

Scheme and Syllabus (I Year)

(With effect from 2024-25 Academic Year)



Bachelor Degree in Engineering Out Come Based Education with Choice Based Credit System



P.E.S. College of Engineering, Mandya - 571 401, Karnataka

*[An Autonomous Institution affiliated to VTU, Belagavi,
Grant – in – Aid Institution (Government of Karnataka),
Accredited by NBA (All UG Programs), NAAC and Approved by AICTE, New Delhi]*

**ಪಿ.ಇ.ಎಸ್. ತಾಂತ್ರಿಕ ಮಹಾವಿದ್ಯಾಲಯ
ಮಂಡ್ಯ-571 401, ಕರ್ನಾಟಕ
(ಎ.ಟಿ.ಯು, ಬೆಳಗಾವಿ ಅಡಿಯಲ್ಲಿನ ಸ್ವಾಯತ್ತ ಸಂಸ್ಥೆ)**

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VISION

“To develop skilled professionals in the field of Artificial Intelligence & Machine Learning contributing globally to the benefit of industry and society.”

MISSION

- *To impart knowledge in cutting edge Artificial Intelligence technologies that meets industry standards.*
- *To collaborate with industry to uplift innovative research and development in Artificial Intelligence & Machine Learning and related domains to meet societal demands.*
- *To produce successful Computer Science and Engineering graduates with a specialization in Artificial Intelligence & Machine Learning with personal and professional responsibilities, and a commitment to lifelong learning.*

QUALITY POLICY

Highly committed in providing quality, concurrent technical education and continuously striving to meet expectations of stake holders.

CORE VALUES

Professionalism

Empathy

Synergy

Commitment

Ethics

B.E. I – Semester [Physics Group] – Civil Engineering Stream (CES)												
Sl. No.	Course & Course Code	Course Title	Teaching Department	Hrs / Week				Credits	Examination Marks			
				L	T	P	SDA		CIE	SEE	Total	
1	BSC P24MACE101	Calculus, Differential Equations and Linear Algebra	MA	2	2	2	-	4	50	50	100	
2	BSC P24PHCE102	Applied Physics (IC)	PH	2	2	2	-	4	50	50	100	
3	ESC P24ESCE103	Engineering Mechanics (IC)	CE	2	2	-	-	3	50	50	100	
4	ESC P24ESC104X	Engineering Science Course-I	Respective Engg. Dept	3	-	-	-	3	50	50	100	
5	ETC P24ETC105X	Emerging Technology Course-I	Any Engg. Dept	3	-	-	-	3	50	50	100	
	OR											
	PLC P24PLC105X	Programming Languages Course-I (IC)		2	-	2	-					
6	AEC P24ENG106	Communicative English - I	Humanities	-	2	-	-	1	50	50	100	
7	AEC P24RP107	Rapid Prototyping	Any Dept	-	1	1	-	1	50	50	100	
8	AEC/SDC P24IDT108	Innovation and Design Thinking	Any Dept	-	2	-	-	1	50	50	100	
	OR											
	AEC/SDC P24SFH108	Scientific Foundation for Health										
9	MAND P24KSK109 / P24KBK109	Sanskrutika Kannada/ Balake Kannada	Humanities	-	2	-	-	0	50	50	100	
	OR											
	MAND P24ICO109	Indian Constitution										
Total							20	450	450	900		

B.E. II – Semester [Chemistry Group] – Civil Engineering Stream (CES)											
Sl. No.	Course & Course Code	Course Title	Teaching Department	Hrs / Week				Credits	Examination Marks		
				L	T	P	SDA		CIE	SEE	Total
1	BSC P24MACE201	Integral Calculus, Partial Differential Equations and Numerical methods	MA	2	2	2	-	4	50	50	100
2	BSC P24CHCE202	Applied Chemistry (IC)	CH	2	2	2	-	4	50	50	100
3	ESC P24CED203	Computer – Aided Engineering Drawing	AU / IP /ME	2	-	2	-	3	50	50	100
4	ESC P24ESC204X	Engineering Science Course-I	Respective Engg. Dept	3	-	-	-	3	50	50	100
5	ETC P24ETC205X	Emerging Technology Course-I	Any Engg. Dept	3	-	-	-	3	50	50	100
	OR										
	PLC P24PLC205X	Programming Languages Course-I (IC)		2	-	2	-				
6	AEC P24ENG206	Communicative English - II	Humanities	-	2	-	-	1	50	50	100
7	AEC P24SI207	Social Innovation	Any Dept	1	-	1	-	1	50	50	100
8	AEC/SDC P24IDT208	Innovation and Design Thinking	Any Dept	-	2	-	-	1	50	50	100
	OR										
	AEC/SDC P24SFH208	Scientific Foundation for Health									
9	MAND P24KSK209 / P24KBK209	Sanskrutika Kannada/ Balake Kannada	Humanities	-	2	-	-	0	50	50	100
	OR										
	MAND P24ICO209	Indian Constitution									
Total								20	450	450	900

B.E. I – Semester [Chemistry Group] – Civil Engineering Stream (CES)											
Sl. No.	Course & Course Code	Course Title	Teaching Department	Hrs / Week				Credits	Examination Marks		
				L	T	P	SDA		CIE	SEE	Total
1	BSC	Calculus, Differential Equations and Linear Algebra	MA	2	2	2	-	4	50	50	100
	P24MACE101										
2	BSC	Applied Chemistry (IC)	CH	2	2	2	-	4	50	50	100
	P24CHCE102										
3	ESC	Computer – Aided Engineering Drawing	ME / IP / AU	2	-	2	-	3	50	50	100
	P24CED103										
4	ESC	Engineering Science Course-I	Respective Engg. Dept	3	-	-	-	3	50	50	100
	P24ESC104X										
5	ETC	Emerging Technology Course-I	Any Engg. Dept	3	-	-	-	3	50	50	100
	P24ETC105X										
	OR										
	PLC	Programming Languages Course-I (IC)		2	-	2	-				
P24PLC105X											
6	AEC	Communicative English - I	Humanities	-	2	-	-	1	50	50	100
	P24ENG106										
7	AEC	Rapid Prototyping	Any Dept	-	1	1	-	1	50	50	100
	P24RP107										
8	AEC/SDC	Innovation and Design Thinking	Any Dept	-	2	-	-	1	50	50	100
	P24IDT108										
	OR										
	AEC/SDC	Scientific Foundation for Health									
P24SFH108											
9	MAND	Samskrutika Kannada/ Balake Kannada	Humanities	-	2	-	-	0	50	50	100
	P24KSK109 / P24KBK109										
	OR										
	MAND	Indian Constitution									
P24ICO109											
Total								20	450	450	900

