strings, Miscellaneous string and character functions, arrays of strings. **Pointers:** Introduction to pointers, declaring pointer variables, Types of pointers, Passing arguments to functions using pointers.	08
MODULE 5 **Structure, Union, and Enumerated Data Type:** Introduction, structures and functions, Unions, unions inside structures, Enumerated data type. **Files:** Introduction to files, using files in C, reading and writing data files, Detecting end of file.	08

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Course Outcomes:

Upon successful completion of this course, student will be able to

CO1	Elucidate the basic architecture and functionalities of a computer and also recognize the hardware parts
CO2	Apply programming constructs of C language to solve the real world problem
CO3	Explore user-defined data structures like arrays in implementing solutions to problems like searching and sorting
CO4	Explore user-defined data structures like structures, unions and pointers in implementing solutions
CO5	Design and Develop Solutions to problems using modular programming constructs using functions

Text Books:

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.

Web links and Video Lectures (e-Resources):

1. elearning.vtu.ac.in/econtent/courses/video/BS/15PCD23.html
2. https://nptel.ac.in/courses/106/105/106105171/ MOOC courses can be adopted for more clarity in understanding the topics and verities of problem solving methods.

Lab Assignments

1	Simulation of a Simple Calculator.
2	Compute the roots of a quadratic equation by accepting the coefficients. Print appropriate messages.
3	An electricity board charges the following rates for the use of electricity: for the first 200 units 80 paise per unit: for the next 100 units 90 paise per unit: beyond 300 units Rs 1 per unit. All users are charged a minimum of Rs. 100 as meter charge. If the total amount is more than Rs 400, then an additional surcharge of 15% of total amount is charged. Write a program to read the name of the user, number of units consumed and print out the charges.
4	Write a C Program to display the following by reading the number of rows as input. 1 1 2 1 1 2 3 2 1 1 2 3 4 3 2 1 ---------- n^{th} row
5	Implement Binary Search on Integers.
6	Implement Matrix multiplication and validate the rules of multiplication.
7	Compute sin(x)/cos(x) using Taylor series approximation. Compare your result with the built-in library function. Print both the results with appropriate inferences.
8	Sort the given set of N numbers using Bubble sort.

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9	Write functions to implement string operations such as compare, concatenate, and find string length. Use the parameter passing techniques.
10	Implement structures to read, write and compute average- marks of the students, list the students scoring above and below the average marks for a class of N students.
11	Develop a program using pointers to compute the sum, mean and standard deviation of all elements stored in an array of N real numbers.
12	Write a C program to copy a text file to another, read both the input file name and target file name.

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SEMESTER – I/II

COURSE: COMPUTER AIDED ENGINEERING DRAWING

Course Code	BCEDK24103/24203	CIE Marks	50
Hours/Week (L: T: P)	2 : 0 : 2	SEE Marks	50
No. of Credits	03	Examination Hours	03

Overview: The course is designed for the I/II Semester Engineering students of all branches. It covers fundamental concepts and principles of engineering drawing with the emphasis on use of drafting software. Engineering drawing is a graphical medium of expression of technical details without the barrier of a language and termed as universal language of engineers. Engineering drawings are important in conveying useful information to other engineers with standardized conventions, rules, and regulations. The end goal of an engineering drawing is to convey all the required technical information that will allow a manufacturer to produce any kind of component in all the fields of engineering.

Course Objectives: At the end of the course, the student should be able to

CLO1	Understand the concept of BIS conventions in Engineering drawing.
CLO2	Apply the theoretical concepts to sketch orthographic projections in different positions.
CLO3	Understand the concepts of isometric projections of combination of solids.
CLO4	Use CAD tools for creation of Engineering drawings.

CONTENT	No. of Hours/ RBT levels
Module 1: Introduction to Engineering Drawing & Orthographic Projections of points and lines: 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. **Projections of points:** Introduction to Orthographic projections, Orthographic projections of points in 1st and 3rd quadrants. **Projections of straight lines (First angle projection only):** Introduction, Line inclined to both the planes, true and apparent lengths, true and apparent inclinations to reference planes. **Orthographic Projection of plane surfaces (First angle projection only):** Introduction, Projections of regular plane surfaces: Triangle, Square, Rectangle, Pentagon, Hexagon and Circle - inclined to both the planes (Placed in First quadrant only using change of position method). ***Application on projections of Lines & Planes (For CIE only)***	**10 Hours** **L3**

Head of Department
Mechanical Engineering
Global Academy of Technology
Bangalore - 98

Module 2: Orthographic Projection of Solids: Introduction, Type of solids, Projections of right regular solids (Solids resting on HP only): Prisms like square, hexahedron(cube), pentagon, hexagon and Pyramids like square, pentagon, hexagon, cone & tetrahedron in different positions (Inclined to both HP and VP). *Projections of Frustum of cone and pyramids (For practice only, not for CIE and SEE).*	**10 Hours** **L3**
Module 3: Isometric Projection (using isometric scale only) Introduction, Isometric scale, Isometric projection of combinations of solids (Maximum of two solids) like cube, regular prisms, cylinders, pyramids, cone, tetrahedron, frustum of pyramids, cone & sphere. *Conversion of simple isometric drawings into orthographic views.*	**08 Hours** **L3**
Module 4: 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. Problems on applications of development of lateral surfaces like funnels and trays. Problems on applications of development of lateral surfaces of transition pieces connecting circular duct and rectangular duct (For CIE Only).	**08 Hours** **L3**
Module 5: 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, 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. **Graphs & Charts:** Like, Column chart, Pie chart, Line charts, Gantt charts, etc. using Microsoft Excel or any suitable software.	**04 Hours** **L3**

*Problems from the above modules (1–4) must be practiced on computer aided drafting software.

COURSE OUTCOMES: The students will be able to

CO1:	Demonstrate competence in orthographic projections of points, lines, and planes.
CO2:	Sketch the orthographic projections of solids inclined to both horizontal & vertical planes.
CO3:	Generate isometric projections of various combinations of solids & develop the lateral surfaces of the prisms & pyramids.
CO4:	Demonstrate 2D drafting of lines, planes & solids using solid-edge software.

Head of Department
Mechanical Engineering
Global Academy of Technology
Bangalore - 98

Textbooks:

1. K.R. Gopala Krishna, Sudhir Gopalakrishna, Engineering Graphics, Subhas Publishers, Bangalore, 40th edition, 2018-19.
2. N.D. Bhatt, Engineering Drawing, Charotar Publishing House, Gujarat, 53rd edition, 2014

References:

1. Luzadder Warren J., Duff John M., Fundamentals of Engineering Drawing with an Introduction to Interactive Computer Graphics for Design and Production, Pearson India, 2015.
2. P. I. Varghese, Engineering Graphics McGraw Hill Education (India) Pvt. Ltd, and New Delhi, 2013.
3. N.S. Parthasarathy & Vela Murali, Engineering Drawing, Oxford University Press, 2015.

ASSESSMENT: CIE Assessment:

Particulars	Marks
Test 1 (Module 1 and Module 2) - @ 8 week	30
Test 2 (Module 2, 3 and 4) - @ 14 weeks	30
Average of Test 1 & Test 2	**30**
Periodic Evaluation of Sketch Book	20
Total Marks	**50**

SEE Assessment: Maximum of **THREE QUESTIONS** will be set for **SEE** as per the pattern given below:

Scheme of Evaluation:

Modules	Marks Allocated
Module 1 : Projection of Points, Lines **Or** Projection of Planes	**30**
Module 2: Answer any **ONE** question out of **TWO** Questions from Projection of solids	**40**
Module 3 & 4: Answer any **ONE** question out of **TWO** Questions from Isometric Projections & Development of Lateral Surfaces of Solids.	**30**
Total Marks	**100**

Question No.	Solutions and sketching in the sketch book	Computer Printout	Total Marks
1	15	15	30
2	20	20	40
3	15	15	30
Total Marks	**50**	**50**	**100**

Note: Students have to submit the computer printouts and the hand drawn sketches at the end of the examination for evaluation.

CO/PO Mapping												
CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	-	-	-	2	-	-	-	-	1	-	-
CO2	3	-	-	-	2	-	-	-	-	1	-	-
CO3	3	-	-	-	2	-	-	-	-	1	-	-
CO4	3	-	-	-	2	-	-	-	-	1	-	-

Low - 1: Medium - 2: High - 3

Head of Department
Mechanical Engineering
Global Academy of Technology
Bangalore - 98

SEMESTER I/II

Subject: Engineering Mechanics

Subject Code	**BCIVC24103**	**CIE Marks**	**50**
Hours/Week (L: T: P)	**2:2:0**	**SEE Marks**	**50**
No. of Credits	**03**	**Examination Hours**	**03**

Overview: The course is designed for I/II semester engineering students of all branches. It covers fundamental concepts and principles of engineering mechanics, application of these basics principles to solve static equilibrium problems related to Civil, Mechanical, Automobile, Aeronautical, Mechatronics, Robotics and other allied engineering branches where analysis for forces and displacement of particles or rigid bodies is involved. It also introduces the real-life problems involving the forces and computer applications to solve engineering mechanics problems. The knowledge of basic mathematics and physics is essential for the course.

Course Objectives: At the end of the course the student should be able to

CLO1	Understand the scalar presentation of forces and moments, apply the principles of engineering mechanics to particles and rigid bodies in equilibrium subjected to coplanar system of forces
CLO2	Realize the mechanical and sectional properties of engineering materials
CLO3	Analyze the forces in the members of trusses

Content	**No. of Hours/ RBT levels**
Module-1 Statics of Particles **Resultant of coplanar force system:** Basic dimensions and units, Idealisations, Classification of force system, principle of transmissibility of a force, composition of forces, resolution of a force, Free body diagrams, moment, Principle of moments, couple, Resultant of coplanar concurrent force system, Resultant of coplanar non-concurrent force system, Numerical examples.	**10 Hours L3**
Module - 2 Equilibrium of Rigid Bodies **Equilibrium of coplanar force system:** Equilibrium of coplanar concurrent force system, Lami's theorem, Equilibrium of coplanar parallel force system, types of beams, types of loadings, types of supports, Equilibrium of coplanar non-concurrent force system, support reactions of statically determinate beams subjected to various types of loads, Numerical examples	**10 Hours L3**

Module - 3 Analysis of Trusses & Friction **Analysis of Trusses:** Introduction, Classification of trusses, analysis of plane perfect trusses by the method of joints and method of sections, Numerical examples. **Friction:** Introduction, laws of Coulomb friction, equilibrium of blocks on horizontal plane, equilibrium of blocks on inclined plane, ladder friction, wedge friction Numerical examples	**10 Hours L3**
Module- 4 Centroid and Moment of Inertia **Centroid of Plane areas:** Introduction, Locating the centroid of rectangle, triangle, circle, semicircle, quadrant and sector of a circle using method of integration, centroid of composite areas and simple built-up sections, Numerical examples. **Moment of inertia of plane areas:** Introduction, Rectangular moment of inertia, polar moment of inertia, product of inertia, radius of gyration, parallel axes theorem, perpendicular axis theorem, moment of inertia of rectangular, triangular and circular areas from the method of integration, moment of inertia of composite areas and simple built-up sections, Numerical examples.	**10 Hours L3**
Module - 5 Kinetics and Kinematics **Kinematics:** Linear motion: Introduction, Displacement, speed, velocity, acceleration, acceleration due to gravity, Numerical examples on linear motion Projectiles: Introduction, numerical examples on projectiles. **Kinetics:** Introduction, D 'Alembert's principle of dynamic equilibrium and its application in-plane motion and connected bodies including pulleys, Numerical examples.	**10 Hours L3**

Course Outcomes: The students will be able to:

BCIVC24103.1	**Compute** the resultant of a force system and resolution of a force
BCIVC24103.2	**Comprehend** the action for forces, moments, and other types of loads on rigid bodies and compute the reactive forces
BCIVC24103.3	**Analyse** the frictional resistance offered by different planes
BCIVC24103.4	**Locate** the centroid and compute the moment of inertia of sections
BCIVC24103.5	**Analyze** the bodies in motion

Textbooks:

1. Kumar, K. L., Kumar, V. Engineering Mechanics, Tata McGraw Hill, 4th edition, 2017
2. Bansal R. K., Rakesh Ranjan Beohar and Ahmad Ali Khan, Basic Civil Engineering and Engineering Mechanics, 2015, Laxmi Publications.
3. Kolhapure B K, Elements of Civil Engineering and Engineering Mechanics, 2014, EBPB

Reference books:

1. S. Rajasekharan, G. Sankarsubramanian, "Engineering Mechanics- Statics and Dynamics" - Vikas Publishing House, 2011
2. F. P. Beer and E. R. Johnston et.al., Vector Mechanics for Engineers - Statics and

Dynamics, McGraw-Hill; 12th edition, 2019

3. R. C. Hibbler, Engineering Mechanics: Statics and Dynamics, Pearson Education; 14th edition, 2017

4. S. Timoshenko, D.H. Young, J.V. Rao, Sukumar Pati, Engineering Mechanics (In SI Units), McGraw Hill Education; 5th edition, 2017

Web Reference:

https://nptel.ac.in/courses/112106286

Scheme of Examination:

Semester End Examination (SEE):

SEE Question paper is to be set for 100 marks and the marks scored will be proportionately reduced to 50. There will be two full questions (with a maximum of four sub questions) from each module carrying 20 marks each. Students are required to answer any five full questions choosing at least one full question from each module.

Continuous Internal Evaluation (CIE):

Three Tests are to be conducted for 40 marks each. Average of three test marks will be added to test component. CIE is executed by way of two quizzes / Alternate Assessment Tools (AATs), and two tests. **Some possible AATs:** seminar/assignments/ mini-projects/ concept videos/ partial reproduction of research work/ group activity/ any other.

Typical Evaluation pattern is shown in Table 1.

Table 1: Distribution of weightage for CIE & SEE of Regular courses

Component		Marks	Total Marks
CIE	CIE Test-1	40	**50**
	CIE Test-2	40	
	CIE Test-3	40	
	Average of CIE	**40**	
	Quiz 1/AAT	05	
	Quiz 2/AAT	05	
SEE	**Semester End Examination**	**50**	**50**
Grand Total			**100**

CO-PO/PSO Mapping															
CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
BCIVC24103.1	3	1													
BCIVC24103.2	2	2													
BCIVC24103.3	3	2	1												
BCIVC24103.4	2	2	1												
BCIVC24103.5	2	2	1												
Average	**2.40**	**1.8**	**1**												

SEMESTER – I/II

COURSE: Elements of Mechanical Engineering

Course Code	**BEMEM24103/24203**	**CIE Marks**	**50**
Hours/Week (L: T: P)	**3 : 0 : 0**	**SEE Marks**	**50**
No. of Credits	**3**	**Examination Hours**	**03**

Course Objectives: This course enables the students to

CLO1	Acquire a basic understanding about scope of mechanical engineering, fundamentals about steam and nonconventional energy sources.
CLO2	Acquire a basic knowledge about conventional and advanced manufacturing processes.
CLO3	Acquiring a basic understanding about IC engines, propulsive devices and air-conditioner.
CLO4	Acquiring a basic knowledge about power transmission and joining processes.
CLO5	Acquiring a basic insight into future mobility and mechatronics and robotics.

Content	No. of Hours/ RBT levels
Module 1 **Introduction to Mechanical Engineering** (Overview only): 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:** Modes of heat transfer, Steam formation, Types of steam, Steam properties and applications of steam (simple numerical problems). **Energy Sources and Power Plants:** Basic working principles of Hydel power plant, Thermal power plant, nuclear power plant, Solar power plant, Tidal power plant and Wind power plant.	8 Hours L3
Module 2 **Machine Tool Operations:** Lathe: Principle of working of a center lathe, lathe operations: Turning, facing, knurling, thread cutting, taper turning by swivelling the compound rest, **Drilling Machine:** Working of simple drilling machine, drilling operations: drilling, boring, reaming, tapping, counter sinking, counter boring, **Milling Machine:** Working and types of 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, 3D printing.	8 Hours L3

Head of Department
Mechanical Engineering
Global Academy of Technology
Bangalore - 98

Module 3 **Introduction to IC Engines:** Components and working principles, 4-Stroke Petrol and Diesel engines, Application of IC Engines, performance of IC engines (Simple numerical). **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	8 Hours L3
Module 4 **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), length of the belt and tensions ratio (simple numerical problems) **Joining Processes**: Soldering, Brazing and Welding, Definitions, classification of welding process, Arc welding, Gas welding, (types of flames), TIG welding, MIG welding and Fusion welding.	8 Hours L3
Module 5 **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 and Robotics:** open-loop and closed-loop mechatronic systems. Joints & links, Robot anatomy, Applications of Robots in material handling, processing and assembly and inspection.	8 Hours L3

Course Outcomes: Upon completion of this course, students will be able to

BEMEM24103/24203.1	Demonstrate the process of primary manufacturing, joining and additive manufacturing.
BEMEM24103/24203.2	Demonstrate the secondary manufacturing processes such as Turning, milling, and drilling.
BEMEM24103/24203.3	Illustrate with applications the working principle of CNC Machines and varied robot configurations.
BEMEM24103/24203.4	Interpret the principles of utilizing water as an effective source of power generation with added principles of I.C. Engines and refrigeration.
BEMEM24103/24203.5	Illustrate on the principles and applications of the core concept of power transmission in mechanical elements.