B.E. II – Semester [Physics Group] – Civil Engineering Stream (CES)											
Sl. No.	Course & Course Code	Course Title	Teaching Department	Hrs / Week				Credits	Examination Marks		
				L	T	P	SDA		CIE	SEE	Total
1	BSC	Integral Calculus, Partial Differential Equations and Numerical methods	MA	2	2	2	-	4	50	50	100
	P24MACE201										
2	BSC	Applied Physics (IC)	PH	2	2	2	-	4	50	50	100
	P24PHCE202										
3	ESC	Engineering Mechanics (IC)	CE	2	-	2	-	3	50	50	100
	P24ESCE203										
4	ESC	Engineering Science Course-I	Respective Engg. Dept	3	-	-	-	3	50	50	100
	P24ESC204X										
5	ETC	Emerging Technology Course-I	Any Engg. Dept	3	-	-	-	3	50	50	100
	P24ETC205X										
	OR										
	PLC	Programming Languages Course-I (IC)		2	-	2	-				
P24PLC205X											
6	AEC	Communicative English - II	Humanities	-	2	-	-	1	50	50	100
	P24ENG206										
7	AEC	Social Innovation	Any Dept	1	-	1	-	1	50	50	100
	P24SI207										
8	AEC/SDC	Innovation and Design Thinking	Any Dept	-	2	-	-	1	50	50	100
	P24IDT208										
	OR										
9	AEC/SDC	Scientific Foundation for Health	Humanities	-	2	-	-	0	50	50	100
	P24SFH208										
	OR										
	MAND	Indian Constitution									
P24KSK209 / P24KBK209											
Total								20	450	450	900

B.E. I – Semester [Physics Group] – Computer Science & Engineering Stream (CSE)											
Sl. No.	Course & Course Code	Course Title	Teaching Department	Hrs / Week				Credits	Examination Marks		
				L	T	P	SDA		CIE	SEE	Total
1	BSC	Calculus, Differential Equations and Linear Algebra	MA	2	2	2	-	4	50	50	100
	P24MACS101										
2	BSC	Applied Physics (IC)	PH	2	2	2	-	4	50	50	100
	P24PHCS102										
3	ESC	Principles of Programming Using C (IC)	CS / IS / AIML	2	-	2	-	3	50	50	100
	P24ESCS103										
4	ESC	Engineering Science Course-I	Respective Engg. Dept	3	-	-	-	3	50	50	100
	P24ESC104X										
5	ETC	Emerging Technology Course-I	Any Engg. Dept	3	-	-	-	3	50	50	100
	P24ETC105X										
	OR										
	PLC	Programming Languages Course-I (IC)		2	-	2	-				
P24PLC105X											
6	AEC	Communicative English - I	Humanities	-	2	-	-	1	50	50	100
	P24ENG106										
	AEC	Rapid Prototyping	Any Dept	-	1	1	-	1	50	50	100
8	AEC/SDC	Innovation and Design Thinking	Any Dept	-	2	-	-	1	50	50	100
	P24IDT108										
	OR										
	AEC/SDC	Scientific Foundation for Health									
P24SFH108											
9	MAND	Samskrutika Kannada/ Balake Kannada	Humanities	-	2	-	-	0	50	50	100
	P24KSK109 / P24KBK109										
	OR										
	MAND	Indian Constitution									
P24ICO109											
Total								20	450	450	900

B.E. II – Semester [Chemistry Group] – Computer Science & Engineering Stream (CSE)											
Sl. No.	Course & Course Code	Course Title	Teaching Department	Hrs / Week				Credits	Examination Marks		
				L	T	P	SDA		CIE	SEE	Total
1	BSC	Integral Calculus, Partial Differential Equations and Numerical methods	MA	2	2	2	-	4	50	50	100
	P24MACS201										
2	BSC	Applied Chemistry (IC)	CH	2	2	2	-	4	50	50	100
	P24CHCS202										
3	ESC	Computer – Aided Engineering Drawing	ME / IP / AU	2	-	2	-	3	50	50	100
	P24CED203										
4	ESC	Engineering Science Course-I	Respective Engg. Dept	3	-	-	-	3	50	50	100
	P24ESC204X										
5	ETC	Emerging Technology Course-I	Any Engg. Dept	3	-	-	-	3	50	50	100
	P24ETC205X										
	OR										
	PLC	Programming Languages Course-I (IC)		2	-	2	-				
P24PLC205X											
6	AEC	Communicative English - II	Humanities	-	2	-	-	1	50	50	100
	P24ENG206										
7	AEC	Social Innovation	Any Dept	1	-	1	-	1	50	50	100
	P24SI207										
8	AEC/SDC	Innovation and Design Thinking	Any Dept	-	2	-	-	1	50	50	100
	P24IDT208										
	OR										
	AEC/SDC	Scientific Foundation for Health									
P24SFH208											
9	MAND	Samskrutika Kannada/ Balake Kannada	Humanities	-	2	-	-	0	50	50	100
	P24KSK209 / P24KBK209										
	OR										
	MAND	Indian Constitution									
P24ICO209											
Total								20	450	450	900

B.E. I – Semester [Chemistry Group] – Computer Science & Engineering Stream (CSE)											
Sl. No.	Course & Course Code	Course Title	Teaching Department	Hrs / Week				Credits	Examination Marks		
				L	T	P	SDA		CIE	SEE	Total
1	BSC	Calculus, Differential Equations and Linear Algebra	MA	2	2	2	-	4	50	50	100
	P24MACS101										
2	BSC	Applied Chemistry (IC)	CH	2	2	2	-	4	50	50	100
	P24CHCS102										
3	ESC	Computer – Aided Engineering Drawing	ME / IP / AU	2	-	2	-	3	50	50	100
	P24CED103										
4	ESC	Engineering Science Course-I	Respective Engg. Dept	3	-	-	-	3	50	50	100
	P24ESC104X										
5	ETC	Emerging Technology Course-I	Any Engg. Dept	3	-	-	-	3	50	50	100
	P24ETC105X										
	OR										
	PLC	Programming Languages Course-I (IC)		2	-	2	-				
P24PLC105X											
6	AEC	Communicative English - I	Humanities	-	2	-	-	1	50	50	100
	P24ENG106										
7	AEC	Rapid Prototyping	Any Dept	-	1	1	-	1	50	50	100
	P24RP107										
8	AEC/SDC	Innovation and Design Thinking	Any Dept	-	2	-	-	1	50	50	100
	P24IDT108										
	OR										
	AEC/SDC	Scientific Foundation for Health									
P24SFH108											
9	MAND	Samskrutika Kannada/ Balake Kannada	Humanities	-	2	-	-	0	50	50	100
	P24KSK109 / P24KBK109										
	OR										
	MAND	Indian Constitution									
P24ICO109											
Total								20	450	450	900

B.E. II – Semester [Physics Group] – Computer Science & Engineering Stream (CSE)											
Sl. No.	Course & Course Code	Course Title	Teaching Department	Hrs / Week				Credits	Examination Marks		
				L	T	P	SDA		CIE	SEE	Total
1	BSC P24MACS201	Integral Calculus, Partial Differential Equations and Numerical methods	MA	2	2	2	-	4	50	50	100
2	BSC P24PHCS202	Applied Physics (IC)	PH	2	2	2	-	4	50	50	100
3	ESC P24ESCS203	Principles of Programming Using C (IC)	CS / IS / AIML	2	-	2	-	3	50	50	100
4	ESC P24ESC204X	Engineering Science Course-I	Respective Engg. Dept	3	-	-	-	3	50	50	100
5	ETC P24ETC205X	Emerging Technology Course-I	Any Engg. Dept	3	-	-	-	3	50	50	100
	OR										
	PLC P24PLC205X	Programming Languages Course-I (IC)		2	-	2	-				
6	AEC P24ENG206	Communicative English - II	Humanities	-	2	-	-	1	50	50	100
7	AEC P24SI207	Social Innovation	Any Dept	1	-	1	-	1	50	50	100
8	AEC/SDC P24IDT208	Innovation and Design Thinking	Any Dept	-	2	-	-	1	50	50	100
	OR										
	AEC/SDC P24SFH208	Scientific Foundation for Health									
9	MAND P24KSK209 / P24KBK209	Sanskrutika Kannada/ Balake Kannada	Humanities	-	2	-	-	0	50	50	100
	OR										
	MAND P24ICO209	Indian Constitution									
Total								20	450	450	900

B.E. I – Semester [Chemistry Group] – Electrical & Electronics Engineering Stream (EEE)											
Sl. No.	Course & Course Code	Course Title	Teaching Department	Hrs / Week				Credits	Examination Marks		
				L	T	P	SDA		CIE	SEE	Total
1	BSC P24MAEE101	Calculus, Differential Equations and Linear Algebra	MA	2	2	2	-	4	50	50	100
2	BSC P24CHEE102	Applied Chemistry (IC)	CH	2	2	2	-	4	50	50	100
3	ESC P24CED103	Computer – Aided Engineering Drawing	ME / IP / AU	2	-	2	-	3	50	50	100
4	ESC P24ESC104X	Engineering Science Course-I	Respective Engg. Dept	3	-	-	-	3	50	50	100
5	ETC P24ETC105X	Emerging Technology Course-I	Any Engg. Dept	3	-	-	-	3	50	50	100
	OR										
	PLC P24PLC105X	Programming Languages Course-I (IC)		2	-	2	-				
6	AEC P24ENG106	Communicative English - I	Humanities	-	2	-	-	1	50	50	100
7	AEC P24RP107	Rapid Prototyping	Any Dept	-	1	1	-	1	50	50	100
8	AEC/SDC P24IDT108	Innovation and Design Thinking	Any Dept	-	2	-	-	1	50	50	100
	OR										
	AEC/SDC P24SFH108	Scientific Foundation for Health									
9	MAND P24KSK109 / P24KBK109	Sanskrutika Kannada/ Balake Kannada	Humanities	-	2	-	-	0	50	50	100
	OR										
	MAND P24ICO109	Indian Constitution									
Total								20	450	450	900

B.E. II – Semester [Physics Group] – Electrical & Electronics Engineering Stream (EEE)											
Sl. No.	Course & Course Code	Course Title	Teaching Department	Hrs / Week				Credits	Examination Marks		
				L	T	P	SDA		CIE	SEE	Total
1	BSC P24MAEE201	Integral Calculus, Partial Differential Equations and Numerical methods	MA	2	2	2	-	4	50	50	100
2	BSC P24PHEE202	Applied Physics (IC)	PH	2	2	2	-	4	50	50	100
3	ESC P24EEE203 Or P24BEE203	Elements of Electrical Engineering OR Basic Electronics	EE / EC	2	2	-	-	3	50	50	100
4	ESC P24ESC204X	Engineering Science Course-I	Respective Engg. Dept	3	-	-	-	3	50	50	100
5	ETC P24ETC205X	Emerging Technology Course-I	Any Engg. Dept	3	-	-	-	3	50	50	100
	OR										
	PLC P24PLC205X	Programming Languages Course-I (IC)		2	-	2	-				
6	AEC P24ENG206	Communicative English - II	Humanities	-	2	-	-	1	50	50	100
7	AEC P24SI207	Social Innovation	Any Dept	1	-	1	-	1	50	50	100
8	AEC/SDC P24IDT208	Innovation and Design Thinking	Any Dept	-	2	-	-	1	50	50	100
	OR										
	AEC/SDC P24SFH208	Scientific Foundation for Health									
9	MAND P24KSK209 / P24KBK209	Sanskrutika Kannada/ Balake Kannada	Humanities	-	2	-	-	0	50	50	100
	OR										
	MAND P24ICO209	Indian Constitution									
Total								20	450	450	900

B.E. I – Semester [Physics Group] – Electrical & Electronics Engineering Stream (EEE)											
Sl. No.	Course & Course Code	Course Title	Teaching Department	Hrs / Week				Credits	Examination Marks		
				L	T	P	SDA		CIE	SEE	Total
1	BSC	Calculus, Differential Equations and Linear Algebra	MA	2	2	2	-	4	50	50	100
	P24MAEE101										
2	BSC	Applied Physics (IC)	PH	2	2	2	-	4	50	50	100
	P24PHEE102										
3	ESC	Elements of Electrical Engineering OR Basic Electronics	EE / EC	2	2	-	-	3	50	50	100
	P24EEE103 Or P24BEE103										
4	ESC	Engineering Science Course-I	Respective Engg. Dept	3	-	-	-	3	50	50	100
	P24ESC104X										
5	ETC	Emerging Technology Course-I	Any Engg. Dept	3	-	-	-	3	50	50	100
	P24ETC105X										
	OR										
	PLC	Programming Languages Course-I (IC)		2	-	2	-				
P24PLC105X											
6	AEC	Communicative English - I	Humanities	-	2	-	-	1	50	50	100
	P24ENG106										
7	AEC	Rapid Prototyping	Any Dept	-	1	1	-	1	50	50	100
	P24RP107										
8	AEC/SDC	Innovation and Design Thinking	Any Dept	-	2	-	-	1	50	50	100
	P24IDT108										
	OR										
	AEC/SDC	Scientific Foundation for Health									
P24SFH108											
9	MAND	Samskrutika Kannada/ Balake Kannada	Humanities	-	2	-	-	0	50	50	100
	P24KSK109 / P24KBK109										
	OR										
	MAND	Indian Constitution									
P24ICO109											
Total								20	450	450	900

B.E. II – Semester [Chemistry Group] – Electrical & Electronics Engineering Stream (EEE)											
Sl. No.	Course & Course Code	Course Title	Teaching Department	Hrs / Week				Credits	Examination Marks		
				L	T	P	SDA		CIE	SEE	Total
1	BSC	Integral Calculus, Partial Differential Equations and Numerical methods	MA	2	2	2	-	4	50	50	100
	P24MAEE201										
2	BSC	Applied Chemistry (IC)	CH	2	2	2	-	4	50	50	100
	P24CHEE202										
3	ESC	Computer – Aided Engineering Drawing	ME / IP / AU	2	-	2	-	3	50	50	100
	P24CED203										
4	ESC	Engineering Science Course-I	Respective Engg. Dept	3	-	-	-	3	50	50	100
	P24ESC204X										
5	ETC	Emerging Technology Course-I	Any Engg. Dept	3	-	-	-	3	50	50	100
	P24ETC205X										
	OR										
	PLC	Programming Languages Course-I (IC)		2	-	2	-				
P24PLC205X											
6	AEC	Communicative English - II	Humanities	-	2	-	-	1	50	50	100
	P24ENG206										
7	AEC	Social Innovation	Any Dept	1	-	1	-	1	50	50	100
	P24SI207										
8	AEC/SDC	Innovation and Design Thinking	Any Dept	-	2	-	-	1	50	50	100
	P24IDT208										
	OR										
	AEC/SDC	Scientific Foundation for Health									
P24SFH208											
9	MAND	Samskrutika Kannada/ Balake Kannada	Humanities	-	2	-	-	0	50	50	100
	P24KSK209 / P24KBK209										
	OR										
	MAND	Indian Constitution									
P24IC0209											
Total								20	450	450	900