Textbooks:

1. Rao, P.N. "Manufacturing Technology", Metal Cutting and Machine Tools, Tata McGraw–Hill, New Delhi, Vol 1 and 2, 2019
2. Mikell P Groover, Automation, Production systems and computer-integrated manufacturing, Pearson learning, 4th Edition, 2018
3. K R Gopalkrishna, SudhirGopalakrishna, Dr.Girish H.N, Elements of Mechanical Engineering, Subhas publications, 2019 Edition.

References:

1. R K Rajput, Elements of Mechanical Engineering, Laxmi Publications Pvt Ltd, 2005
2. Pravin Kumar, Basic Mechanical Engineering, Pearson learning, 2013.
3. M. L. Sharma and R. P. Mathur, Internal Combustion Engines, Dhanpat Rai Publications, 2014

Head of Department
Mechanical Engineering
Global Academy of Technology
Bangalore - 98

4. Dr.P.Radhakrishnan, CAD/CAM/CIM, 3rd edition, New Age International Publishers, New Delhi, 2008
5. V K Manglik, Elements of Mechanical Engineering, PHI Publications, 2013
6. Hajra Choudhry S K, Elements of Workshop Technology, Vol 1 and 2, 2009

Web links and Video Lectures (e-Resources):

- . https://www.tlv.com/global/TI/steam-theory/principal-applications-for-steam.html
- https://www.forbesmarshall.com/Knowledge/SteamPedia/About-Steam/Fundamental-Applications-of-Steam
- https://rakhoh.com/en/applications-and-advantages-of-steam-in-manufacturing- and process-industry/)
- Videos | Makino (For Machine Tool Operation)

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

1. Visit to any manufacturing/aero/auto industry or any power plant
2. Demonstration of lathe/milling/drilling/CNC operations
3. Demonstration of working of IC engine/refrigerator
4. Demonstration of metal joining process
5. Video demonstration of latest trends in mobility/robotics

Scheme of Examination:

Semester End Examination (SEE): SEE Question paper is to be set for 100 marks and the marks scored will be proportionately reduced to 50. There will be two full questions (with a maximum of four sub-questions) from each module carrying 20 marks each. Students must answer any **five full questions** choosing at least **one full question from each module.**

Continuous Internal Evaluation (CIE): Three Tests are to be conducted for 40 marks each. An average of three tests is taken, and CIE is executed through quizzes / Alternate Assessment Tools (AATs) for 10 marks.

Some possible AATs: Assignments/ group activity / any other.

The typical Evaluation pattern for regular courses is shown in Table 2.

Table 2: Distribution of weightage for CIE & SEE of Regular courses

	Component	Marks	Total Marks
CIE	CIE Test-1	40	50
	CIE Test-2	40	
	CIE Test-3	40	
	Quiz/AAT	10	
SEE	Semester End Examination	100	50
		Grand Total	100

CO/PO Mapping												
CO/PO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO103.1	3	1	-	-	-	1	2	-	-	-	-	1
CO103.2	3	1	-	-	-	1	2	-	-	-	-	1
CO103.3	3	1	-	-	-	1	2	-	-	-	-	1
CO103.4	3	1	-	-	-	1	2	-	-	-	-	1
CO103.5	3	1	-	-	-	1	2	-	-	-	-	1
Average	**3**	**1**	**-**	**-**	**-**	**1**	**2**	**-**	**-**	**-**	**-**	**1**

Low - 1: Medium - 2: High - 3

Head of Department
Mechanical Engineering
Global Academy of Technology
Bangalore - 98

SEMESTER – I/II

Course: *INTRODUCTION TO ELECTRONICS AND COMMUNICATION*

Course Code	BESCK24104B/204B	CIE Marks	50
Hours/Week (L: T: P)	3:0:0	SEE Marks	50
Credits	03	Examination Hours	03

Course Learning Objectives: Students will be taught;

CLO1	Operation of a Semiconductor diode and its applications
CLO2	Biasing circuits for transistor (BJT) as an amplifier
CLO3	Op-amps and its applications.
CLO4	Number systems and basic Logic circuits.
CLO5	Oscillators and basics of Communication system.

Content	No. of Hours/ RBT levels
Module 1 **Semiconductor Diode and Applications:** Introduction, V-I Characteristics of PN Junction diode, Diode current equation, Effect of temperature on diode characteristic, ideal diodes, Practical /Real diode, Diode applications, working of Half wave rectifier, Center tapped Full Wave Rectifier-Operation, Advantages and Disadvantages, Full Wave Bridge Rectifier-Operation, advantages and disadvantages, Filters, Capacitor filter. (Text1: 5-1 to 5-7, 5-9, 5-10, 8-1, 8-2, 8-7, 8-12, 8-13,8-17 8-26, 8-27 & 8-29)	8 Hours L2
Module 2 **BJT Biasing:** Introduction, DC operating point and Load Line, Methods of Transistor Biasing - Fixed/Base Bias and Voltage Divider Bias (Text 1: 12-1,12-2, 12-3,12-4, 12-10,12-11, 12-17). **Single Stage BJT amplifier:** Introduction, Classification of amplifier and Transistor as an Amplifier, RC Coupled amplifier, Transformer Coupled amplifier and Direct Coupled amplifier. (Text 1: 16-1, 16-2, 16-3, 18-4, 18-6, 18-7, 18-10, 18-12, 18-13, 18-15,18-18,18-19).	8 Hours L2
Module 3 **Op-Amps and its Applications:** Introduction, modes of operation, Op-Amp parameters - Gain, input resistance, Output resistance, CMRR, slew rate, Bandwidth, input offset voltage, input bias Current and Input Offset Current. Applications- Inverting amplifier, Non-Inverting Amplifier, Voltage Follower, Summer, Differential/Difference amplifier, Integrator and Differentiator. (Text 1: 29-1 to 29-13, 30-3 & 30-5)	8 Hours L3

Module 4	8 Hours
Binary Systems: Binary numbers, Number Base Conversion, octal & Hexa Decimal Numbers, 1's & 2's Complements. (Text 2: 1.2, 1.3, 1.4 & 1.5) **Boolean Algebra and Logic Circuits:** 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, Realization of Boolean expressions. Adders- Half adder, Full adder (Text 2: 2.1 to 2.7, 4.3.1 & 4.3.2)	L2
Module 5	**8 Hours**
Sinusoidal Oscillators: Introduction, Classification of Oscillators, Nature of Sinusoidal oscillations, Oscillatory circuit, Barkhausen criterion, Tuned oscillators –BJT based Hartley and Colpitts (Text 1: 25-1, 25-3, 25-5, 25-6, 25-9, 25-10, 25-14 & 25-15). **Communication Systems:** Introduction, Radio frequency Spectrum, Modulation, Need for modulation, Methods of Modulation/schemes, Amplitude Modulation: – Percentage Modulation, Upper and Lower frequencies and side bands, Mathematical analysis of a Modulated Carrier Wave,Power relation in an AM Wave. (Text 1:32-1,32-3 32-5, 32-7, 32-8, 32-9, 32-10, 32-11, 32-12, 32-13, 32-14)	L3

COURSE OUTCOMES: Upon completion of this course, student will be able to:

CO1	Apply the knowledge of diodes as a rectifiers.
CO2	Analyze the biasing circuit for transistor as an amplifier
CO3	Explain the operation of Op-Amp circuits for various applications.
CO4	Apply Boolean algebra in logic circuits synthesis.
CO5	Explain the concept of Oscillator and Communication system.

Textbooks:

1. Dr. R.S. Sedha, "Electronic Circuits", S Chand and Company Pvt Ltd, 3rd Revised edition, Reprint 2020.
2. Morris Mano, "Digital Logic and Computer Design", Prentice Hall India Publication, Second Impression-2017.

Reference books:

1. Robert L. Boylestad, "Electronic Devices and Circuit Theory", Prentice Hall of India Pvt Ltd., 11th edition,2015, 2020 reprint.
2. David A Bell, "Electronic Devices and Circuits", Oxford University Press, Fifth Edition.

Scheme of Examination:

Semester End Examination (SEE):

SEE Question paper is to be set for 100 marks and the marks scored will be proportionately reduced to 50. There will be two full questions (with a maximum of three sub questions) from each module carrying 20 marks each. Students are required to answer any **five full questions** choosing at least **one full question** from each module.

Continuous Internal Evaluation (CIE):

Three Tests are to be conducted for 40 marks each. Average of Marks scored in all three tests is added to test component. CIE is executed by way of quizzes / Alternate Assessment Tools (AATs), and three tests. **Some possible AATs:** Seminar/assignments/ mini-projects/ concept videos/ partial reproduction of research work/ group activity/ any other. Typical Evaluation pattern for regular courses is shown in Table 1

Table 1: Distribution of weightage for CIE & SEE of Regular courses

	Component	Marks	Total Marks
CIE	CIE Test-1	40	50
	CIE Test-2	40	
	CIE Test-3	40	
	Assignments	10	
SEE	Semester End Examination	50	50
Grand Total			100

CO-PO and PSO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	-	-	-	-	-	-	-	1	-	1	-	-
CO2	3	2	-	-	-	-	-	-	-	1	-	1	-	-
CO3	3	2	-	-	-	-	-	-	-	1	-	1	-	-
CO4	3	2	-	-	-	-	-	-	-	1	-	1	-	-
CO5	3	2	-	-	-	-	-	-	-	1	-	1	-	-
Average	3	2	-	-	-	-	-	-	-	1	-	1	-	-

SEMESTER I/II

SUBJECT: Introduction to Civil Engineering

Subject Code	**BESCK24104/204A**	**CIE Marks**	**50**
Hours/Week (L: T: P)	**3:0:0**	**SEE Marks**	**50**
No. of Credits	**03**	**Examination Hours**	**03**

Course Objectives: At the end of the course the student should be able to

CLO1	Learn the scope of various specializations of civil engineering.
CLO2	Learn the concepts of sustainable infrastructure
CLO3	Analyze the problems involving forces, moments with their applications.
CLO4	To find out the center of gravity and moment of inertia and their applications.
CLO5	Learn about kinematics

Content	**No. of Hours/ RBT levels**
Module-1 **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:** Bricks, Cement & mortars, Plain, Reinforced &Pre-stressed Concrete, Structural steel, Construction Chemicals. **Structural elements of a building:** foundation, plinth, lintel, chejja, Masonry wall, column, beam, slab and staircase.	**10 Hours L3**
Module - 2 **Societal and Global Impact of Infrastructure** **Infrastructure:** Introduction to sustainable development goals, Smart city concept, clean city concept, Safe city concept **Environment:** Water Supply and Sanitary systems, urban air pollution management, Solid waste management, identification of Landfill sites, urban flood control **Built-environment:** Energy efficient buildings, recycling, Temperature and Sound control in buildings, Security systems; Smart buildings.	**10 Hours L3**

Module - 3 **Analysis of force systems**: Concept of idealization, system of forces, principles of superposition and transmissibility, Resolution and composition of forces, Law of Parallelogram of forces, Resultant of concurrent and non-concurrent coplanar force systems, moment of forces, couple, Varignon's theorem, free body diagram, equations of equilibrium, equilibrium of concurrent and non-concurrent coplanar force systems	**10 Hours L3**
Module- 4 **Centroid:** Importance of centroid and centre of gravity, methods of determining the centroid, locating the centroid of plane laminae from first principles, centroid of built-up sections. Numerical examples	**10 Hours L3**
Module - 5 **Moment of inertia:** Importance of Moment of Inertia, method of determining the second moment of area (moment of inertia) of plane sections from first principles, parallel axis theorem and perpendicular axis theorem, section modulus, radius of gyration, moment of inertia of built-up sections, Numerical Examples.	**10 Hours L3**

Course Outcomes: The students will be able to:

BESCK24104/204A.1	Understand the various disciplines of civil engineering
BESCK24104/204A.2	Understand the infrastructure requirement for sustainable development
BESCK24104/204A.3	Compute the resultant and equilibrium of force systems.
BESCK24104/204A.4	Locate the centroid of plane and built-up sections
BESCK24104/204A.5	Compute the moment of inertia of plane and built-up sections.

Textbooks:

1. Bansal R. K., Rakesh Ranjan Beohar and Ahmad Ali Khan, Basic Civil Engineering and Engineering Mechanics, 2015, Laxmi Publications.
2. Kolhapure B K, Elements of Civil Engineering and Engineering Mechanics, 2014, EBPB

Reference books:

1. S. Rajasekharan, G. Sankarsubramanian, "Engineering Mechanics- Statics and Dynamics" - Vikas Publishing House, 2011
2. F. P. Beer and E. R. Johnston et.al., Vector Mechanics for Engineers - Statics and Dynamics, McGraw-Hill; 12th edition, 2019
3. R. C. Hibbler, Engineering Mechanics: Statics and Dynamics, Pearson Education; 14th edition, 2017
4. S. Timoshenko, D.H. Young, J.V. Rao, Sukumar Pati, Engineering Mechanics (In SI Units),McGraw Hill Education; 5th edition, 2017

Web Reference:

https://nptel.ac.in/courses/112106286

Scheme of Examination:

Semester End Examination (SEE):

SEE Question paper is to be set for 100 marks and the marks scored will be proportionately reduced to 50. There will be two full questions (with a maximum of four sub questions) from each module carrying 20 marks each. Students are required to answer any five full questions choosing at least one full question from each module.

Continuous Internal Evaluation (CIE):

Three Tests are to be conducted for 40 marks each. Average of three test marks will be added to test component. CIE is executed by way of two quizzes / Alternate Assessment Tools (AATs), and two tests. **Some possible AATs:** seminar/assignments/ mini-projects/ concept videos/ partial reproduction of research work/ group activity/ any other.

Typical Evaluation pattern is shown in Table 1.