B.E. I – Semester [Physics Group] – Mechanical Engineering Stream															
Sl. No.	Course & Course Code	Course Title	Teaching Department	Hrs / Week				Credits	Examination Marks						
				L	T	P	SDA		CIE	SEE	Total				
1	BSC	Calculus, Ordinary Differential Equations and Linear Algebra	MA	2	2	2	-	4	50	50	100				
	P24MAME101														
2	BSC	Applied Physics (IC)	PH	2	2	2	-	4	50	50	100				
	P24PHME102														
3	ESC	Elements of Mechanical Engineering	AU/IP/ME	2	2	0	-	3	50	50	100				
4	ESC	Engineering Science Course-I	Respective Engg. Dept	3	-	-	-	3	50	50	100				
	P24ESC104X														
5	ETC	Emerging Technology Course-I	Any Engg. Dept	3	-	-	-	3	50	50	100				
	P24ETC105X														
	OR														
	PLC	Programming Languages Course-I (IC)		2	-	2	-								
P24PLC105X															
6	AEC	Communicative English - I	Humanities	-	2	-	-	1	50	50	100				
	P24ENG106														
7	AEC	Rapid Prototyping	Any Dept	-	1	1	-	1	50	50	100				
8	AEC/SDC	Innovation and Design Thinking	Any Dept	-	2	-	-	1	50	50	100				
	P24IDT108														
	OR														
	AEC/SDC	Scientific Foundation for Health													
P24SFH108															
9	MAND	Samskrutika Kannada/ Balake Kannada	Humanities	-	2	-	-	0	50	50	100				
	P24KSK109 / P24KBK109														
	OR														
	MAND	Indian Constitution													
P24ICO109															
Total								20	450	450	900				

B.E. II – Semester [Chemistry Group] – Mechanical Engineering Stream (MES)											
Sl. No.	Course & Course Code	Course Title	Teaching Department	Hrs / Week				Credits	Examination Marks		
				L	T	P	SDA		CIE	SEE	Total
1	BSC P24MAME201	Integral Calculus, Partial Differential Equations and Numerical methods	MA	2	2	2	-	4	50	50	100
2	BSC P24CHME202	Applied Chemistry (IC)	CH	2	2	2	-	4	50	50	100
3	ESC P24CED203	Computer Aided Engineering Drawing	AU / IP / ME	2	-	2	-	3	50	50	100
4	ESC P24ESC204X	Engineering Science Course-I	Respective Engg. Dept	3	-	-	-	3	50	50	100
5	ETC P24ETC205X	Emerging Technology Course-I	Any Engg. Dept	3	-	-	-	3	50	50	100
	OR										
	PLC P24PLC205X	Programming Languages Course-I (IC)		2	-	2	-				
6	AEC P24ENG206	Communicative English - II	Humanities	-	2	-	-	1	50	50	100
7	AEC P24SI207	Social Innovation	Any Dept	1	-	1	-	1	50	50	100
8	AEC/SDC P24IDT208	Innovation and Design Thinking	Any Dept	-	2	-	-	1	50	50	100
	OR										
	AEC/SDC P24SFH208	Scientific Foundation for Health									
9	MAND P24KSK209 / P24KBK209	Sanskrutika Kannada/ Balake Kannada	Humanities	-	2	-	-	0	50	50	100
	OR										
	MAND P24ICO209	Indian Constitution									
Total								20	450	450	900
B.E. I – Semester [Chemistry Group] – Mechanical Engineering Stream (MES)											

Sl. No.	Course & Course Code	Course Title	Teaching Department	Hrs / Week				Credits	Examination Marks						
				L	T	P	SDA		CIE	SEE	Total				
1	BSC	Calculus, Ordinary Differential Equations and Linear Algebra	MA	2	2	2	-	4	50	50	100				
	P24MAME101														
2	BSC	Applied Chemistry (IC)	CH	2	2	2	-	4	50	50	100				
	P24CHME102														
3	ESC	Computer Aided Engineering Drawing	AU / IP / ME	2	-	2	-	3	50	50	100				
	P24CED103														
4	ESC	Engineering Science Course-I	Respective Engg. Dept	3	-	-	-	3	50	50	100				
	P24ESC104X														
5	ETC	Emerging Technology Course-I	Any Engg. Dept	3	-	-	-	3	50	50	100				
	P24ETC105X														
	OR														
	PLC	Programming Languages Course-I (IC)		2	-	2	-								
P24PLC105X															
6	AEC	Communicative English - I	Humanities	-	2	-	-	1	50	50	100				
	P24ENG106														
7	AEC	Rapid Prototyping	Any Dept	-	1	1	-	1	50	50	100				
	P24RP107														
8	AEC/SDC	Innovation and Design Thinking	Any Dept	-	2	-	-	1	50	50	100				
	P24IDT108														
	OR														
	AEC/SDC	Scientific Foundation for Health													
P24SFH108															
9	MAND	Sanskrutika Kannada/ Balake Kannada	Humanities	-	2	-	-	0	50	50	100				
	P24KSK109 / P24KBK109														
	OR														
	MAND	Indian Constitution													
P24ICO109															
Total								20	450	450	900				

B.E. II – Semester [Physics Group] – Mechanical Engineering Stream

Sl. No.	Course & Course Code	Course Title	Teaching Department	Hrs / Week				Credits	Examination Marks			
				L	T	P	SDA		CIE	SEE	Total	
1	BSC	Integral Calculus, Partial Differential Equations and Numerical methods	MA	2	2	2	-	4	50	50	100	
	P24MAME201											
2	BSC	Applied Physics (IC)	PH	2	2	2	-	4	50	50	100	
	P24PHME202											
3	ESC	Elements of Mechanical Engineering	AU/IP/ME	2	2	0	-	3	50	50	100	
	P24ESME203											
4	ESC	Engineering Science Course-I	Respective Engg. Dept	3	-	-	-	3	50	50	100	
	P24ESC204X											
5	ETC	Emerging Technology Course-I	Any Engg. Dept	3	-	-	-	3	50	50	100	
	P24ETC205X											
	OR											
	PLC	Programming Languages Course-I (IC)		2	-	2	-					
P24PLC205X												
6	AEC	Communicative English - II	Humanities	-	2	-	-	1	50	50	100	
	P24ENG206											
7	AEC	Social Innovation	Any Dept	1	-	1	-	1	50	50	100	
	P24SI207											
8	AEC/SDC	Innovation and Design Thinking	Any Dept	-	2	-	-	1	50	50	100	
	P24IDT208											
	OR											
	AEC/SDC	Scientific Foundation for Health										
P24SFH208												
9	MAND	Sanskrutika Kannada/ Balake Kannada	Humanities	-	2	-	-	0	50	50	100	
	P24KSK209 / P24KBK209											
	OR											
	MAND	Indian Constitution										
P24ICO209												
Total								20	450	450	900	

SDA - Skill Development Activities, BSC - Basic Science Course, ESC - Engineering Science Courses, ETC - Emerging Technology Course, AEC - Ability Enhancement Course, HSMS - Humanity and Social Science and management Course, MAND – Mandatory Courses, CIE – Continuous Internal Evaluation, SEE - Semester End Examination, IC – Integrated Course (Theory Course Integrated with Practical Course), SDC - Skill Development Course	
Credit Definition: 1-hour Lecture (L) per week= 1Credit 2-hours Tutorial (T) per week= 1Credit 2-hours Practical / Drawing (P) per week= 1Credit 2-hous Skill Development Actives (SDA) per week = 1 Credit	04-Credits courses are to be designed for 50 hours of Teaching-Learning Session 04-Credits (IC) are to be designed for 40 hours' theory and 12-14 hours of practical sessions 03-Credits courses are to be designed for 40 hours of Teaching-Learning Session 02- Credits courses are to be designed for 25 hours of Teaching-Learning Session 01-Credit courses are to be designed for 12-15 hours of Teaching-Learning sessions
Mandatory Student's Induction Program: Motivating (Inspiring) Activities under the Induction program – The main aim of the induction program is to provide newly admitted students a broad understanding of society, relationships, and values. Along with the knowledge and skill of his/her study, students' character needs to be nurtured as an essential quality by which he/she would understand and fulfill the responsibility as an engineer. The following activities are to be covered in 21 days. Physical Activity, Creative Arts, Universal Human Values, Literary, Proficiency Modules, Lectures by Eminent People, Visits to Local areas, Familiarization with Department/Branch and Innovation, etc. For details, refer the ANNEXURE - I of Induction Programs notification of the University published at the beginning of the 1st semester.	
Mandatory AICTE Activity Points to be earned by students admitted to BE/ B.Tech., / B. Plan day college program (For more details refer to Chapter 6, AICTE Activity Point Program, Model Internship Guidelines): Over and above the academic grades, every regular student admitted to the 4 years Degree program and every student entering 4 years Degree programs through lateral entry, shall earn 100 and 75 Activity Points respectively for the award of degree through AICTE Activity Point Program. Students transferred from other Universities to the fifth semester are required to earn 50 Activity Points from the year of entry to VTU. The Activity Points earned shall be reflected on the student's eighth semester Grade Card . The activities can be spread over the years, any time during the semester weekends, and holidays, as per the liking and convenience of the student from the year of entry to the program. However, the minimum hours' requirement should be fulfilled. Activity Points (non-credit) do not affect SGPA/CGPA and shall not be considered for vertical progression. In case students fail to earn the prescribed activity Points, an Eighth Semester Grade Card shall be issued only after earning the required activity points. Students shall be admitted for the award of the degree only after the release of the Eighth semester Grade Card.	
#-P24PHCE102 SEE shall have the 03 hours of theory examination and 03 hours of practical examination ESC or ETC of 03 credits Courses shall have only a theory component (L:T :P:S=3:0:0:0) or if the nature the of course required practical learning syllabus shall be designed as an Integrated course (L:T:P:S= 2:0:2:0).	
All 01 Credit- courses shall have the SEE of 01 hours duration and the pattern of the question paper shall be MCQ.	

(ESC-I) Engineering Science Courses-I					(ETC-I) Emerging Technology Courses-I				
Code	Title	L	T	P	Code	Title	L	T	P
P24ESC1041	Introduction to Civil Engineering	3	0	0	P24ETC1051	Green Buildings	3	0	0
P24ESC1042	Introduction to Electrical Engineering	3	0	0	P24ETC1052	Operation and Maintenance of Solar Electric Systems	3	0	0
P24ESC1043	Introduction to Electronics Engineering	3	0	0	P24ETC1053	Introduction to Embedded System	3	0	0
P24ESC1044	Introduction to Mechanical Engineering	3	0	0	P24ETC1054	Renewable Energy Sources	3	0	0
P24ESC1045	Introduction to C Programming	2	0	2	P24ETC1055	Introduction to Internet of Things (IOT)	3	0	0
					P24ETC1056	Smart Materials and Systems	3	0	0
					P24ETC1057	Introduction to Cyber Security	3	0	0
					Note: ETC list shall be defined by the concerned department				
(PLC-I) Programming Language Courses-I					- The student has to select one course from the ESC-I group. - Civil and allied branches Students shall opt for any one of the courses from the ESC-I group except, P24ESC1041-Introduction to Civil Engineering - The students have to opt for the courses from ESC group without repeating the course in either 1st or 2nd semester				
Code	Title	L	T	P					
P24PLC1051	Introduction to Web Programming	2	0	2					
P24PLC1052	Introduction to Python Programming	2	0	2					
P24PLC1053	Basics of JAVA programming	2	0	2					
P24PLC1054	Introduction to C++ Programming	2	0	2					

					<i>The students must select one course from either ETC-I or PLC-I group.</i> <i>If students study the subject from ETC-I in 1st semester he/she has to select the course from PLC-II in the 2nd semester and vice-versa</i>
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(ESC-I) Engineering Science Courses-I					(ETC-I) Emerging Technology Courses-I				
Code	Title	L	T	P	Code	Title	L	T	P
P24ESC2041	Introduction to Civil Engineering	3	0	0	P24ETC2051	Green Buildings	3	0	0
P24ESC2042	Introduction to Electrical Engineering	3	0	0	P24ETC2052	Operation and Maintenance of Solar Electric Systems	3	0	0
P24ESC2043	Introduction to Electronics Engineering	3	0	0	P24ETC2053	Introduction to Embedded System	3	0	0
P24ESC2044	Introduction to Mechanical Engineering	3	0	0	P24ETC2054	Renewable Energy Sources	3	0	0
P24ESC2045	Introduction to C Programming	2	0	2	P24ETC2055	Introduction to Internet of Things (IOT)	3	0	0
					P24ETC2056	Smart Materials and Systems	3	0	0
					P24ETC2057	Introduction to Cyber Security	3	0	0
					Note: ETC list shall be defined by the concerned department				

(PLC-I) Programming Language Courses-I					<i>The student has to select one course from the ESC-I group.</i> <i>Civil and allied branches Students shall opt for any one of the courses from the ESC-I group except, P24ESC2041-Introduction to Civil Engineering</i> <i>The students have to opt for the courses from ESC group without repeating the course in either 1st or 2nd semester</i> <i>The students must select one course from either ETC-I or PLC-I group.</i> <i>If students study the subject from ETC-I in 1st semester he/she has to select the course from PLC-II in the 2nd semester and vice-versa</i>
Code	Title	L	T	P	
P24PLC2051	Introduction to Web Programming	2	0	2	
P24PLC2052	Introduction to Python Programming	2	0	2	
P24PLC2053	Basics of JAVA programming	2	0	2	
P24PLC2054	Introduction to C++ Programming	2	0	2	