Table 1: Distribution of weightage for CIE & SEE of Regular courses

Component		Marks	Total Marks
CIE	CIE Test-1	40	**50**
	CIE Test-2	40	
	CIE Test-3	40	
	Average of CIE	**40**	
	Quiz 1/AAT	05	
	Quiz 2/AAT	05	
SEE	**Semester End Examination**	**50**	**50**
Grand Total			**100**

CO-PO/PSO Mapping															
CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
BESCK24104/204A.1	3	1													
BESCK24104/204A.2	2	2													
BESCK24104/204A.3	3	2	1												
BESCK24104/204A.4	2	2	1												
BESCK24104/204A.5	2	2	1												
Average	**2.40**	**1.8**	**1**												

SEMESTER –I/II

SUBJECT: Introduction to Electrical Engineering

Subject Code	BESCK24104/204C	CIE Marks	50
Hours /Week	3:0:0	SEE Marks	50
Total Hours	40	Examination Hours	03
No. of Credits:3			

Course Learning Objectives:

CLO 1	Analysis of DC circuits.
CLO 2	Analysis of single phase AC circuits.
CLO 3	Explain the three phase circuit and three phase Synchronous Generators .
CLO 4	Understand the principle of operation, construction of single-phase transformer and three phase Induction motor.
CLO 5	Understand the importance of Green energy systems, Electric vehicles and necessity of earthing

Contents	No. of Hours / RBT Levels
Module – 1: DC Circuits: Basics concepts, Ohm's law, Kirchhoff's laws, analysis of series, parallel and series parallel circuits excited by independent voltage sources only. Power and energy in resistor. Analysis of Two loop circuits by Loop or mesh current method. (**Two loop circuits only**)	8/L3
Module – 2: Single Phase AC Circuits **Basics Terminology:** Generation of sinusoidal voltage, frequency of generated voltage, average value, root mean square value, form and peak factors. **Analysis of Circuits:** Voltage and current relationship, with phasor diagrams, in R, L, C, R-L, R-C and R-L-C series circuits. Concept of apparent, real, and reactive powers. Significance of power factor.	8/L4
Module – 3: Three Phase AC Circuits and Synchronous Generator Three Phase AC Circuits: Advantages of three phase systems, Generationof three phase voltages, meaning of phase sequence, Relationship betweenline and phase quantities for balanced star and delta connections for balancedloads. **Synchronous Generator**: Principle of operation and construction of Synchronous Generator, types and EMF equation (**Excluding the derivation and Calculation of winding factors**).	8/L2
Module – 4: Single-phase Transformer and Three Phase Induction Motor **Single-phase Transformer:** Principle of operation and construction, types, EMF equation, losses and efficiency calculations (Condition for maximum efficiency excluded). **Three phase Induction Motor:** Principle of operation and construction, types, concept of rotating magnetic field, slip and significance of slip, Advantages and applications. (**Numerical problems on slip calculations only**)	8/L2
Module – 5: Green Energy Sources and Electric vehicles **Green Energy Sources:** Solar and Wind energy generation systems. **Introduction to Electric vehicles:** Overview and block diagram approach to electric vehicles. **Earthing:** Necessity of Earthing and Types of Earthing.	8/L2

Text Books				
1.	Basic Electrical Engineering	Kulshreshtha. D.C	Tata McGrawHill	2012
Reference Books				
1.	Basic Electrical Engineering	V. K. Mehta, Rohit Mehta	S Chand	2017
2.	Fundamentals of Electrical and Electronics Engineering	Samarjit Ghosh	PHI Learning	2007
3.	Hughes Electrical and ElectronicTechnology	John Hiley, Keith Brown, Ian Mckenzie Smith	Pearson Education	Tenth Edition Revised 2020
4.	Basic Electrical and ElectronicsEngineering	S. K. Bhattacharya	Pearson Education	2011
5.	A Text Book of Electrical Technology – Volume 1 (Basic Electrical Engineering) in SI system of units BL Theraja	BL. Theraja AK. Theraja	S. Chand	1999
6.	Electrical Engineering Fundamentals	Vincent Deltoro	Pearson	2015
7.	Non -Conventional Energy Resources	Sobh Nath Singh	Pearson Education	2017

COs	Statement	Bloom's Cognitive level	POs/PSOs
CO1	Apply fundamental laws to DC circuits.	Apply	PO1, PO2, PO12
CO2	Analyze the behaviour of single phase AC circuits.	Analyze	PO1, PO2, PO12
CO3	Explain three phase AC circuits and synchronous generator.	Understand	PO1, PO2, PO12
CO4	Explain the constructional features, working of single phase transformer and three phase induction motor.	Understand	PO1, PO2, PO12
CO5	Discuss the working of green energy systems, electric vehicles and types of earthing.	Understand	PO1, PO2, PO12

Scheme of Examination:

Semester End Examination (SEE):

SEE Question paper is to be set for 100 marks and the marks scored will be proportionately reduced to 50.

There will be two full questions (with a maximum of four sub questions) from each module carrying 20 marks each. Students are required to answer any **five full questions** choosing at least **one full question from each module.**

Continuous Internal Evaluation (CIE):

Three Tests are to be conducted for 40 marks each. The average of the three tests are taken for computation of CIE final marks.

CIE is executed by way of quizzes / Alternate Assessment Tools (AATs), and three tests.

Some possible AATs: seminar/ assignments/term paper/ open ended experiments/ mini-projects/

concept videos/ partial reproduction of research work/ oral presentation of research work/ group activity/ developing a generic toolbox for problem solving/ report based on participation in create-athon/ make-a-thon/ code-a-thon/ hack-a-thon conducted by reputed organizations/ any other.

Table 2: Distribution of weightage for CIE & SEE of Regular courses

	Component	Marks	Total Marks
CIE	CIE Test – 1	40	50
	CIE Test – 2	40	
	CIE Test – 3	40	
	Quiz / assignment/group discussion/presentation/mini projects	10	
SEE	Semester End Examination	100	50
Grand Total			100

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3
CO1	3	2	-	-	-	-	-	-	-	-	-	2	-	-	-
CO2	3	2	-	-	-	-	-	-	-	-	-	2	-	-	-
CO3	3	2	-	-	-	-	-	-	-	-	-	2	-	-	-
CO4	3	2	-	-	-	-	-	-	-	-	-	2	-	-	-
CO5	3	-	-	-	-	-	-	-	-	-	-	2	-	-	-
Av.	3	2	-	-	-	-	-	-	-	-	-	2	-	-	-

SEMESTER – I/II

INTRODUCTION TO C PROGRAMMING (Integrated)

Course Code:	BESCK24104/204D	CIE Marks	50
Hours/Week (L: T: P)	2:0:2	SEE Marks	50
Total Hours	40	Examination Hours	3
No. of Credits	3		

Course Learning Objectives:

The course will enable students to:

CLO1	Elucidate the basic architecture and functionalities of a Computer
CLO2	Apply programming constructs of C language to solve the real-world problems
CLO3	Explore user-defined data structures like arrays, structures and pointers in implementing solutions to problems
CLO4	Design and Develop Solutions to problems using modular programming constructs such as functions and procedures

CONTENTS	# of Hours
MODULE 1 **Introduction to C:** Introduction to computers, input and output devices, designing efficient programs. Introduction to C, Structure of C program, Files used in a C program, Compilers, Compiling and executing C programs, variables, constants, Input/output statements in C.	08
MODULE 2 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.	08
MODULE 3 **Functions:** Introduction using functions, Function definition, function declaration, function call, return statement, passing parameters to functions, scope of variables, storage classes, recursive functions. **Arrays:** Declaration of arrays, accessing the elements of an array, storing values in arrays, Operations on arrays, Passing arrays to functions.	08
MODULE 4 Two dimensional arrays, operations on two-dimensional arrays, two-dimensional arrays to functions, multidimensional arrays. **Applications of arrays and introduction to strings:** Applications of arrays, case study with sorting techniques. **Introduction to strings:** Reading strings, writing strings, summary of functions used to read and write characters. Suppressing input using a Scanset.	08
MODULE 5 **Strings:** String taxonomy, operations on strings, Miscellaneous string and character functions, arrays of strings. **Pointers:** Understanding the Computers Memory, Introduction to Pointers, Declaring Pointer Variables **Structures:** Introduction to structures	08

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Course Outcomes:

Upon successful completion of this course, student will be able to

CO1	Elucidate the basic architecture and functionalities of a computer and also recognize the hardware parts
CO2	Apply programming constructs of C language to solve the real world problem
CO3	Explore user-defined data structures like arrays in implementing solutions to problems like searching and sorting
CO4	Explore user-defined data structures like structures, unions and pointers in implementing solutions
CO5	Design and Develop Solutions to problems using modular programming constructs using functions

Text Books:

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.

Web links and Video Lectures (e-Resources):

1. elearning.vtu.ac.in/econtent/courses/video/BS/15PCD23.html
2. https://nptel.ac.in/courses/106/105/106105171/ MOOC courses can be adopted for more clarity in understanding the topics and verities of problem solving methods.

Lab Assignments

1	C Program to find Mechanical Energy of a particle using $E = mgh+1/2\ mv^2$
2	C Program to convert Kilometers into Meters and Centimeters.
3	C Program to Check the Given Character is Lowercase or Uppercase or Special Character.
4	Program to balance the given Chemical Equation values x, y, p, q of a simple chemical equation of the type: The task is to find the values of constants b1, b2, b3 such that the equation is balanced on both sides and it must be the reduced form.
5	Implement Matrix multiplication and validate the rules of multiplication.
6	Compute sin(x)/cos(x) using Taylor series approximation. Compare your result with the builtin 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	Implement structure stored, write and compute average marks and the students scoring above and below the average marks for a class of N students.
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.

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SEMESTER I/II

SUBJECT: Engineering Geology (Integrated)

Subject Code	**BESCK24104/204F**	**CIE Marks**	**50**
Hours/Week (L: T: P)	**2:0:2**	**SEE Marks**	**50**
No. of Credits	**03**	**Examination Hours**	**03**

Course Objectives: At the end of the course the student should be able to

CLO1	To identify the minerals & and their Physical properties, composition & uses.
CLO2	The Engineering Properties of Rocks & uses in construction, and as foundation materials.
CLO3	The Distribution of rocks in geo-tectonic setup, the seismic zones and natural hazards.
CLO4	To Understand the earth's interior and landform by exogene and endogene agents.
CLO5	To identify the minerals & and their Physical properties, composition & uses.

Content	**No. of Hours/ RBT levels**
Module-1 **Earth resources:** Introduction, Application of geology in Civil Engineering. **Minerals**-definition, classification, texture composition and industrial uses. **Rocks** – classification and types; Igneous, Sedimentary, and metamorphic. Engineering properties, texture, and composition of rocks. Rocks as construction materials –aggregates - natural sand, M-sand, road metals and railway ballast. Decorative stone facing/polishing/monumental/architectural stones.	**7 Hours L2**
Module - 2 **Site selection for projects:** Soil formation and types of soil, prevention of soil erosion. **Fluvial process** – Erosion, transportation, and deposition; and l and formed by river. Subsurface water and groundwater systems–Aquifers, porosity and permeability, water-bearing properties of materials, groundwater recharge .	**5 Hours L3**

Module - 3 **Structures in rocks** – Stress, Strain and deformation, Dip, and strike of rocks– Numerical problems. Folds, faults, joints, and unconformities; types, causes, and effects, Engineering considerations. **Selection of site for mega structures** – Dams, reservoirs, tunnels, and Highways **Subsurface investigation** through the boreholes, problems, electrical resistivity investigations and geophysical techniques -electrical, seismic and GPR.	**6 Hours L2**
Module- 4 **Geodynamics and natural hazards:** Geodynamics, Plate tectonics, Earthquake - types, causes, seismic zones of India and Earthquake resistant structures, Tsunamis – causes, impacts. Volcano types and causes, Impacts, Landslides- cause, types, preventive measures. Tsunami warning system.	**6 Hours L3**
Module - 5 **Mapping techniques:** Types of Maps, Toposheets Concept of Latitude, longitude. Aerial survey – Types and application in Civil Engineering. Remote Sensing- Sensors and resolution, Satellite Image interpretation and application, GIS and GPS – Concept, component, and types. Environment, climate change and costal erosion.	**4 Hours L2**

Lab Component:

Sl.No	Content	No. of Hours/RBT Levels
1	Identification of rock-forming and ore-forming minerals	4hrs/L2
2	Identification of rocks	2hrs/L3
3	Interpretation of geological maps in folded and faulted strata	2hrs/L2
4	Interpretation of geological maps for tunnelling and dam construction	2hrs/L3
5	Visual interpretation of toposheets and satellite images	2hrs/L2

Course Outcomes: The students will be able to:

BESCK24104/204F.1	**Comprehend** the relations between minerals and rocks based on their respective physical properties
BESCK24104/204F.2	**Understand** the weathering extent and its effect on civil engineering. structures

BESCK24104/204F.3	**Differentiate** geological investigations necessary for the construction of dams, bridges, and tunnels
BESCK24104/204F.4	**Explain** the phenomena of the earth based on exogenous and endogenous Processes.
BESCK24104/204F.5	**Understand** the applications of Remote Sensing and Geographic Information Systems in Civil Engineering.

Text books:

1. Engineering Geology, by Parthasarathy et al, Wiley, 1st Edition, 2013
2. Engineering Geology by Chenna Kesavulu, Macmillan Publishers India, 1993, ISBN-10: 0333927079
3. Principle of Engineering Geology, by K.M. Bangar, Standard publishers

Reference books:

1. Engineering Geology and Rock Mechanics B. P. Verma,4th edition, Khanna publishers, ISBN: 978-93-87394-15-5
2. Principles of Engineering Geology and Geotechnics,1 January 2005, Krynine and Judd, CBS Publications, ISBN-13 : 978-8123906034
3. Principles of Engineering Geology, by KVGK Gokhale, BS Publications, 1 December 2016 ISBN-13 : 978-9352300655
4. Text Book of Engineering Geology by K N Radhika & B C Prabhakar , Walnut publication
5. Physical and Engineering Geology, 7th edition, by S.K. Garg, Khanna publishers, ISBN: 978- 81-7409-032-4

Web Reference:

1. https://www.youtube.com/watch?v=aTVDiRtRook&list=PLDF5162B475DD915F
2. https://www.youtube.com/watch?v=EBiLLJAxBuU&index=2&list=PLDF5162B475DD 915F
3. https://www.youtube.com/watch?v=sTY-ao4RZck&list=PLDF5162B475DD915F&index=3

https://nptel.ac.in/courses

4. https://youtu.be/fvoYHzAhvVM
5. https://youtu.be/aTVDiRtRook

Scheme of Examination:

Semester End Examination (SEE):

SEE Question paper is to be set for 100 marks and the marks scored will be proportionately reduced to 50. There will be two full questions (with a maximum of four sub questions) from each module carrying 20 marks each. Students are required to answer any five full questions choosing at least one full question from each module.

Continuous Internal Evaluation (CIE):

Three Tests are to be conducted for 40 marks each. Average of three test marks will be added to test component. CIE is executed by way of two quizzes / Alternate Assessment Tools (AATs), and two tests. **Some possible AATs:** seminar/assignments/ mini-projects/ concept videos/ partial reproduction of research work/ group activity/ any other.

Typical Evaluation pattern is shown in Table 1.

Table 1: Distribution of weightage for CIE & SEE of Regular courses

	Component	Marks	Total Marks
CIE	CIE Test-1	30	50
	CIE Test-2	30	
	CIE Test-3	30	
	Laboratory	20	
SEE	Semester End Examination	100	50
		Grand Total	100

CO-PO/PSO Mapping															
CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
BESCK24104/204F.1	-	3	-	-	-	2	2	-	-	-	-	-	-	-	-
BESCK24104/204F.2	-	2	-	-	-	1	-	-	-	-	-	-	-	-	-
BESCK24104/204F.3	-	-	-	-	-	2	2	-	-	-	-	-	-	-	-
BESCK24104/204F.4	3	-	-	-	-	2	-	-	-	-	-	-	-	-	-
BESCK24104/204F.5	3	2	-	-	-	2	-	-	-	-	-	-	-	-	-
Average	3	2.7	-	-	-	1.8	2	-	-	-	-	-	-	-	-

SEMESTER – I/II

COURSE: Introduction to Engineering Mechanics

Course Code	BESCK24104/204E	CIE Marks	50
Hours/Week (L: T: P)	3 : 0 : 0	SEE Marks	50
No. of Credits	3	Examination Hours	03

Overview: The course is designed for I/II semester engineering students of all branches. It covers fundamental concepts and principles of Engineering Mechanics, and the application of these basic principles to solve static equilibrium problems related to Mechanical, Civil, Automobile, Aeronautical, Mechatronics, Robotics, and other allied Engineering branches where analysis for forces and displacement of particles or rigid bodies is involved. It also introduces real-life problems involving forces and computer applications to solve Engineering Mechanics problems. Knowledge of basic mathematics and physics is essential for the course.

Course Objectives: This course enables the students to

CLO1	Understand the scalar presentation of forces and moments, apply the principles of engineering mechanics to particles and rigid bodies in equilibrium subjected to coplanar system of forces.
CLO2	Realize the mechanical and sectional properties of engineering materials.
CLO3	Analyze the forces in the members of trusses.