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P24MAME101	22	P24ETC1056/2056	94
P24PHCE102/202	25	P24ETC1057/2057	96
P24PHCS102/202	29	P24PLC1051/2051	98
P24PHEE102/202	34	P24PLC1052/2052	103
P24PHME102/202	38	P24PLC1053/2053	107
P24CHCE102/202	42	P24PLC1054/2054	110
P24CHCS102/202	43	P24ENG106	113
P24CHEE102/202	48	P24RP107	115
P24CHME102/202	51	P24MACE201	116
P24ESCE103/203	54	P24MACS201	119
P24ESCS103/203	58	P24MAEE201	122
P24EEE103/203	62	P24MAME201	125
P24BEE103/203	65	P24ENG206	128
P24ESME103/203	67	P24SI207	130
P24CED103/203	70	P24IDT108/208	131
P24ESC1041/2041	72	P24SFH108/208	133
P24ESC1042/2042	76	P24KSK109/209	136
P24ESC1043/2043	79	P24KBK109/209	138
P24ESC1044/2044	82	P24ICO109/209	141

Calculus, Differential Equations and Linear Algebra [As per Choice Based Credit System (CBCS) & OBE Scheme] SEMESTER – I			
Course Code:	P24MACE101	CIE Marks:	50
Course Type (Theory/Practical/Integrated)	Integrated	SEE Marks:	50
		Total Marks:	100
Teaching Hours/Week (L:T:P):	2:2:2:0	Exam Hours:	03
Total Hours of Pedagogy	40 hours Theory + 10 to12 Lab slots	Credits:	04
Course Learning Objectives:			
1	Familiarize the importance of calculus associated with one variable and two variables.		
2	Analyze Engineering problems by applying Ordinary Differential Equations		
3	Develop the knowledge of Linear Algebra to solve system of equation by using matrices		
Unit	Syllabus content	No. of hours	
		Theory	Tutorial
I	Polar coordinates and curvature: Introduction, Polar coordinates, Polar curves, angle between the radius vector and the tangent, angle between two curves. Pedal equations. Curvature and Radius of curvature - Cartesian, Parametric, Polar and Pedal forms. Problems. Self - study: Center and circle of curvature, evolutes and involutes.	06	02
II	Series Expansion and Multivariable Calculus: Taylor's and Maclaurin's series expansion for one variable (Statement only) – problems. Indeterminate forms -L'Hospital's rule, problems. Partial differentiation, total derivative - differentiation of composite functions. Jacobian and problems. Maxima and minima for a function of two variables. Problems. Self - study: Euler's theorem and problems. Method of Lagrange's undetermined multipliers with single constraint.	06	02
III	Ordinary Differential Equations (ODEs) of first order: Linear and Bernoulli's differential equations. Exact and reducible to exact differential equations Integrating factors on $\frac{1}{N} \left[\frac{\partial M}{\partial y} - \frac{\partial N}{\partial x} \right]$ and $\frac{1}{M} \left[\frac{\partial N}{\partial x} - \frac{\partial M}{\partial y} \right]$ Applications of ODE's - Orthogonal trajectories, Newton's law of cooling. Nonlinear differential equations: Introduction to general and singular solutions, Solvable for p only, Clairaut's equations, reducible to Clairaut's equations. Problems. Self-Study: Applications of ODE's: Solvable for x and y.	06	02
IV	Ordinary Differential Equations of higher order: Higher-order linear ODE's with constant coefficients - Inverse differential operator, case (I) to case (IV), method of variation of parameters, Cauchy's and Legendre's homogeneous differential equations. Problems Self - study: Formulation and solution of Cantilever beam. Finding the solution by the method of undetermined coefficients.	06	02

V	Linear Algebra: 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. Eigen values and Eigenvectors, Rayleigh's power method to find the dominant Eigen value and Eigenvector. Self-Study: Solution of a system of linear equations by Gauss-Jacobi iterative method. Inverse of a square matrix by Cayley- Hamilton theorem.	06	02
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COURSE OUTCOMES: On completion of the course, student should be able to:

- CO1: Describe** the translation of coordinate system, various types of series of functions, identify the variation of multivariables, and match the system of equations in matrix form
- CO2: Explain** the graph of function relate to polar coordinates, interpret series of continuous function and demonstrate the methods to describe mathematical solution to equations related to Engineering problems.
- CO3: Apply** the Mathematical properties to solve illustrative Engineering problems, calculate Maxima and minima of a function and calculate Eigen value relates to Eigenvector of system of equations.
- CO4: Analyze** the Mathematical model of differential and systems of equations of more than one variable classify various solutions to problems, enumerate numerical solutions to system of equations and familiarize with modern mathematical tools namely SCILAB/PYTHON/MATLAB

TEACHING - LEARNING PROCESS: Chalk and Talk, power point presentation, animations, videos.

TEXT BOOKS

1. B.S. Grewal, Higher Engineering Mathematics (44th Edition 2018), Khanna Publishers, New Delhi.
2. E. Kreyszig, Advanced Engineering Mathematics, John Wiley and sons, 10th Ed. (Reprint) 2016.

REFERENCE BOOKS

1. V. Ramana: Higher Engineering Mathematics, McGraw –Hill Education, 11th Ed..
2. H. C. Taneja, Advanced Engineering Mathematics, Volume I & II, I.K. International Publishing House Pvt. Ltd., New Delhi.
3. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2010.

ONLINE RESOURCES

1. <http://www.nptel.ac.in>
2. <https://en.wikipedia.org>
3. <https://ocw.mit.edu/courses/18-03sc-differential-equations-fall-2011/>
4. <https://ocw.mit.edu/courses/18-06sc-linear-algebra-fall-2011/>
5. <https://math.hmc.edu/calculus/hmc-mathematics-calculus-online-tutorials/differential-equations/first-order-differential-equations/>

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2										
CO2	2	3										
CO3	3	2										
CO4	2	3										
Strength of correlation: Low-1, Medium- 2, High-3												

Calculus, Differential Equations and Linear Algebra [As per Choice Based Credit System (CBCS) & OBE Scheme] SEMESTER – I			
Course Code:	P24MACS101	CIE Marks:	50
Course Type (Theory/Practical/Integrated)	Integrated	SEE Marks:	50
		Total Marks:	100
Teaching Hours/Week (L:T:P):	2:2:2:0	Exam Hours:	03
Total Hours of Pedagogy	40 hours Theory + 10 to 12 Lab slots	Credits:	04
Course Learning Objectives:			
1	Familiarize the importance of calculus associated with one variable and two variables.		
2	Analyze Engineering problems by applying Ordinary Differential Equations		
3	Develop the knowledge of Linear Algebra to solve system of equation by using matrices		
Unit	Syllabus content	No. of hours	
		Theory	Tutorial
I	Polar coordinates and curvature: Introduction, Polar coordinates, Polar curves, angle between the radius vector and the tangent, angle between two curves. Pedal equations. Curvature and Radius of curvature - Cartesian, Parametric, Polar and Pedal forms. Problems. Self - study: Center and circle of curvature, evolutes and involutes.	06	02
II	Series Expansion and Multivariable Calculus: Taylor's and Maclaurin's series expansion for one variable (Statement only) – problems. Indeterminate forms - L'Hospital's rule, problems. Partial differentiation, total derivative - differentiation of composite functions. Jacobian and problems. Maxima and minima for a function of two variables. Problems. Self - study: Euler's theorem and problems. Method of Lagrange's undetermined multipliers with single constraint.	06	02
III	Ordinary Differential Equations (ODEs) of first order: Linear and Bernoulli's differential equations. Exact and reducible to exact differential equations Integrating factors on $\frac{1}{N} \left[\frac{\partial M}{\partial y} - \frac{\partial N}{\partial x} \right]$ and $\frac{1}{M} \left[\frac{\partial N}{\partial x} - \frac{\partial M}{\partial y} \right]$ Applications of ODE's - Orthogonal trajectories, Newton's law of cooling. Nonlinear differential equations: Introduction to general and singular solutions, Solvable for p only, Clairaut's equations, reducible to Clairaut's equations. Problems. Self-Study: Applications of ODE's: Solvable for x and y.	06	02
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V	Linear Algebra : 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. Eigen values and Eigenvectors, Rayleigh's power method to find the dominant Eigen value and Eigenvector. Self-Study: Solution of a system of linear equations by Gauss-Jacobi iterative method. Inverse of a square matrix by Cayley- Hamilton theorem.	06	02
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COURSE OUTCOMES: On completion of the course, student should be able to:

- CO1: Describe** the translation of coordinate system, various types of series of functions, identify the variation of multivariable's, and match the system of equations in matrix form
- CO2: Explain** the graph of function relate to polar coordinates, interpret series of continuous function and demonstrate the methods to describe mathematical solution to equations related to Engineering problems.
- CO3: Apply** the Mathematical properties to solve illustrative Engineering problems, calculate Maxima and minima of a function and calculate Eigen value relate to Eigenvector of system of equations.
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TEACHING - LEARNING PROCESS: Chalk and Talk, power point presentation, animations, videos.

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5. <https://math.hmc.edu/calculus/hmc-mathematics-calculus-online-tutorials/differential-equations/first-order-differential-equations/>

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2										
CO2	2	3										
CO3	3	2										
CO4	2	3										
Strength of correlation: Low-1, Medium- 2, High-3												

Suggested Learning Resources:

Reference Books

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

Calculus, Ordinary Differential Equations and Linear Algebra [As per Choice Based Credit System (CBCS) & OBE Scheme] SEMESTER – I			
Course Code:	P24MAEE101	CIE Marks:	50
Course Type (Theory/Practical/Integrated)	Integrated	SEE Marks:	50
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3. <https://ocw.mit.edu/courses/18-03sc-differential-equations-fall-2011/>
4. <https://ocw.mit.edu/courses/18-06sc-linear-algebra-fall-2011/>
5. <https://math.hmc.edu/calculus/hmc-mathematics-calculus-online-tutorials/differential-equations/first-order-differential-equations/>

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2										
CO2	2	3										
CO3	3	2										
CO4	2	3										
Strength of correlation: Low-1, Medium- 2, High-3												

Calculus, Ordinary Differential Equations and Linear Algebra [As per Choice Based Credit System (CBCS) & OBE Scheme] SEMESTER – I			
Course Code:	P24MAME101	CIE Marks:	50
Course Type (Theory/Practical/Integrated)	Integrated	SEE Marks:	50
		Total Marks:	100
Teaching Hours/Week (L:T:P):	2:2:2:0	Exam Hours:	03
Total Hours of Pedagogy	40 hours Theory + 10 to12 Lab slots	Credits:	04
Course Learning Objectives:			
1	Familiarize the importance of calculus associated with one variable and two variables.		
2	Analyze Engineering problems by applying Ordinary Differential Equations		
3	Develop the knowledge of Linear Algebra to solve system of equation by using matrices		
Unit	Syllabus content	No. of hours	
		Theory	Tutorial
I	Polar coordinates and curvature: Introduction, Polar coordinates, Polar curves, angle between the radius vector and the tangent, angle between two curves. Pedal equations. Curvature and Radius of curvature - Cartesian, Parametric, Polar and Pedal forms. Problems. Self - study: Center and circle of curvature, evolutes and involutes.	06	02
II	Series Expansion and Multivariable Calculus: Taylor's and Maclaurin's series expansion for one variable (Statement only) – problems. Indeterminate forms - L'Hospital's rule, problems. Partial differentiation, total derivative - differentiation of composite functions. Jacobian and problems. Maxima and minima for a function of two variables. Problems. Self - study: Euler's theorem and problems. Method of Lagrange's undetermined multipliers with single constraint.	06	02
III	Ordinary Differential Equations (ODEs) of first order: Linear and Bernoulli's differential equations. Exact and reducible to exact differential equations Integrating factors on $\frac{1}{N} \left[\frac{\partial M}{\partial y} - \frac{\partial N}{\partial x} \right]$ and $\frac{1}{M} \left[\frac{\partial N}{\partial x} - \frac{\partial M}{\partial y} \right]$ Applications of ODE's - Orthogonal trajectories, Newton's law of cooling. Nonlinear differential equations: Introduction to general and singular solutions, Solvable for p only, Clairaut's equations, reducible to Clairaut's equations. Problems. Self-Study: Applications of ODE's: Solvable for x and y.	06	02
IV	Ordinary Differential Equations of higher order: Higher-order linear ODE's with constant coefficients - Inverse differential operator, case-I to case-IV, method of variation of parameters, Cauchy's and Legendre's homogeneous differential equations. Problems Self - study: Formulation and solution of Cantilever beam. Finding the solution by the method of undetermined coefficients.	06	02

V	Linear Algebra: 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. Eigen values and Eigenvectors, Rayleigh's power method to find the dominant Eigen value and Eigenvector. Self-Study: Solution of a system of linear equations by Gauss-Jacobi iterative method. Inverse of a square matrix by Cayley- Hamilton theorem.	06	02
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COURSE OUTCOMES: On completion of the course, student should be able to:

- CO1: Describe** the translation of coordinate system, various types of series of functions, identify the variation of multivariable's, and match the system of equations in matrix form
- CO2: Explain** the graph of function relate to polar coordinates, interpret series of continuous function and demonstrate the methods to describe mathematical solution to equations related to Engineering problems.
- CO3: Apply** the Mathematical properties to solve illustrative Engineering problems, calculate Maxima and minima of a function and calculate Eigen value relates to Eigenvector of system of equations.
- CO4: Analyze** the Mathematical model of differential and systems of equations of more than one variable classify various solutions to problems, enumerate numerical solutions to system of equations and familiarize with modern mathematical tools namely SCILAB/PYTHON/MATLAB

TEACHING - LEARNING PROCESS: Chalk and Talk, power point presentation, animations, videos.