Content	No. of Hours/ RBT levels
Module 1: Statics of particles **Introduction to Engineering Mechanics:** Basic idealization and principles in Engineering Mechanics. Newton's laws of motion, units and dimensions, scalar, and vectors. Force and Systems of Forces, Moment of a force and couple, **Lami's theorem**: Equations of equilibrium for coplanar concurrent force systems. (Simple numericals, No derivation of Lami's theorem)	08 Hours / L3
Module 2: Equilibrium of Rigid bodies **Equilibrium of Forces:** Free body diagrams, Vector representation of forces., Varignon's theorem, Resolution and composition of forces – Coplanar concurrent and non-concurrent force system. **Beams:** Support reactions for statically determinate beams at different loading conditions.	08 Hours / L3
Module 3: Centroid **Centroid**: Importance of centroid and centre of gravity, methods of determining the centroid, locating the centroid of plane laminae from first principles, centroid of built-up sections. Numerical examples	08 Hours / L3

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Bangalore - 98

Module 4: Moment of Inertia **Moment of Inertia:** Importance of Moment of Inertia, method of determining the second moment of area (moment of inertia) of plane sections from first principles **Friction:** Introduction, Frictional force, Types of friction-Static friction and Dynamic friction, Limiting friction, Laws of friction – Laws of Static friction and Laws of Dynamic friction, Angle of friction, Angle of Repose, Ladder friction. Problems on Static friction –Inclined plane and ladder friction.	08 Hours / L3
Module 5: Analysis of trusses **Trusses:** Types of trusses, Assumptions in analysis, Analysis of determinate trusses by method of joints. **Simple Machines:** Introduction to Simple Machines (levers, pulleys). Mechanical advantage, Law of Machines and efficiency.	08 Hours / L3

COURSE OUTCOMES: Upon completion of this course, students will be able to

BESCK24104E/204E.1	Categorize the system of forces and analyze for resultant of forces acting on structural elements.
BESCK24104E/204E.2	Write the equations of equilibrium and analyze the determinate structure for forces and moments.
BESCK24104E/204E.3	Evaluate the centroid and moment of inertia of plane and composite sections and discuss work and energy principles.
BESCK24104E/204E.4	Apply equations of equilibrium in analyzing frictional forces.
BESCK24104E/204E.5	Determine the forces in the members of trusses by method of joints and understand the mechanical advantage of simple machines.

Textbooks:

1. Kumar, K. L., Kumar, V. Engineering Mechanics, Tata McGraw Hill, 4th edition, 2017
2. Bansal R. K., Rakesh Ranjan Beohar and Ahmad Ali Khan, Basic Civil Engineering and Engineering Mechanics, 2015, Laxmi Publications.
3. Kolhapure B K, Elements of Civil Engineering and Engineering Mechanics, 2014, EBPB

Reference books:

1. S. Rajasekharan, G. Sankarsubramanian, "Engineering Mechanics- Statics and Dynamics" - Vikas Publishing House, 2011
2. F. P. Beer and E. R. Johnston et.al., Vector Mechanics for Engineers - Statics and Dynamics, McGraw-Hill; 12th edition, 2019
3. R. C. Hibbler, Engineering Mechanics: Statics and Dynamics, Pearson Education; 14th edition, 2017
4. S. Timoshenko, D.H. Young, J.V. Rao, Sukumar Patil, Engineering Mechanics (In SI Units), McGraw Hill Education; 5th edition, 2017.

E-Books / Web References

1. https://nptel.ac.in/courses/112106286

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Scheme of Examination: (Theory courses)

Semester End Examination (SEE):

SEE Question paper is to be set for 100 marks and the marks scored will be proportionately reduced to 50. There will be two full questions (with a maximum of four sub questions) from each module carrying 20 marks each. Students are required to answer any **five full questions** choosing at least **one full question from each module.**

Continuous Internal Evaluation (CIE): Three Tests are to be conducted for 40 marks each. The average of the three tests are taken for computation of CIE on a scale of 40. CIE is executed by way of two quizzes / Other Assessment Tools (OATs), and three tests.

Some possible AATs: Assignments / Oral presentations / Group activity/Projects

Typical Evaluation pattern for regular courses is shown in Table 2.

Table 2: Distribution of weightage for CIE & SEE of Regular courses

	Component	Marks	Total Marks
CIE	CIE Test-1	40	50
	CIE Test-2	40	
	CIE Test-3	40	
	Quiz /AAT	10	
SEE	Semester End Examination	100	50
Grand Total			100

CO/PO Mapping												
CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
BESCK24104E/204E.1	3	1	-	-	-	-	-	-	-	-	-	1
BESCK24104E/204E.2	2	2	-	-	-	-	-	-	-	-	-	1
BESCK24104E/204E.3	3	2	1	-	-	-	-	-	-	-	-	1
BESCK24104E/204E.4	2	2	1	-	-	-	-	-	-	-	-	1
BESCK24104E/204E.5	2	2	1	-	-	-	-	-	-	-	-	1
BESCK24104E/204E	**3**	**2**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1**

Low - 1: Medium - 2: High - 3

Head of Department
Mechanical Engineering
Global Academy of Technology
Bangalore - 98

SEMESTER – I/II

INTRODUCTION TO AERONAUTICAL ENGINEERING (Integrated)

Course Code	BESCK24104G	CIE Marks	50
Hours/Week (L: T: P)	2:0:2	SEE Marks	50
No. of Credits	3	Examination Hours	03

Course Objectives:

By learning the 'Introduction to Aeronautical Engineering' course students can be able to

CLO1	Understand the Historical evaluation of Airplanes & different structures & construction
CLO2	Understand the basic properties and principles behind the flight
CLO3	Study the various types of power plants used in aircraft
CLO4	Study of the Aircraft Performance
CLO5	Study the different component systems and functions

Content	No. of Hours/ RBT levels
Module 1 **Introduction to Aircrafts** History of aviation; Atmosphere and its properties; Classification of aircrafts; Basic components of an aircraft; structural members; aircraft axis system; aircraft motions; control surfaces and high lift devices; conventional design configurations; Helicopters, their parts and functions. **Aircraft Structures and Materials** Introduction; general types of construction; monocoque, semi monocoque and geodesic structures; typical wing and fuselage structure; metallic and non-metallic materials for aircraft application.	08 Hours L3
Module 2 **Aerodynamics** Basic principles of flight – significance of speed of sound; airspeed and groundspeed; Bernoulli's theorem; forces over wing section, aero foil nomenclature, pressure distribution over a wing section. Lift and drag components, lift curve, drag curve, types of drag, factors affecting lift and drag; Centre of pressure and its significance; aerodynamic Centre, aspect ratio, Mach number and supersonic flight.	08 Hours L3
Module 3 **Aircraft Propulsion** Aircraft power plants, classification based on power plant and principle of operation. Turboprop, turbojet and turbofan engines; ramjets and scramjets; performance characteristics. Aircraft power plants – basic principles of piston, turboprop and jet engines; Brayton cycle and its application to gas turbine engines; use of propellers and jets for production of thrust; comparative merits and limitations of different types of propulsion engines; principle of thrust augmentation.	08 Hours L3

Module 4 **Aircraft performance** Mission profile, Equations of Motion: Static Performance, Thrust Required, Power Required: Cruise, Excess Thrust and Power: Climb Angle and Rate of Climb, Range and Endurance, Gliding Flight, Accelerated Flight, V-n Diagram	**08 Hours** **L3**
Module 5 **Aircraft Systems** Mechanical systems and their components; hydraulic and pneumatic systems; oxygen System; environmental Control System; fuel system. Electrical systems, flight deck and cockpit systems; navigation systems, and communication systems. Flight control system, cockpit instrumentation and displays; communication systems; navigation systems; power generation systems – engine driven alternators, auxiliary power Module, ram air turbine; power conversion, distribution and management.	**10 Hours** **L3**

Practical Component of IPCC

Sl. No	Experiments
1	Create a paper plane model and calculate the Range and Endurance of the same.
2	Sketching the detailed configuration of Aircraft (Fighter or Commercial)
3	Fabrication on types of wing configuration-Foam or Balsa wood
4	Fabrication of glider using balsa wood (unpowered)
5	Calculate the CG of the modelled Glider & Assess the aerodynamic performance parameter i.e. Range & Endurance
6	Flight testing on the gliders (belly landing)
7	Design & Fabrication of Ornithopter
8	Design & Fabrication of Lighter Than Air Concepts (Para Gliding)
9	Visualisation of the concept of landing
10	Sugar candy solid propellant
11	Design & Fabrication of powered gliders
12	Case Study on Aircraft Crash Investigation

COURSE OUTCOMES:

Upon completion of this course, students will be able to:

CO1	Learn the history of aircraft & developments over the years, acquire knowledge on Aircraft differentiate types and constructions
CO2	Understand the basic concepts of flight & Physical properties of Atmosphere
CO3	Understand the Different types of Engines and principles of Rocket
CO4	Understand the Basics of aircraft performance
CO5	Ability to identify the types & classifications of components and control systems

Textbooks:

1. *Anderson, J.D., Introduction to Flight, McGraw-Hill; 8th edition, 2015*
2. *Handbooks of Airframe and Power Plant Mechanics, US dept. of Transportation, Federal, Aviation Administration, the English Book Store, New Delhi, 1995.*
3. *Mekinley, J.L. and R.D. Bent, Aircraft Power Plants, McGraw Hill 1993.*
4. *Pallet, E.H.J. Aircraft Instruments & Principles, Pitman & Co 1993.*
5. *Stephen.A. Brandt, Introduction to aeronautics: A design perspective, 2nd edition, AIAA Education Series, 2004.*

Reference books:

1. Kermode, A.C. Flight without Formulae, Pearson Education; Eleven edition, 2011
2. McKinley, J.L. and Bent R.D. Aircraft Maintenance & Repair, McGraw Hill, 1993.

Scheme of Examination:

Semester End Examination (SEE):

SEE Question paper is to be set for 100 marks and the marks scored will be proportionately reduced to 50. There will be two full questions (with a maximum of four sub questions) from each module carrying 20 marks each. Students are required to answer any **five full questions** choosing at least **one full question from each module.**

Continuous Internal Evaluation (CIE):

Three Tests are to be conducted for 40 marks each. CIE is executed by way of quizzes / Alternate Assessment Tools (AATs) for 10 marks

Table 1: Distribution of weightage for CIE & SEE of Regular courses

	Component	Marks	Total Marks
CIE	CIE Test-1	40	50
	CIE Test-2		
	CIE Test-3		
	Quizzes /Assignment	10	
SEE	Semester End Examination	50	50
Grand Total			100

CO/PO Mapping														
CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO36.1	3	3	-	-	-	-	-	-	-	-	-	3	3	-
CO36.2	3	3	-	-	-	-	-	-	-	-	-	3	3	-
CO36.3	3	3	-	-	-	-	-	-	-	-	-	3	3	-
CO36.4	3	3	-	-	-	-	-	-	-	-	-	3	3	-
CO36.5	3	3	-	-	-	-	-	-	-	-	-	3	3	-
Average	3	3	-	-	-	-	-	-	-	-	-	3	3	-

Low-1: Medium-2: High-3

SEMESTER – II

Course: Introduction to Embedded System

Course Code	BETCK24105B/205B	CIE Marks	50
Hours/Week (L: T: P)	3:0:0	SEE Marks	50
No. of Credits	3	Examination Hours	03

Course Objectives: Students will be taught;

CLO1	Components of an embedded system.
CLO2	Characteristics and quality attributes of an embedded system
CLO3	Introduction to 8051 microcontroller
CLO4	Types of instructions.
CLO5	Looping and Interfacing

Content	No. of Hours/ RBT levels
Module 1 **Introduction to Embedded System:** Introduction, Embedded Systems and general purpose computer systems, classifications, purpose of embedded systems, Elements of embedded systems, **Typical Embedded system:** Microprocessors and microcontrollers, Harvard architecture and Von-Neumann architecture, Memory, Sensors, Actuators, I/O subsystem: LED,7-Segment LED display, Relay, Push button Switch, On board Communication interface- Inter integrated circuits bus, UART and External communication Interfaces: R S 232 (excluding pin details,), USB and Bluetooth. Text1:1.1, 1.2, 1.4, 1.6, 2.1.1.4, 2.1.1.7, 2.2.1, 2.2.2, 2.3, 2.4.1.1, 2.4.1.3, & 2.4.2)	8 Hours L2
Module 2 **Characteristics and Quality Attributes of Embedded Systems:** Characteristics of an Embedded System, Quality Attributes of Embedded Systems. **Embedded systems – Application and domain -specific-** Washing machine-Application specific embedded system, Automotive -Domain specific examples of embedded system **Embedded Product Development Life Cycle (EDLC):** Introduction, objectives of EDLC, EDLC Approaches-Linear or waterfall model, Fountain model, Evolutionary model and Spiral Model. (Text 1:3.1, 3.2, 4.1, 4.2, 15.1, 15.2, 15.3 & 15.5)	8 Hours L2
Module 3 8051 Architecture: 8051 Microcontroller Hardware, I/O Pins and ports, External Memory and Addressing modes. (Text 2: 3.1, 3.2, 3.3 & 5.1)	8 Hours L3.
Module 4 **8051 Instructions:** External Data Moves, Code Memory Read -only Data Moves, Push and Pop opcodes, Data Exchanges, programs, Arithmetic, logic instructions Rotate and Swap instructions and Example Programs. (Text 2: 5.2, 5.3, 5.4, 5.5,5.6, 6.1, 6.3 & 6.4)	8 Hours L3.

Module 5	8 Hours L3
LOOP, CALL Instructions and Interfacing (programs using only ALP) LOOP and JUMP Instructions, CALL Instructions with programs, DAC Interfacing: Square wave, Sine, Triangular wave form generation and Stepper motor interface (Text 3: 3.1, 3.2 , 13.2 & 17.2)	

COURSE OUTCOMES: Upon completion of this course, student will be able to:

CO1	Understand the basic components of Embedded System
CO2	Explain the Characteristics and Quality attributes of Embedded System
CO3	Understand the architecture and different addressing modes in 8051.
CO4	Learn different instructions of 8051
CO5	Develop assembly language programs and interfacing.

Textbooks:

1. Shibu K V, "Introduction to Embedded Systems", 2nd Edition, McGraw Hill Education, 2009.
2. Kenneth J. Ayala, "The 8051 Microcontroller 3rd Edition, Thomson/Cengage Learning

Muhammed Ali Mazidi, Janice Mazidi, and Rolin McKinlay. 2005. 8051 Microcontroller and Embedded Systems, The (2nd Edition). Prentice-Hall, Inc

Scheme of Examination:

Semester End Examination (SEE):

SEE Question paper is to be set for 100 marks and the marks scored will be proportionately reduced to 50. There will be two full questions (with a maximum of three sub questions) from each module carrying 20 marks each. Students are required to answer any **five full questions** choosing at least **one full question** from each module.

Continuous Internal Evaluation (CIE):

Three Tests are to be conducted for 40 marks each. Average of Marks scored in all three tests is added to test component. CIE is executed by way of quizzes / Alternate Assessment Tools (AATs), and three tests. **Some possible AATs**: Seminar/assignments/ mini-projects/ concept videos/ partial reproduction of research work/ group activity/ any other. Typical Evaluation pattern for regular courses is shown in Table 1

Table 1: Distribution of weightage for CIE & SEE of Regular courses

	Component	Marks	Total Marks
CIE	CIE Test-1	40	50
	CIE Test-2	40	
	CIE Test-3	40	
	Assignments	10	
SEE	Semester End Examination	50	50
Grand Total			100

CO-PO and PSO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	1	2				2						2		
CO2	2	2				2						2		
CO3	2	2				2						2		
CO4	2	2				2						1		
CO5	3	2				2						1		
Average	2	2				2						2		

SEMESTER –I

Course: Sensor Systems

Subject Code	BETCK24105C	CIE Marks	50
Hours /Week	3:0:0	SEE Marks	50
Total Hours	40	Examination Hours	03
No. of Credits:3			

Course Objectives:

CLO 1	Discuss the classical measurement methods to measure resistance, inductance and capacitance
CLO 2	Explain the methods of voltage, current and power measurements.
CLO 3	Explain the classification of sensors and discuss sensor performance characteristics.
CLO 4	Describe the working principle and applications of LVDT, thermoelectric sensors, strain gauges and piezoelectric sensors.
CLO 5	Describe the working of hall effect sensors, MEMs based sensors, wireless sensors and bio sensors and list the applications.

Contents	No. of Hours / RBT Levels
Module 1: Classical Methods of Sensing Resistance, Inductance and Capacitance **Measurement of Resistance:** Classification of Resistance, Measurement of Resistance - Kelvin Double Bridge, Wheatstone Bridge, Measurement of Earth Resistance – Megger. **Measurement of Inductance:** Anderson Bridge. **Measurement of Capacitance:** Schering Bridge.	8/L2
Module 2: Measurement of Voltage, Current & Power Introduction, Classification – Ammeters and Voltmeters, Errors in Ammeters & Voltmeters, Moving Iron, Moving Coil & Electrodynamometer Instruments (Theory of Construction and Torque expression). Errors & error minimization of single-phase dynamometer type wattmeter, single phase UPF & LPF wattmeter's. Concept of instrument transformers.	8/L2
Module 3: Sensor fundamentals Introduction, definitions – sensor, actuator, transducer, classification of sensors and actuators, Sensor performance characteristics – Transfer characteristics, accuracy, error and repeatability in sensor, Specifications, Sensor Limitations, Active and Passive sensors, Application Considerations, Guidelines for selection of sensors.	8/L2
Module 4: Sensors for Engineering applications Linear Variable Differential Transformer (LVDT), working, advantages, disadvantages, applications, LDRs. Thermo-resistive Sensors: Thermistors, Resistance Temperature Sensors, Semiconductor Thermocouples, Quantum-Based Optical Sensors – Photodiodes, Phototransistors. Force Sensors - strain gauges, Strain Gauge Accelerometers, The Piezoelectric Effect, Piezoelectric Sensors, Piezo resistive, Capacitive, Optical sensors.	8/L3

Module 5: Advanced Sensors	
Hall Effect Transducers, Applications of Hall Effect Transducer. Micro-Electro-Mechanical Systems (MEMS), MEMS based Sensors for measurement of pressure, mass air flow, inertia, MEMS Actuators - Thermal and Piezoelectric Actuation, Electrostatic Actuation, Applications. Wireless Sensors and Actuators and related challenges, Chemical sensors, Biosensors and its applications.	8/L3

Text Book:

1. A.K. Sawhney: "A Course in Electrical and Electronic Measurements and Instrumentation", 18th Edition, Dhanpat Rai Publications, 2001.
2. Nathan Ida, Sensors, Actuators, and their Interfaces - A Multidisciplinary Introduction, Scitech Publishing, 2014

Reference Book:

1. D. Patranabis, "Sensors and Transducers" –PHI Learning Private Limited., 2003
2. Jon S. Wilson, Sensor Technology Handbook, Elsevier Science,U.S.A, 2005

Upon completion of this course, student will be able to:

COs	Statement	Bloom's Cognitive level	POs/PSOs
CO1	Describe the classical methods of measuring resistance, inductance and capacitance	L2	
CO2	Explain the methods of measuring voltage, current and power in an electrical network.	L3	
CO3	Explain sensor performance characteristics and classifications of sensors.	L3	
CO4	Illustrate the working and applications of LVDT, thermoelectric sensors, strain gauges and piezoelectric sensors.	L3	
CO5	Illustrate the working and applications of hall effect sensors, MEMs based sensors, wireless sensors and bio sensors.	L3	

CO/PO/PSO Mapping

CO/PO/PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
COXXX.1	2	1	-	-	-	-	-	-	-	-	-	2	-	-	2
COXXX.2	2	1	-	-	-	-	-	-	-	-	-	2	-	-	2
COXXX.3	2	-	-	-	-	-	-	-	-	-	-	2	-	-	2
COXXX.4	2	-	-	-	-	-	-	-	-	-	-	2	-	-	2
COXXX.5	2	-	-	-	-	-	1	-	-	-	-	2	-	-	1
Average	2	1	-	-	-	-	1	-	-	-	-	2	-	-	2

Scheme of Examination:

Continuous Internal Evaluation (CIE):

Three Tests are to be conducted for 40 marks each. The average of the three tests are taken for computation of CIE final marks.

CIE is executed by way of quizzes / Alternate Assessment Tools (AATs), and three tests.

Some possible AATs: seminar/ assignments/term paper/ open ended experiments/ mini-projects/ concept videos/ partial reproduction of research work/ oral presentation of research work/ group activity/ developing a

generic toolbox for problem solving/ report based on participation in create-athon/ make-a-thon/ code-a-thon/ hack-a-thon conducted by reputed organizations/ any other.

Semester End Examination (SEE):

SEE Question paper is to be set for 100 marks and the marks scored will be proportionately reduced to 50. There will be two full questions (with a maximum of four sub questions) from each module carrying 20 marks each. Students are required to answer any **five full questions** choosing at least **one full question from each module.**

Table 2: Distribution of weightage for CIE & SEE of Regular courses

	Component	Marks	Total Marks
CIE	CIE Test – 1	40	50 (Average of Three CIE (40) + AAT (10))
	CIE Test – 2	40	
	CIE Test – 3	40	
	Quiz / assignment/group discussion/presentation/mini projects	10	
SEE	Semester End Examination	100	50
Grand Total			100

SEMESTER –I

SUBJECT: Electromechanical Systems & Measurements

Subject Code	BETCK24105D	CIE Marks	50
Hours /Week	3:0:0	SEE Marks	50
Total Hours	40	Examination Hours	03
No. of Credits:3			

Course Objectives:

CLO 1	Analysis of DC and single-phase AC circuit,
CLO 2	Understand the principle of operation and construction of DC Motor, three-phase Induction Motor and special machines.
CLO 3	Understand the Measuring Devices.
CLO 4	Understand the working of Electric transducers and resistive transducers.
CLO 5	Understand Semiconductor Devices and Logic Systems

Contents	No. of Hours / RBT Levels
Module 1: DC & AC Circuit Ohm's law, Kirchhoff's laws, analysis of series, parallel and series parallel circuits excited by independent voltage sources only. Power and energy in resistor. Analysis of Two loop circuits by Loop or mesh current method. Generation of sinusoidal voltage, frequency of generated voltage, average value, root mean square value, form and peak factors. Voltage and current relationship, with phasor diagrams, in R, L, C, R-L, R-C and R-L-C series circuits. Concept of apparent, real, and reactive powers.	8/L2
Module 2: Electromechanical Systems DC Motors - Motor Principle, Back EMF, Torque Equation, Rotational Losses & Efficiency, Types of d.c Motors & its Characteristics, Speed Control of d.c. Motors. Three phase Induction Motors: Principle of operation and construction, types, concept of rotating magnetic field, slip and significance of slip, Advantages and applications. (Numerical problems on slip calculations only). Special Machines: BLDC motor, Stepper Motor, Servo motors and Universal Motor. Selection of motors, Electrical symbols used in wiring diagram.	8/L2
Module 3: Measuring Devices Indicating Instruments, Essentials of Indicating Instruments, Deflecting, Controlling & Damping Torques. Types of Indicating Instruments, Ammeters and Voltmeters, Permanent Magnet Moving Coil Instrument, Moving Iron Ammeters and Voltmeters, Electrodynamometer Type Wattmeter's, Induction Type Energy Meter, Extension of Range Using current and potential Transformer.	8/L2
Module 4: Transducers Introduction to Electric Transducers, Advantages, Classification and Choice of Transducers. Resistive Transducers - Potentiometers, Strain Gauge, Resistance Thermometers, Thermistor. Variable Inductance Transducers, Linear Variable Differential Transformer (LVDT), Advantage and Disadvantage of LVDTs, Uses of LVDTs, Rotary Variable Differential Transformer (RVDT). Piezo – Electric Transducers, Hall Effect Transducers, Applications of Hall Effect Transducer.	8/L2

Module 5: **Semiconductor Devices & Logic Systems** PN Junction Diode: Construction & Operation with Characteristics, Rectifiers: Half Wave and Full Wave, Zener Diodes. Logic Systems: Logic Gates & Universal Gates, Combinational Circuits, MUX/DEMUX, Decoder/Encoders.	8/L2

Upon completion of this course, student will be able to:

COs	Statement	Bloom's Cognitivelevel
CO1	Analyze the fundamentals to DC circuit and also the behaviour of single-phase AC circuit.	L3
CO2	Explain the principle of operation and construction of DC Motor, three-phase Induction motor and special machines.	L3
CO3	Explain the measuring devices of Indicating Instruments and its types.	L3
CO4	Describe the working of Electric transducers and Potentiometers.	L3
CO5	Explain semiconductor devices and Logic Systems	

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	-	-	-	-	-	-	-	-	-	2	2	1	-
CO2	3	2	-	-	-	-	-	-	-	-	-	2	2	1	-
CO3	3	2	-	-	-	-	-	-	-	-	-	2	2	1	-
CO4	3	2	-	-	-	-	-	-	-	-	-	2	2	1	-
CO5	3	2			1							2	2	1	
Average	3	2			1							2	2	2	

Text books:

1. Basic Electrical Engineering, by Kulshreshtha D C, Tata McGrawHill, 2012
2. Electrical & Electronics Measurement & Instruments, by A. K Sawhney, Dhanpat Rai & Co. Publication 2007.
3. Electric Machines by Ashfaq Husain **Dhanpat Rai & Co**
4. Basic Electrical Engineering by V.N Mittal, McGraw Hill Education; 2nd edition (1 July 2017)
5. Basic Electrical Engineering by S.K Sahadev, Pearson Education India; 1st edition (1 January 2015); Pearson India

Scheme of Examination:

Continuous Internal Evaluation (CIE):

Three Tests are to be conducted for 40 marks each. The average of the three tests are taken for computation of CIE final marks.

CIE is executed by way of quizzes / Alternate Assessment Tools (AATs), and three tests.

Some possible AATs: seminar/ assignments/term paper/ open ended experiments/ mini-projects/ concept videos/ partial reproduction of research work/ oral presentation of research work/ group activity/ developing a generic toolbox for problem solving/ report based on participation in create-athon/ make-a-thon/ code-a-thon/ hack-a-thon conducted by reputed organizations/ any other.

Semester End Examination (SEE):

SEE Question paper is to be set for 100 marks and the marks scored will be proportionately reduced to 50. There will be two full questions (with a maximum of four sub questions) from each module

carrying 20 marks each. Students are required to answer any **five full questions** choosing at least **one full question from each module.**

Table 2: Distribution of weightage for CIE & SEE of Regular courses

	Component	Marks	Total Marks
CIE	CIE Test – 1	40	50 (Average of Three CIE (40) + AAT (10))
	CIE Test – 2	40	
	CIE Test – 3	40	
	Quiz / assignment/group discussion/presentation/mini projects	10	
SEE	Semester End Examination	100	50
Grand Total			100

SEMESTER I/II

Subject: Waste Management

Subject Code	**BETCK24105/205E**	**CIE Marks**	**50**
Hours/Week (L: T: P)	**3:0:0**	**SEE Marks**	**50**
No. of Credits	**3**	**Examination Hours**	**03**

Course Objectives: At the end of the course the student should be able to

CLO1	Identify key sources, typical quantities generated, composition, and properties of solid waste
CLO2	Understand the waste characteristics, health and environmental effects of solid waste
CLO3	Identify the key factors of waste collection system, waste disposal and estimate the landfill areas.
CLO4	Understand recovery of products from solid waste to compost and biogas, incineration and energy recovery
CLO5	Understand different types of hazardous waste or industrial waste, their handling, storage, disposal requirements, remediation, and their potential effect on the environment.

Content	No. of Hours/ RBT levels
Module-1 **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, progress in MSW (municipal solid waste) management in India. Indian and global scenario of e-waste	**10 Hours L3**
Module - 2 **Waste Generation Aspects:** Waste stream assessment (WSA), waste generation and composition, waste characteristics (physical and chemical), health and environmental effects (public health and environmental), comparative assessment of waste generation and composition of developing and developed nations, a case study results from an Indian city, handouts on solid waste compositions. E-waste generation.	**10 Hours L3**
Module - 3 **Collection, Storage, Transport and Disposal of Wastes:** Waste Collection, Storage and Transport: Collection components, storage-containers/collection vehicles, collection operation, transfer station, waste collection system design, record keeping, control, inventory and monitoring, implementing collection and transfer system, a case study. Waste Disposal: key issues in waste disposal, disposal options and selection criteria,	**10 Hours L3**

sanitary landfill, landfill gas emission, leachate formation, environmental effects of landfill, landfill operation issues, a case study	
Module- 4 **Waste Processing Techniques & Source Reduction, Product Recovery & Recycling:** Purpose of processing, mechanical volume and size reduction, component separation, drying and dewatering. Source Reduction, Product Recovery and Recycling: basics, purpose, implementation monitoring and evaluation of source reduction, significance of recycling, planning of a recycling Programme, recycling programme elements, commonly recycled materials and processes, a case study.	**10 Hours L3**
Module - 5 **Hazardous Waste Management and Treatment:** Identification and classification of hazardous waste, hazardous waste treatment, pollution prevention and waste minimization, hazardous wastes management in India. E-waste recycling.	**10 Hours L3**

Course Outcomes: The students will be able to:

BETCK24105/205E.1	Apply the basics of solid waste management towards sustainable development
BETCK24105/205E.2	Apply technologies to process waste and dispose the same.
BETCK24105/205E.3	Design working models to convert waste to energy
BETCK24105/205E.4	Identify and classify hazardous waste and manage the hazard

Textbooks:

1. Tchobaanoglous, G., Theisen, H., and Samuel A Vigil, Integrated Solid Waste Management, McGraw-Hill Publishers, 1993. 2.
2. Bilitewski B., Hard He G., Marek K., Weissbach A., and Boeddicker H., Waste Management, Springer, 1994.

Reference books:

White, F. R., Franke P. R, & Hindle M., Integrated solid waste management: a life cycle inventory. McDougall,P. John Wiley & Sons. 2001.

Nicholas, P., & Cheremisinoff, P. D., Handbook of solid waste management and waste minimization technologies, Imprint of Elsevier Science. 2005.

Web Reference:

1. https://nptel.ac.in/courses/105103205
2. https://www.youtube.com/watch?v=k0ktJRoRcOA
3. https://nptel.ac.in/courses/103/107/103107125/
4. https://onlinecourses.nptel.ac.in/noc22_ce76/preview
5. https://onlinecourses.swayam2.ac.in/cec20_ge13/preview

Scheme of Examination:

Semester End Examination (SEE):
SEE Question paper is to be set for 100 marks and the marks scored will be proportionately reduced to 50. There will be two full questions (with a maximum of four sub questions) from each module carrying 20 marks each. Students are required to answer any five full questions choosing at least one full question from each module.

Continuous Internal Evaluation (CIE):
Three Tests are to be conducted for 40 marks each. Average of three test marks will be added to test component. CIE is executed by way of two quizzes / Alternate Assessment Tools (AATs), and two tests. **Some possible AATs:** seminar/assignments/ mini-projects/ concept videos/ partial reproduction of research work/ group activity/ any other.

Typical Evaluation pattern is shown in Table 1.

Table 1: Distribution of weightage for CIE & SEE of Regular courses

Component		Marks	Total Marks
CIE	CIE Test-1	40	**50**
	CIE Test-2	40	
	CIE Test-3	40	
	Average of CIE	**40**	
	Quiz 1/AAT	05	
	Quiz 2/AAT	05	
SEE	**Semester End Examination**	**50**	**50**
Grand Total			**100**

CO/PO Mapping

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
BETCK24105/205E.1	3					3	3								
BETCK24105/205E.2	3					3	3								
BETCK24105/205E.3	3					3	3								
BETCK24105/205E.4	3					3	3								
Average	**3**					3	3								

SEMESTER I/II

Subject: Green Buildings

Subject Code	**BETCK24105/205F**	**CIE Marks**	**50**
Hours/Week (L: T: P)	**3:0:0**	**SEE Marks**	**50**
No. of Credits	**03**	**Examination Hours**	**03**

Course Objectives: At the end of the course the student should be able to

CLO1	Understand the Definition, Concept & Objectives of the terms cost effective construction and green building
CLO2	Apply cost effective techniques in construction
CLO3	Apply cost effective Technologies and Methods in Construction
CLO4	Understand the Problems due to Global Warming
CLO5	State the Concept of Green Building

Content	**No. of Hours/ RBT levels**
Module-1 **Introduction to the concept of cost effective construction** -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- Availability of different materials - Recycling of building materials – Brick- Concrete- Steel- Plastics - Environmental issues related to quarrying of building materials.	**10 Hours L3**
Module - 2 **Environment friendly and cost effective Building Technologies** - Different substitute for wall construction Flemish Bond - Rat Trap Bond – Arches – Panels - Cavity Wall - Ferro Cement and Ferro Concrete constructions – different pre cast 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 and plastic - Contributions of agencies - Costford - Nirmithi Kendra - Habitat	**10 Hours L3**

Module - 3 **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 benefit - Economical benefits - Health and Social benefits - Major Energy efficient areas for buildings – Embodied Energy in Materials Green Materials - Comparison of Initial cost of Green V/s Conventional Building - Life cycle cost of Buildings.	**10 Hours L3**
Module- 4 **Green Building Rating Systems-** BREEAM – LEED - GREEN STAR -GRIHA (Green Rating for Integrated Habitat Assessment) for new buildings – Purpose - Key highlights - Point System with Differential weight age. 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)	**10 Hours L3**
Module - 5 **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. Management of Solid Wastes. Management of Sullage Water and Sewage. Urban Environment and Green Buildings. Green Cover and Built Environment.	**10 Hours L3**

Course Outcomes: The students will be able to:

BETCK24105/205F.1	Select different building materials for construction
BETCK24105/205F.2	Apply effective environmentally friendly building technology
BETCK24105/205F.3	Analyze global warming due to different materials in construction
BETCK24105/205F.4	Analyze buildings for green rating
BETCK24105/205F.5	Use alternate source of energy and effective use water

Textbooks:

1. HarharaIyer G, Green Building Fundamentals, Notion Press
2. Dr. Adv. HarshulSavla, Green Building: Principles & Practices

Web Reference:

https://www.youtube.com/watch?v=THgQF8zHBW8
https://www.youtube.com/watch?v=DRO_rIkywxQ

Scheme of Examination:

Semester End Examination (SEE):

SEE Question paper is to be set for 100 marks and the marks scored will be proportionately reduced to 50. There will be two full questions (with a maximum of four sub questions) from each module carrying 20 marks each. Students are required to answer any five full questions choosing at least one full question from each module.

Continuous Internal Evaluation (CIE):

Three Tests are to be conducted for 40 marks each. Average of three test marks will be added to test component. CIE is executed by way of two quizzes / Alternate Assessment Tools (AATs), and two tests. **Some possible AATs:** seminar/assignments/ mini-projects/ concept videos/ partial reproduction of research work/ group activity/ any other.

Typical Evaluation pattern is shown in Table 1.

Table 1: Distribution of weightage for CIE & SEE of Regular courses

Component		Marks	Total Marks
CIE	CIE Test-1	40	50
	CIE Test-2	40	
	CIE Test-3	40	
	Average of CIE	**40**	
	Quiz 1/AAT	05	
	Quiz 2/AAT	05	
SEE	**Semester End Examination**	**50**	**50**
Grand Total			**100**

CO-PO/PSO Mapping															
CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
BETCK24105/205F.1	2	1				1	1								
BETCK24105/205F.2	2	1				1	1								
BETCK24105/205F.3	2	1				1	1								
BETCK24105/205F.4	2	1				1	1								
BETCK24105/205F.5	2	1				1	1								
Average	2	1				1	1								

SEMESTER – I/II

SUBJECT: INTRODUCTION TO ARTIFICIAL INTELLIGENCE

Semester:	1	**CIE Marks:**	50
Course Code:	BETCK24105/205A	**SEE Marks:**	50
Hours/Week (L:T:P):	3: 0 : 0	**Duration of SEE (Hours):**	3 hrs.
Type of Course	ETC	**Credits**	3

Prerequisites: **None**

Course Learning Objectives: The course will enable students to:

CLO1	To interpret various concepts like agents, environment in applications to AI.
CLO2	To understand and compare the various search strategies used by the agents.
CLO3	To relate and contrast different learning paradigms and understand the data.
CLO4	To understand the applications of AI in the development of Expert System.

CONTENTS	No. of Hours	RBT Level
Module 1: Introduction to AI What is AI? History of AI, Agents and Environments, Structure of Agents, Types of Agents: Simple reflex agents, Model-based reflex agent, Goal-based agents, Utility-based agents, Learning agents. **Textbook 1: Chapter 1 and 2**	**8**	**L2**
Module 2: Search Algorithms Search strategies, Best First Search, A*, AO*, Hill Climbing, Generate & Test, Alpha-Beta pruning, Min-max search, **Textbook 1: Chapter 3**	**8**	**L2**
Module 3: Data preprocessing Types of Data: Structured and Unstructured Data, Quantitative and Qualitative Data, Four Levels of data (Nominal, Ordinal, Interval, Ratio Level). Data Transformation: Handling imbalanced data, Handling time series data, Function, Power and Quantile transformers. **Textbook 3: Chapter 3**	**8**	**L2**
Module 4: Feature Engineering and Learning Feature Engineering: Processes, Techniques Forms of Learning: Introduction to Supervised, Unsupervised, Semi Supervised, Self-Supervised, Weakly Supervised and Reinforcement Learning. Use cases **Textbook 3: Chapter 7**	**8**	**L2**
Module 5: Expert Systems What an expert system is; how it works and how it is built, basic components of an expert system, Expert System Architectures, Examples of Expert Systems. Rule-based Expert systems: Structure of rule based expert system, Conflict resolution, Uncertainty Management, Advantages & disadvantages of rule-based.Fuzzy based expert System (Mamdani and Sugeno Fuzzy Inference Systems) **Textbook 2: Chapter 20**	**8**	**L2**

8/11/24

COURSE OUTCOMES (CO): Upon completion of this course, student will be able to:

CO1	Elucidate the reasons behind AI for being an important field of study, and understand the types of agents, environments, and their relationships
CO2	Describe the Informed search algorithms that make up the fundamental building blocks of AI.
CO3	Understand the importance of preprocessing, types of data, and data transformation.
CO4	Understand different forms of learning and the importance of the structure of the data used by the agent.
CO5	Explore the application of AI ideas in the development of expert systems.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3		2							2	3	
CO2	3	3	3		2							2	3	
CO3	3	3	3		2							2	3	
CO4	3	3	3		2							2	3	
CO5	3	3	3		2							2	3	
Average	3	3	3		2							2	3	

High-3: Medium-2: Low-1

Note: Kindly discuss the relevant case studies.

Textbooks:

1. Artificial Intelligence – A Modern Approachl, by Stuart J. Russell and Peter Norvig, 3rd EditionPearson 2015.
2. Artificial Intelligence – E. Rich and Knight, 3rd Edition, McGraw Hill International, 2016.
3. Data preprocessing in Data Mining - Salvador García, JuliánLuengo Francisco Herrera, Springer.

Reference Books:

1. Introduction to Algorithms, Thomas H. Cormen, Charles E. Leiserson, Ronal L. Rivest, CliffordStein, 3rd Edition, PHI.

28/11/24

SEMESTER – I/II

PROGRAMMING IN C (Integrated)

Course Code:	BPLCK24105/205A	CIE Marks	50
Hours/Week (L: T: P)	2:0:2	SEE Marks	50
Total Hours	40	Examination Hours	3
No. of Credits	3		

Course Learning Objectives:

The course will enable students to:

CLO1	Elucidate the basic architecture and functionalities of a Computer
CLO2	Apply programming constructs of C language to solve the real-world problems
CLO3	Explore user-defined data structures like arrays, structures and pointers in implementing solutions to problems
CLO4	Design and Develop Solutions to problems using modular programming constructs such as functions and procedures

CONTENTS	# of Hours
MODULE 1 **Introduction to C:** Introduction to computers, input and output devices, designing efficient programs. Introduction to C, Structure of C program, Files used in a C program, Compilers, Compiling and executing C programs, variables, constants, Input/output statements in C.	08
MODULE 2 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.	08
MODULE 3 **Functions:** Introduction using functions, Function definition, function declaration, function call, return statement, passing parameters to functions, scope of variables, storage classes, recursive functions. **Arrays:** Declaration of arrays, accessing the elements of an array, storing values in arrays, Operations on arrays, Passing arrays to functions.	08
MODULE 4 Two dimensional arrays, operations on two-dimensional arrays, two-dimensional arrays to functions, multidimensional arrays. **Applications of arrays and introduction to strings:** Applications of arrays, case study with sorting techniques. **Introduction to strings:** Reading strings, writing strings, summary of functions used to read and write characters. Suppressing input using a Scanset.	08
MODULE 5 **Strings:** String taxonomy, operations on strings, Miscellaneous string and character functions, arrays of strings. **Pointers:** Understanding the Computers Memory, Introduction to Pointers, Declaring Pointer Variables **Structures:** Introduction to structures	08

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Course Outcomes:

Upon successful completion of this course, student will be able to

CO1	Elucidate the basic architecture and functionalities of a computer and also recognize the hardware parts
CO2	Apply programming constructs of C language to solve the real world problem
CO3	Explore user-defined data structures like arrays in implementing solutions to problems like searching and sorting
CO4	Explore user-defined data structures like structures, unions and pointers in implementing solutions
CO5	Design and Develop Solutions to problems using modular programming constructs using functions

Text Books:

2. Computer fundamentals and programming in c, "Reema Thareja", Oxford University, Second Edition, 2017.

Reference Books:

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

Web links and Video Lectures (e-Resources):

1. elearning.vtu.ac.in/econtent/courses/video/BS/15PCD23.html
2. https://nptel.ac.in/courses/106/105/106105171/ MOOC courses can be adopted for more clarity in understanding the topics and verities of problem solving methods.

Lab Assignments

1	C Program to find Mechanical Energy of a particle using $E = mgh+1/2\ mv^2$
2	C Program to convert Kilometers into Meters and Centimeters.
3	C Program to Check the Given Character is Lowercase or Uppercase or Special Character.
4	Program to balance the given Chemical Equation values x, y, p, q of a simple chemical equation of the type: The task is to find the values of constants b1, b2, b3 such that the equation is balanced on both sides and it must be the reduced form.
5	Implement Matrix multiplication and validate the rules of multiplication.
6	Compute sin(x)/cos(x) using Taylor series approximation. Compare your result with the builtin 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	Implement structure stored, write and compute average marks and the students scoring above and below the average marks for a class of N students.
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.

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SEMESTER – I/II

ADVANCED PROGRAMMING IN C (Integrated)

Subject Code	BPLCK24205D	CIE Marks	50
Hours/Week (L: T: P)	2:0:2	SEE Marks	50
Total Hours	40	Examination Hours	3
No. of Credits: 4			

Course Learning Objectives:

The course will enable students to:

CLO1	Write C programs that access data through pointers.
CLO2	Implement the three kinds of memory allocation through the variables in a C program.
CLO3	Use files, handle errors during file operations, and write programs that accept command line arguments.
CLO4	Include preprocessor directives and miscellaneous features in C programs.

CONTENTS	# of Hours / RBT Levels
MODULE 1 **POINTERS** Review of Pointers, Pointers and arrays, Passing an array to a function, Difference between array name and pointer, Pointers and strings, Array of pointers **Textbook: T1 Chapter: 7**	**08 Hours** **L3**
MODULE 2 **POINTERS AND ARRAYS** Pointers and 2D arrays, Pointers and 3D arrays, Function pointers, Array of function pointers, Pointers to Pointers, Memory allocation in C programs, Memory usage, Dynamic memory allocation, Drawbacks of Pointers. **Textbook: T1 Chapter: 7**	**08 Hours** **L3**
MODULE 3 **FILES** Review of using files in C, Error handling during file operations, Accepting command line arguments, Functions for selecting a record randomly, Function Remove(), Renaming the file, Creating a temporary file. **Textbook: T1 Chapter: 9**	**08 Hours** **L3**

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MODULE 4 **PREPROCESSOR DIRECTIVES** Introduction, Types of preprocessor directives, #define, #include, #undef, #line, Pragma directives, Conditional directives, Defined operator, #error directive, Predefined macro names. **Textbook: T1 Chapter: 10**	**08 Hours** **L3**
MODULE 5 **MISCELLANEOUS FEATURES** Volatile and Restrict Type Qualifiers, Inline Functions in C, Bit-level Programming and Bitwise Shift Operators, Program Optimization Techniques. **Textbook: T1 Appendix D, E, F**	**08 Hours** **L3**

Laboratory Component

1. Implementation and execution of C programs using pointers and arrays.
2. Implementation and execution of C programs using array of pointers.
3. Implementation and execution of C programs using dynamic memory allocation.
4. Implementation and execution of C programs using array of structures.
5. Implementation and execution of C programs using a pointer to a structure.
6. Implementation and execution of C program that illustrate error handling during file operations.
7. Implementation and execution of C programs that facilitates programmers to pass command line arguments.
8. Implementation and execution of C programs that illustrate the use of preprocessor directives.
9. Implementation and execution of C programs that illustrate the use of bit-level programming and bitwise shift operators.
10. Implementation and execution of C programs that illustrate the use of program optimization techniques.

Course Outcomes: Upon successful completion of this course, student will be able to

CO1	Write C programs using the concept of pointers and arrays.
CO2	Explore the three kinds of memory allocation through the variables in a C program.
CO3	Demonstrate the use of structured programming constructs involving files.
CO4	Illustrate the usage of preprocessor directives in C programs.
CO5	Implement program optimization techniques.

Textbook:

1. Programming in C, Dr. Reema Thareja, 3rd Edition, Oxford University Press, 2023, ISBN-13:978-9354979453

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Reference Books:

1. The C Programming Language, Kernighan B. W. and Dennis M. Ritchie, 2nd Edition, Pearson Education India, 2015, ISBN: 978-93-3254-944-9
2. Intermediate C Programming, Yung-Hsiang Lu, George K. Thiruvathukal, 2nd Edition, CRC Press, 2024, ISBN-13: 978-1032189819
3. Head First C: A Brain-Friendly Guide, David Griffiths, and Dawn Griffiths, O'Reilly Media, 2012, ISBN-13: 978-1449399917

E-Books / Web References

1. https://progforperf.github.io/Expert_C_Programming.pdf
2. https://www.cc4e.com/index.php

MOOCs

1. https://nptel.ac.in/courses/106105171
2. https://www.coursera.org/specializations/c-programming-for-everybody?action=enroll

Mapping of CO-PO:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3		2				2	2			2	2
CO2	3	3	3		2				2	2			2	2
CO3	3	3	3		2				2	2			2	2
CO4	3	3	3		2				2	2			2	2
CO5	3	3	3		2				2	2			2	2
Average	**3**	**3**	**3**		**2**				**2**	**2**			**2**	**2**

Low-1: Medium-2: High-3

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SEMESTER – I/II

Course: Introduction to Python Programming (Integrated)

Subject Code	BPLCK24105B / 205B	CIE Marks	50
Hours/Week (L: T: P)	2:0:2	SEE Marks	50
Total Hours	50	Examination Hours	03
No. of Credits: 03			

Prerequisites: C – Programming (but not Mandatory)

Course Objectives: The course will enable students to:

CLO1	Learn the syntax and semantics of Python Programming Language.
CLO2	Write Python programs using lists and functions to facilitate code reuse and optimization.
CLO3	Illustrate the process of structuring the data using dictionaries and strings
CLO4	Demonstrate the use of meta characters and built-in functions of regular expression package
CLO5	Appraise the need for working with various file system.

CONTENTS	No. of Hours & RBT levels
Module 1 **Introduction and Flow Control** **Introduction, 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, 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(). **Text Book 01: Chapters - 1, 2**	**08 Hours & L3**
Module 2 **Functions and List** **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 **Lists:** The List Data Type, Working with Lists, Augmented Assignment Operators, Methods, List-like Types: Strings and Tuples, References **Text Book 01: Chapters - 3, 4**	**08 Hours & L3**

Module 3 **Dictionaries and String** **Dictionaries and Structuring Data:** The Dictionary Data Type, Pretty Printing, Using Data Structures to Model Real-World Things: Nested Dictionaries and Lists **Manipulating Strings** - Working with Strings, Useful String Methods Project: Password Locker **Text Book 01: Chapters - 5, 6**	**08 Hours** **&** **L3**
Module 4 **Regular Expressions** **Pattern Matching with Regular Expressions**: Finding Patterns of Text without Regular Expressions, Finding Patterns of Text with Regular Expressions, More Pattern Matching with Regular Expressions, Greedy and Nongreedy Matching, The findall() Method, Character Classes, Making YourOwn Character Classes, The Caret and Dollar Sign Characters, The WildcardCharacter, Review of Regex Symbols, Case-Insensitive Matching, Substituting Strings with the sub() Method, Managing Complex Regexes, Combining re.IGNORECASE, re. DOTALL, and re. VERBOSE. **Text Book 01: Chapters - 7**	**08 Hours** **&** **L3**
Module 5 **Files Handling** **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 pprint. pformat() Function. **Organizing Files**: The shutil Module, Walking a Directory Tree, Compressing Files with the zipfile Module. **Text Book 01: Chapters -8, 9**	**08 Hours** **&** **L3**

PROGRAMMING EXERCISES

Lab No.	PROGRAMMING EXERCISES ON
1.	Introduction lab session – Sample Programs
2.	Programs on data types, string concatenation and replication
3.	Program on operators and Flow Control Statements
4.	Programs on loops
5.	Programs on Functions
6.	Programs on List
7.	Programs on Dictionaries
8.	Programs on String manipulation
9.	Programs on Pattern Matching with Regular Expressions
10.	Programs on Pattern Matching with Regular Expressions
11.	Programs on File Handling

Note: The sample set of programs are provided on each topic for the reference only.
The course instructor/ Lab in-chargers are given a liberty to ask any kind of questions in the laboratory on the specified the topic and encourage students to write program by themselves.

Course Outcomes: Upon successful completion of this course, student will be able to

BPLCK24105B / 205B.1	Experiment with the data types, Operators and Flow Control Statements
BPLCK24105B / 205B.2	Write programs using Functions and List
BPLCK24105B / 205B.3	Make use of methods to create and manipulate dictionaries and Strings
BPLCK24105B / 205B.4	Develop programs for Pattern Matching using regular expressions.
BPLCK24105B / 205B.5	Utilize python packages to perform file handling operations.

Recommended Tools: Linux. Liclipse, PyCharm, Visual Studio 2019

Text Books:

1. Al Sweigart, "Automate the Boring Stuff with Python", William Pollock, 2015,ISBN: 978-1593275990.

Reference Books:

1. Allen B. Downey, "Think Python: How to Think Like a Computer Scientist", 2nd Edition, Green Tea Press, 2015, ISBN: 978-9352134755.
2. Charles Dierbach, "Introduction to Computer Science Using Python", 1st Edition, Wiley India Pvt Ltd. ISBN-13: 978-8126556014.
3. Wesley J Chun, "Core Python Applications Programming", 3rd Edition, Pearson Education India, 2015. ISBN-13: 978-9332555365.

4. Roberto Tamassia, Michael H Goldwasser, Michael T Goodrich, "Data Structures and Algorithms in Python", 1st Edition, Wiley India Pvt Ltd, 2016. ISBN-13: 978-8126562176.
5. ReemaThareja, "Python Programming using problem solving approach", Oxford University press, 2017. ISBN-13: 978-0199480173
6. Charles R. Severance, "Python for Everybody: Exploring Data Using Python- 3",1st Edition, Shroff Publishers, 2017. ISBN: 978-9352136278.

Web Reference:

https://infytq.infosys.com/
https://www.learnbyexample.org/python/
https://www.learnpython.org/
https://pythontutor.com/visualize.html#mode=edit

Scheme of Examination:

Scheme of Evaluation: (Integrated courses)

Semester End Examination (SEE):

SEE Question paper is to be set for 100 marks and the marks scored will be proportionately reduced to 50. There will be two full questions (with a maximum of four sub questions) from each module carrying 20 marks each. Students are required to answer any five full questions choosing at least one full question from each module.

The laboratory assessment would be restricted to only the CIE evaluation.

Continuous Internal Evaluation (CIE):

Three Tests are to be conducted for 40 marks each. The average of the three tests are taken for computation of CIE on a scale of **30 Marks,** the CIE would also include laboratory evaluation for **20 marks.**

The 20 Marks allotted for laboratory comprises two components:

- Regular laboratory assessment which includes lab record/observation for 10 marks
- The exclusive laboratory internal assessment test for 10 Marks

Typical Evaluation pattern for Programming Language Courses is shown in the Table below

Table: Distribution of weightage for CIE & SEE of Integrated courses

	Component	Marks	Total Marks
CIE	CIE Test-1	30	50
	CIE Test-2	30	
	CIE Test-3	30	
	Laboratory	20	
SEE	Semester End Examination	50	50
Grand Total			**100**

CO/PO Mapping																
CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
BPLCK24105B / 205B.1	3	3	2	2	3							2				
BPLCK24105B / 205B.2	3	3	2	2	3							2				
BPLCK24105B / 205B.3	3	3	2	2	3							2				
BPLCK24105B / 205B.4	3	3	2	2	3							2				
BPLCK24105B / 205B.5	3	3	2	2	3							2				
Average	**3**	**3**	**2**	**2**	**3**							**2**				

Low-1: Medium-2: High-3

SEMESTER – I/II

Course: Basics of JAVA Programming(Integrated)

Course Code	BPLCK24105C/205C	CIE Marks	50
Hours/Week (L: T: P)	2:0:2	SEE Marks	50
No. of Credits	3	Examination Hours	3

Prerequisites: Programming in C(Not Mandatory)

Course Learning Objectives

CLO1	Understand the history and Overview of object-oriented concepts in JAVA.
CLO2	Discuss and make use of Data types, operators and Control statements of Java
CLO3	Discuss the concepts of Classes and Inheritance
CLO4	Discuss and make use of Packages, interfaces Multithreading and Exception Handling statements of Java
CLO5	Interpret the concepts of Type Wrapping and String Handling Function

Contents	No. of Hours RBT Level
Module 1 **The History and Evolution of Java**: Java's Lineage, The Creation of Java, How Java Impacted the Internet, Java's magic: the Byte code; the Java Buzzwords, The Evolution of Java **An Overview of Java:**Object-oriented programming; A First Simple Program, A Second Short Program, Two Control Statements, Using Blocks of Code, Lexical Issues **Text book 1: Chapter 1 & 2**	08 Hours L3
Module 2 **Data Types, Variables, and Arrays:** The Primitive Types, A Closer Look at Literals, Variables, Type Conversion and Casting, Automatic Type Promotion in Expressions, Arrays, Introducing Type Inference with Local Variables **Operators:** Arithmetic Operators, The Bitwise Operators, Relational Operators, Boolean Logical Operators, The Assignment Operator, The ? Operator, Operator Precedence, Using Parentheses **Control Statements:** Java's Selection Statements, Iteration Statements, Jump statements **Text book 1: Chapter 3, 4 &5**	08 Hours L3
Module 3 **Classes:** Classes: Classes fundamentals; Declaring objects; Constructors, this keyword, garbage collection **Inheritance:** Inheritance basics, using super, creating multilevel hierarchy, method overriding and Abstract class. **Text book 1: Ch:6 Ch: 8**	08 Hours L3

Module 4	
Packages and Interfaces: Packages, Packages and Member Access, Importing Packages, Interfaces **Exceptions:** Exception Types, using try and catch, throw, throws finally **Multi-Threaded Programming:** The Java Thread Model, The Main Thread, creating a Thread: Implementing Runnable **Text book 1: Chapter 9 ,10 & 11**	**08 Hours** **L3**
Module 5	
Type Wrappers: Character, Boolean, Numeric type wrappers. Autoboxing: Autoboxing and Methods, Autoboxing / Unboxing occur in expressions, Autoboxing/Unboxing Boolean and Character values, Autoboxing / Unboxing helps prevents errors **String Handling:** String Constructors, Special string operations, character extraction, Comparison, Searching and Modifying of strings, Data Conversion, Changing the case of characters, Additional String Methods. **Text book 1: Chapter 12 & 17**	**08 Hours** **L3**

PROGRAMMING EXERCISES

Lab No.	PROGRAMMING EXERCISES ON
1.	Introduction lab session – Sample Programs
2.	Programs on data types and operators
3.	Program on Flow Control Statements
4.	Programs on loops
5.	Programs on Classes and objects
6.	Programs on Inheritance
7.	Programs on Packages and Interfaces
8.	Programs on Exception
9.	Programs on Multithreading
10.	Programs on Type Wrappers
11.	Programs on String Handling

Note: The sample set of programs are provided on each topic for the reference only.

The course instructor/ Lab in-chargers are given a liberty to ask any kind of questions in the laboratory on the specified the topic and encourage students to write program by themselves.

COURSE OUTCOMES

Upon completion of this course, student will be able to

BPLCK24105C/205C.1	Illustrate the fundamentals of Java Programming.
BPLCK24105C/205C.2	Make use of concepts of Datatypes, operators and Control Statements to develop Java Programs
BPLCK24105C/205C.3	Apply the Classes and inheritance concepts in Java application development.
BPLCK24105C/205C.4	Make use of concepts Packages and Interfaces, Exceptions and Multi-Threaded Programming in Java application development
BPLCK24105C/205C.5	Develop Java programs using wrapper classes and string handling methods.

Text Books

1. **Java the Complete Reference**, Herbert Schildt, 11th Edition, Tata McGraw Hill, 2020.

Reference Books

1. **Starting Out with Java**: From Control Structures through Objects Tony Gaddis, Haywood Community College.—6th edition, Pearson Education.2017
2. **Big Java: Early Objects**, Cay S. Horstmann, 7th Edition, Wiley Publication.
3. **Advanced JAVA programming**, Uttam K Roy, Oxford University press, 2015.

MOOCs (Format is given below)

1. Programming in java:https://nptel.ac.in/courses/106/105/106105191/
2. Java Tutorial for Complete Beginners: https://www.udemy.com/course/java-tutorial/
3. Core Java Specialization:https://www.coursera.org/specializations/core-java

Scheme of Examination:

Semester End Examination (SEE):

SEE Question paper is to be set for 100 marks and the marks scored will be proportionately reduced to 50. There will be two full questions (with a maximum of four sub questions) from each module carrying 20 marks each. Students are required to answer any **five full questions** choosing at least **one full question from each module.**

Continuous Internal Evaluation (CIE):

Three Tests for the theory component are to be conducted for 40 marks each. Marks scored in each test is reduced to 30. Average of three test will be considered. The Lab CIE is conducted for 20 marks and is added to the theory component.

Typical Evaluation pattern for regular courses is shown in Table 2.

Table 2: Distribution of weightage for CIE & SEE of Integrated courses

	Component	Marks	Total Marks
CIE	CIE Test-1	30	50
	CIE Test-2	30	
	CIE Test-3	30	
	Laboratory	20	
SEE	Semester End Examination	50	50
Grand Total			100

CO/PO Mapping												
CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
BPLCK24105C/205C.1	3	3	3	-	2	-	-	-	-	-	-	2
BPLCK24105C/205C.2	3	3	3	-	2	-	-	-	-	-	-	2
BPLCK24105C/205C.3	3	3	3	-	2	-	-	-	-	-	-	2
BPLCK24105C/205C.4	3	3	3	-	2	-	-	-	-	-	-	2
BPLCK24105C/205C.5	3	3	3	-	2	-	-	-	-	-	-	2
Average	3	3	3	-	2	-	-	-	-	-	-	2

Low-1: Medium-2: High-3

SEMESTER – I/II

Course: Innovation and Design Thinking

Course Code	BIDTK24108/208	CIE Marks	50
Hours/Week (L: T: P)	1:0:0	SEE Marks	50
No. of Credits	1	Examination Hours	01

Course Objectives:

CLO1	To explain the concept of design thinking for product and service development
CLO2	To explain the fundamental concept of innovation and design thinking
CLO3	To discuss the methods of implementing design thinking in the real world.

Content	No. of Hours/ RBT levels
Module 1 Understanding Design thinking: Shared model in team-based design – Theory and practice in Design thinking – Explore presentation signers across globe – MVP or Prototyping	03 Hours
Module 2 Tools for Design Thinking: Real-Time design interaction capture and analysis – Enabling efficient collaboration in digital space – Empathy for design – Collaboration in distributed Design	03 Hours
Module 3 Design Thinking in IT: Design Thinking to Business Process modelling – Agile in Virtual collaboration environment – Scenario based Prototyping	03 Hours
Module 4 DT For strategic innovations: Growth – Story telling representation – Strategic Foresight - Change – Sense Making – Maintenance Relevance – Value redefinition - Extreme Competition – experience design - Standardization – Humanization - Creative Culture – Rapid prototyping, Strategy and Organization – Business Model design.	03 Hours
Module 5 Design thinking workshop: Design Thinking Workshop Empathize, Design, Ideate, Prototype and Test	03 Hours

Textbook:

1. John.R.Karsnitz, Stephen O'Brien and John P. Hutchinson, "Engineering Design", Cengage learning (International edition) Second Edition, 2013.
2. Roger Martin, "The Design of Business: Why Design Thinking is the Next Competitive Advantage", Harvard Business Press , 2009.
3. Hasso Plattner, Christoph Meinel and Larry Leifer (eds), "Design Thinking: Understand – Improve – Apply", Springer, 2011
4. Idris Mootee, "Design Thinking for Strategic Innovation: What They Can't Teach You at Business or Design School", John Wiley & Sons 2013.

Reference Books:

1. Yousef Haik and Tamer M.Shahin, "Engineering Design Process", Cengage Learning, Second Edition, 2011.
2. Book - Solving Problems with Design Thinking - Ten Stories of What Works (Columbia Business School Publishing) Hardcover – 20 Sep 2013 by Jeanne Liedtka (Author), Andrew King (Author), Kevin Bennett (Author).

COURSE OUTCOMES:

Upon completion of this course, student will be able to:

CO 1	Appreciate various design process procedure

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CO 2	Generate and develop design ideas through different technique
CO 3	Identify the significance of reverse Engineering to Understand products
CO 4	Draw technical drawing for design ideas

Scheme of Examination:

Semester End Examination (SEE):
SEE paper shall be set for 50 questions, each of the 01 mark. The pattern of the question paper is MCQ (multiple choice questions). The time allotted for SEE is 01 hour.
Continuous Internal Evaluation (CIE):
Three Tests are to be conducted for 40 marks each. Average of Marks scored in all three tests is added to test component. CIE is executed by way of quizzes / Alternate Assessment Tools (AATs), and three tests.
Typical Evaluation pattern for regular courses is shown in Table 2.

Table 2: Distribution of weightage for CIE & SEE of Regular courses

Component		Marks	Total Marks
CIE	CIE Test-1	40	50
	CIE Test-2	40	
	CIE Test-3	40	
	Assignments	10	
SEE	Semester End Examination	50	50
Grand Total			100

CO/PO	PO1	PO2	PO3	PO4	PO12
CO 1	2	2	1	1	2
CO 2	2	2	1	1	2
CO 3	2	2	1	1	2
CO 4	2	2	1	1	2
Average	2	2	1	1	2

Low-1: Medium-2: High-3

H.N. Rajashekar Dean Academic
Global Academy of Technology,
Rajarajeshwarinagar, Bengaluru-98

SEMESTER – I/II

Course: Scientific Foundations of Health

Course Code	BSFHK24108/208	CIE Marks	50
Hours/Week (L: T: P)	1:0:0	SEE Marks	50
No. of Credits	1	Examination Hours	01

Course Objectives:

CLO1	To know about Health and wellness (and its Beliefs) & It's balance for positive mindset.
CLO2	To Build the healthy lifestyles for good health for their better future.
CLO3	To Create a Healthy and caring relationships to meet the requirements of good/social/positive life.
CLO4	To learn about Avoiding risks and harmful habits in their campus and outside the campus for their bright future
CLO5	To Prevent and fight against harmful diseases for good health through positive mindset

Content	No. of Hours/ RBT levels
Module 1 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.	03 Hours
Module 2 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	03 Hours
Module 3 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.	03 Hours
Module 4 Avoiding risks and harmful habits: Characteristics of health compromising behaviors, 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.	03 Hours
Module 5 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.	03 Hours

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.

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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.

COURSE OUTCOMES:

Upon completion of this course, student will be able to:

CO 1	To understand and analyse about Health and wellness (and its Beliefs) & It's balance for positive mindset.
CO 2	Develop the healthy lifestyles for good health for their better future.
CO 3	Build a Healthy and caring relationships to meet the requirements of good/social/positive life.
CO 4	To learn about Avoiding risks and harmful habits in their campus and outside the campus for their bright future.
CO 5	Prevent and fight against harmful diseases for good health through positive mindset.

Scheme of Examination:

Semester End Examination (SEE):

SEE paper shall be set for 50 questions, each of the 01 mark. The pattern of the question paper is MCQ (multiple choice questions). The time allotted for SEE is 01 hour.

Continuous Internal Evaluation (CIE):

Three Tests are to be conducted for 40 marks each. Average of Marks scored in all three tests is added to test component. CIE is executed by way of quizzes / Alternate Assessment Tools (AATs), and three tests.

Typical Evaluation pattern for regular courses is shown in Table 2.

Table 2: Distribution of weightage for CIE & SEE of Regular courses

Component		Marks	Total Marks
CIE	CIE Test-1	40	50
	CIE Test-2	40	
	CIE Test-3	40	
	Assignments	10	
SEE	Semester End Examination	50	50
Grand Total			**100**

CO/PO	PO6
CO 1	3
CO 2	3
CO 3	3
CO 4	3
CO 5	3
Average	3

Low-1: Medium-2: High-3

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SEMESTER – I/II

Course: ಬಳಕೆ ಕನ್ನಡ - baLake Kannada (Kannada for Usage)

Course Code	BKBKK24107/207	CIE Marks	50
Hours/Week (L: T: P)	1:0:0	SEE Marks	50
No. of Credits	1	Examination Hours	01

Course Objectives:

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 Kamataka state and its language, literature and General information about this state.

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 ಸರ್ವನಾಮಗಳು 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 ವರ್ಣವಾಚಕ ವಿಶೇಷಣಗಳು, ಸಂಖ್ಯಾವಾಚಕಗಳು Qualitative, Quantitative and Colour Adjectives, Numerals**
3. **ಅಂಶ ರೂಪಗಳು ಮತ್ತು ವಿಭಕ್ತಿ ಪ್ರತ್ಯಯಗಳು –ಪಂಚಮಿ ವಿಭಕ್ತಿ ಪ್ರತ್ಯಯ – (ಅ, ಅದು, ಅಟ್ಟು, 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 ಪ್ರತಿರೂಪಗಳು -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, ನಿಷೇಧಕತೆ, ಪ್ರೋತ್ಸಾಹನ ಮತ್ತು ಒತ್ತಾಯ ಅರ್ಥಬರುವ ಪದಗಳು ಮತ್ತು ವಾಕ್ಯಗಳು Permission, Commands, encouraging and Urging words (Imperative words and sentences)** 2. **ಸಾಮಾನ್ಯ ಸಂಭಾಷಣೆಗಳಲ್ಲಿ ದ್ವಿತೀಯ ವಿಭಕ್ತಿ ಪ್ರತ್ಯಯಗಳು ಮತ್ತು ಸಂಭವನೀಯ ಪ್ರಯೋಗಗಳು Accusative Cases and Potential Forms used in General Communication**
3. "ಇರು ಮತ್ತು ಇರಲ್ಲ" ಸಹಾಯಕ ಕ್ರಿಯಾಪದಗಳು, ಸಂಭಾವ್ಯಸೂಚಕ ಮತ್ತು ನಿಷೇಧಾರ್ಥಕ ಕ್ರಿಯಾ ಪದಗಳು - Helping Verbs "iru and iralla", Corresponding Future and Negation Verbs
4. ಹೋಲಿಕೆ (ತರತಮ), ಸಂಬಂಧ ಸೂಚಕ, ಮತ್ತು ಸೂಚಕ ಪ್ರತ್ಯಯಗಳು ಮತ್ತು ನಿಷೇಧಾರ್ಥಕ ಪದಗಳ ಬಳಕೆ- Comparitive, Relationship, Identification and Negation Words

Module - 5 (03 hours of pedagogy)
1. ಕಾಲ ಮತ್ತು ಸಮಯದ ಹಾಗೂ ಕ್ರಿಯಾಪದಗಳ ವಿವಿಧ ಪ್ರಯೋಗಗಳು -Different types of Tense, Time and Verbs
2. ದ್, -ತ್, - ಪು, - ಇಪು, - ಆಗಿ, - ಅಲ್ಲ, - ಗ್, -ಳ್, 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 ದಿನನಿತ್ಯದಲ್ಲಿ ಕನ್ನಡ ಪದಗಳು -Kannada Words in Conversation**

H. N. Rajashekar
Dean Academic
Global Academy of Technology,
Rajarajeshwarinagar, Bengal-98

Textbook:

ಬಳಕೆ ಕನ್ನಡ

ಡಾ. ಎಲ್. ತಿಮ್ಮೇಶ

ಪ್ರಕಟಣೆ : ಪ್ರಸಾರಾಂಗ,

ವಿಶ್ವವಿದ್ಯಾಲಯ, ಜಾಂತ್ರಿಕ ವಿಜ್ಞಾನಮಂದಿರ, ಬೆಳಗಾವಿ.

COURSE OUTCOMES:

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.

Scheme of Examination:

Semester End Examination (SEE):
SEE paper shall be set for 50 questions, each of the 01 mark. The pattern of the question paper is MCQ (multiple choice questions). The time allotted for SEE is 01 hour.

Continuous Internal Evaluation (CIE):
Three Tests are to be conducted for 40 marks each. Average of Marks scored in all three tests is added to test component. CIE is executed by way of quizzes / Alternate Assessment Tools (AATs), and three tests.
Typical Evaluation pattern for regular courses is shown in Table 2.

Table 2: Distribution of weightage for CIE & SEE of Regular courses

Component		Marks	Total Marks
CIE	CIE Test-1	40	50
	CIE Test-2	40	
	CIE Test-3	40	
	Assignments	10	
SEE	Semester End Examination	50	50
Grand Total			100

CO/PO	PO10
CO 1	3
CO 2	3
CO 3	3
CO 4	3
CO 5	3
Average	3

Low-1: Medium-2: High-3

H.N. Rajashekar Shetty
Dean Academic
Global Academy of Technology,
Rajarajeshwarinagar, Bengaluru-98

SEMESTER – I/II

Course: ಸಾಂಸ್ಕೃತಿಕ ಕನ್ನಡ

Course Code	BKSKK24107/207	CIE Marks	50
Hours/Week (L: T: P)	1:0:0	SEE Marks	50
No. of Credits	1	Examination Hours	01

Course Objectives:

1. ವ್ಯಕ್ತಿಪರ 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.

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 : ಆದರಿಂದೇನು ಫಲ ಇದರಿಂದೇನು ಫಲ – ಪುರಂದರದಾಸರು ಶಲ್ಯನೆಸದಿರು ಕಂಡ್ಯ ತಾಳು ಮನವೇ - ಕನಕದಾಸರು 3. ತತ್ವಪದಗಳು : ಸಾವಿರ ಕೊಡಗಳ ಸುಟ್ಟು - ಶಿಶುನಾಳ ಶರೀಫ
ಘಟಕ -3 ಆಧುನಿಕ ಕಾವ್ಯಭಾಗ (03 hours of pedagogy)
1. ಡಿವಿಜಿ ರವರ ಮಂಕುತಿಮ್ಮನ ಕಗ್ಗದಿಂದ ಆಯ್ದ 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 : ಕರಿಗೌಡ ಬೀಚನಹಳ್ಳಿ
ಘಟಕ - 5 ಸಾಂಸ್ಕೃತಿಕ, ಜನಪದ ಕಥೆ ಮತ್ತು ಪ್ರವಾಸ ಕಥನ (03 hours of pedagogy)
1. ಯುಗಾದಿ : ಮಸುಧೇಂದ್ರ 2. ಮೈಸೂರಿನ ಗಿರಿಜನ ಪರ್ವತ : ಹಿ.ಚಿ. ಬೋರಲಿಂಗಯ್ಯ

Textbook:

ಸಾಂಸ್ಕೃತಿಕ ಕನ್ನಡ

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

ಪ್ರಕಟಣೆ : ಪ್ರಸಾರಾಂಗ,

ವಿಶ್ವೇಶ್ವರಯ್ಯ ತಾಂತ್ರಿಕ ವಿಶ್ವವಿದ್ಯಾಲಯ, ಬೆಳಗಾವಿ.

COURSE OUTCOMES:

Upon completion of this course, student will be able to:

D.M. Rajashekar Swamy
Dean Academic
Global Academy of Technology,
Rajarajeshwarinagar, Bengaluru-98

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 ಸ್ಫೂರ್ತಿ 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.
CO5	ಸಾಂಸ್ಕೃತಿಕ, ಜನಪದ ಹಾಗೂ ಪ್ರವಾಸ ಕಥನಗಳ ಪರಿಚಯ ಮಾಡಿಕೊಡುವುದು.

Scheme of Examination:

Semester End Examination (SEE):
SEE paper shall be set for 50 questions, each of the 01 mark. The pattern of the question paper is MCQ (multiple choice questions). The time allotted for SEE is 01 hour.

Continuous Internal Evaluation (CIE):
Three Tests are to be conducted for 40 marks each. Average of Marks scored in all three tests is added to test component. CIE is executed by way of quizzes / Alternate Assessment Tools (AATs), and three tests.
Typical Evaluation pattern for regular courses is shown in Table 2.

Table 2: Distribution of weightage for CIE & SEE of Regular courses

Component		Marks	Total Marks
CIE	CIE Test-1	40	50
	CIE Test-2	40	
	CIE Test-3	40	
	Assignments	10	
SEE	Semester End Examination	50	50
Grand Total			100

CO/PO	PO10
CO 1	3
CO 2	3
CO 3	3
CO 4	3
CO 5	3
Average	3

Low-1: Medium-2: High-3

Dean Academic
Global Academy of Technology,
Rajarajeshwarinagar, Bengaluru-98

SEMESTER – I/II

Course: Indian Constitution

Course Code	BICOK24107/207	CIE Marks	50
Hours/Week (L: T: P)	1:0:0	SEE Marks	50
No. of Credits	1	Examination Hours	01

Course Objectives:

CLO1	To know about the basic structure of Indian Constitution.
CLO2	To know the Fundamental Rights (FR's), DPSP's and Fundamental Duties (FD's) of our constitution.
CLO3	To know about our Union Government, political structure & codes, procedures.
CLO4	To know the State Executive & Elections system of India.
CLO5	To learn the Amendments and Emergency Provisions, other important provisions given by the constitution.

Content	No. of Hours/ RBT levels
Module 1 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.	03 Hours
Module 2 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.	03 Hours
Module 3 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.	03 Hours
Module 4 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.	03 Hours
Module 5 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.	03 Hours

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.

COURSE OUTCOMES:

Upon completion of this course, student will be able to:

H.M. Rajashekar Swamy
Dean Academic
Global Academy of Technology,
Rajarajeshwarinagar, Bengaluru-98

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

Scheme of Examination:

Semester End Examination (SEE):
SEE paper shall be set for 50 questions, each of the 01 mark. The pattern of the question paper is MCQ (multiple choice questions). The time allotted for SEE is 01 hour.

Continuous Internal Evaluation (CIE):
Three Tests are to be conducted for 40 marks each. Average of Marks scored in all three tests is added to test component. CIE is executed by way of quizzes / Alternate Assessment Tools (AATs), and three tests.
Typical Evaluation pattern for regular courses is shown in Table 2.

Table 2: Distribution of weightage for CIE & SEE of Regular courses

Component		Marks	Total Marks
CIE	CIE Test-1	40	50
	CIE Test-2	40	
	CIE Test-3	40	
	Assignments	10	
SEE	Semester End Examination	50	50
Grand Total			100

CO/PO	PO6
CO 1	3
CO 2	3
CO 3	3
CO 4	3
CO 5	3
Average	3

Low-1: Medium-2: High-3

H. N. Rajashekar Swamy

Global Academy of Technology,
Rajarajeshwarinagar, Bengaluru-98

SEMESTER – I/II

Course: Professional Writing Skills in English

Course Code	BPWSK24106/206	CIE Marks	50
Hours/Week (L: T: P)	1:0:0	SEE Marks	50
No. of Credits	1	Examination Hours	01

Course Objectives:

CLO1	To Identify the Common Errors in Writing and Speaking of English.
CLO2	To Achieve better Technical writing and Presentation skills for employment.
CLO3	To read Technical proposals properly and make them to write good technical reports.
CLO4	To Acquire Employment and Workplace communication skills.
CLO5	To learn about Techniques of Information Transfer through presentation in different level.

Content	No. of Hours/ RBT levels
Module 1 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.	03 Hours
Module 2 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.	03 Hours
Module 3 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.	03 Hours
Module 4 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.	03 Hours
Module 5 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.	03 Hours

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:

V. P. Rajasheekaran Sir
Dean Academic
Global Academy of Technology,
Rajarajeshwarinagar, Bengal -98

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) Pr

COURSE OUTCOMES:

Upon completion of this course, student will be able to:

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

Scheme of Examination:

Semester End Examination (SEE):
SEE paper shall be set for 50 questions, each of the 01 mark. The pattern of the question paper is MCQ (multiple choice questions). The time allotted for SEE is 01 hour.
Continuous Internal Evaluation (CIE):
Three Tests are to be conducted for 40 marks each. Average of Marks scored in all three tests is added to test component. CIE is executed by way of quizzes / Alternate Assessment Tools (AATs), and three tests.
Typical Evaluation pattern for regular courses is shown in Table 2.

Table 2: Distribution of weightage for CIE & SEE of Regular courses

Component		Marks	Total Marks
CIE	CIE Test-1	40	50
	CIE Test-2	40	
	CIE Test-3	40	
	Assignments	10	
SEE	Semester End Examination	50	50
Grand Total			100

CO/PO	PO10
CO 1	3
CO 2	3
CO 3	3
CO 4	3
CO 5	3
Average	3

Low-1: Medium-2: High-3

H. N. Rajashekhar Dean Academic
Global Academy of Technology,
Rajarajeshwarinagar, Bengaluru-98

SEMESTER – I/II

Course: Communicative English

Course Code	BENGK24106/206	CIE Marks	50
Hours/Week (L: T: P)	1:0:0	SEE Marks	50
No. of Credits	1	Examination Hours	01

Course Objectives:

CLO1	To know about Fundamentals of Communicative English and Communication Skills in general.
CLO2	To train to identify the nuances of phonetics, intonation and enhance pronunciation skills for better Communication skills.
CLO3	To impart basic English grammar and essentials of important language skills.
CLO4	To enhance with English vocabulary and language proficiency for better communication skills.
CLO5	To learn about Techniques of Information Transfer through presentation.

Content	No. of Hours/ RBT levels
Module 1 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.	03 Hours
Module 2 Introduction to Phonetics: Phonetic Transcription, English Pronunciation, Pronunciation Guidelines to consonants and vowels, Sounds Mispronounced, Silent and Non-silent Letters, Syllables and Structure. Word Accent, Stress Shift and Intonation, Spelling Rules and Words often Misspelt. Common Errors in Pronunciation.	03 Hours
Module 3 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.	03 Hours
Module 4 Basic English Communicative Grammar and Vocabulary PART - II: Words formation - Prefixes and Suffixes, Contractions and Abbreviations. Word Pairs (Minimal Pairs) – Exercises, Tense and Types of tenses, The Sequence of Tenses (Rules in use of Tenses) and Exercises on it.	03 Hours
Module 5 Communication Skills for Employment: Information Transfer: Oral Presentation and its Practice. Difference between Extempore/Public Speaking, Communication Guidelines. Mother Tongue Influence (MTI), Various Techniques for Neutralization of Mother Tongue Influence. Reading and Listening Comprehensions – Exercises.	03 Hours

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 Infinite Learning Solutions, Bengaluru - 2022.

Reference Books:

1. Technical Communication by Gajendra Singh Chauhan and Et al, (ISBN-978-93-5350-050-4), Cengage learning India Pvt Limited [Latest Revised Edition] - 2019.

2. English for Engineers by N.P.Sudharshana and C.Savitha, Cambridge University Press – 2018.

H.P. Rajeshekar Jonas

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.

COURSE OUTCOMES:

Upon completion of this course, student will be able to:

CO 1	Understand and apply the Fundamentals of Communication Skills in their communication skills.
CO 2	Identify the nuances of phonetics, intonation and enhance pronunciation skills.
CO 3	To impart basic English grammar and essentials of language skills as per present requirement.
CO 4	Understand and use all types of English vocabulary and language proficiency.
CO 5	Adopt the Techniques of Information Transfer through presentation.

Scheme of Examination:

Semester End Examination (SEE):
SEE paper shall be set for 50 questions, each of the 01 mark. The pattern of the question paper is MCQ (multiple choice questions). The time allotted for SEE is 01 hour.
Continuous Internal Evaluation (CIE):
Three Tests are to be conducted for 40 marks each. Average of Marks scored in all three tests is added to test component. CIE is executed by way of quizzes / Alternate Assessment Tools (AATs), and three tests.
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CIE	CIE Test-1	40	50
	CIE Test-2	40	
	CIE Test-3	40	
	Assignments	10	
SEE	Semester End Examination	50	50
Grand Total			100

CO/PO	PO10
CO 1	3
CO 2	3
CO 3	3
CO 4	3
CO 5	3
Average	3

Low-1: Medium-2: High-3

H. N. Rajashekar Gowda
Dean Academic
Global Academy of Technology,
Rajarajeshwarinagar, Bengaluru-98