TEXT BOOKS

1. B.S. Grewal, Higher Engineering Mathematics (44th Edition 2018), Khanna Publishers, New Delhi.
2. E. Kreyszig, Advanced Engineering Mathematics, John Wiley and sons, 10th Ed. (Reprint) 2016.

REFERENCE BOOKS

1. V. Ramana: Higher Engineering Mathematics, McGraw –Hill Education, 11th Ed..
2. H. C. Taneja, Advanced Engineering Mathematics, Volume I & II, I.K. International Publishing House Pvt. Ltd., New Delhi.
3. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2010.

ONLINE RESOURCES

1. <http://www.nptel.ac.in>
2. <https://en.wikipedia.org>
3. <https://ocw.mit.edu/courses/18-03sc-differential-equations-fall-2011/>
4. <https://ocw.mit.edu/courses/18-06sc-linear-algebra-fall-2011/>
5. <https://math.hmc.edu/calculus/hmc-mathematics-calculus-online-tutorials/differential-equations/first-order-differential-equations/>

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2										
CO2	2	3										
CO3	3	2										
CO4	2	3										
Strength of correlation: Low-1, Medium- 2, High-3												

Applied Physics [As per Choice Based Credit System (CBCS) & OBE Scheme] SEMESTER – I/II			
Course Code:	P24PHCE102/202	CIE Marks	50
Course Type (Theory/Practical/Integrated)	Integrated	SEE Marks	50
		Total Marks	100
Teaching Hours/Week (L:T:P: S)	2:2:2:0	Exam Hours	03
Total Hours of Pedagogy	40 hours Theory + 10 to 12 Lab slots	Credits	04
Course Objectives			
❖ To recall the concepts of physics related to waves and oscillations, quantum mechanics, elastic properties of materials, fundamentals of LASER and optical fibers used in the applications ❖ To understand the concepts of waves and oscillations and their engineering applications ❖ To realize the concepts of modern physics and quantum mechanics and their applications ❖ To study elastic properties of materials and factors involved for the failure of engineering materials ❖ To learn the fundamentals of LASERs and optical fibers through photonics related to engineering field ❖ To study the concepts and principles of sound and ultrasonics to understand architectural acoustics			
Pedagogy:			
Techniques and strategies which teachers may adopt to achieve maximum attainment of the objectives.			
1. Chalk and Talk	4. Interactive simulations and animations		
2. Flipped Class	5. Online learning videos on theory topics		
3. Blended mode of learning	6. Hands-on and open ended experiments		
Unit-I: Oscillations and Shock waves			8 Hours
Oscillations- Simple Harmonic motion (SHM), differential equation for SHM (derivation), Springs - stiffness factor and its physical significance, series and parallel combination of springs (derivation), Types of spring and their applications. Free, damped and forced oscillations (Qualitative), Types of damping (Graphical Approach). Engineering applications of damped oscillations, resonance and sharpness of resonance. Shock waves- Mach number and Mach Angle, Mach Regimes, definition and characteristics of Shock waves, Construction and working of Reddy shock tube, Applications of Shock Waves. Numerical problems. Pre requisites: Basics of Oscillations and waves Self-learning component: Conservation of energy in SHM Practical component: Spring Constant and Reddy Shock Tube			
Unit-II: Quantum Physics:			8 Hours
Matter Waves - de Broglie Hypothesis, Phase Velocity and Group Velocity, de Broglie wavelength and derivation of expression by group velocity concept, Heisenberg's Uncertainty Principle and its application (Non existence of electron inside the nucleus) Wave Mechanics - Wave Function, Probability and normalization, Time independent Schrodinger wave equation, Eigen functions and Eigen Values, Application: Energy and wave function of particle in a one dimensional potential well of infinite depth. Numerical Problems Pre requisites: Quantum theory of Radiation Self-learning component: Blackbody Radiation Spectrum Practical component: Stefan-Boltzmann law and Planck's Constant			

Unit-III: Elastic properties of materials:	8 Hours
Elastic materials (qualitative). Stress-Strain Curve, strain hardening and softening. Elastic Moduli, Poisson's ratio and its limiting values. Relation between q , n , k and σ (derivation), Beams, bending moment of rectangular beam (derivation), I-section girder and their Engineering Applications. Twisting couple per unit twist of a cylinder (derivation), Failures of engineering materials - stress concentration, fatigue and factors affecting fatigue (qualitative). Numerical problems Pre requisites: Elasticity, Stress & Strain Self-learning: Single Cantilever Practical component: Rigidity modulus and Young's modulus	
Unit-IV: Photonics:	8 Hours
Lasers-Definition and Characteristics of LASER, Interaction of radiation with matter, Expression for energy density (derivation). Requisites of a Laser system. Conditions for Laser action. Principle, construction and working of carbon dioxide laser. Applications: Lasers as Range finder, Road profiling. Optical Fibers- Propagation mechanism, angle of acceptance and numerical aperture (derivation), fractional index change, modes of propagation, Number of modes and V-parameter, Types of optical fibers. Attenuation and expression for attenuation coefficient (no derivation), Applications: Detect damages and faults at remotely accessible places. Numerical problems. Pre requisite: Introduction on LASER and Optical fibres Self-learning component: Construction and working of Semiconductor LASER Practical component: Diffraction Grating and Optical fiber	
Unit-V: Architectural Acoustics	8 Hours
Acoustics- Reflection of sound, echo, reverberation and reverberation time, absorption power and absorption coefficient. Types of Acoustics, Requisites for acoustics in auditorium, Sabine's formula (derivation), measurement of absorption coefficient, factors affecting the acoustics and remedial measures, Impact of Noise in Multi-storied buildings Ultrasonics- Introduction, Principle, Measurement of ultrasonic velocity in liquids. Application: Non-destructive method of testing the materials. Pre requisites: Basics of Sound Self-learning: Eyring's equation Practical component: Ultrasonic interferometer	

Practical Component:

The laboratory experiments are classified as Exercise/hands on, open ended, demonstration and structured inquiry. From the list of experiments given below, student must perform **minimum of 10 experiments**.

Sl. No.	Name of the experiment	Type
1	Spring Constant – Series and Parallel arrangement	Hands on
2	Spring Constant – Oscillation method	Hands on
3	Verification of Stefan - Boltzmann law	Hands on
4	Verification of Planck's Constant	Hands on
5	Rigidity modulus – Torsional method	Hands on
6	Young's modulus – Uniform bending	Hands on

7	Moment of Inertia – Searl’s double bar method	Hands on
8	Wavelength of Laser - Diffraction Grating	Hands on
9	Numerical aperture and angle of acceptance of an optical fiber	Open ended
10	Velocity of Ultrasonic – Ultrasonic interferometer	Open ended
11	Determination of Mach number – Reddy’s shock tube	Demonstration
12	PHET interactive simulations	Demonstration
13	GNU step interactive simulations (Self activity)	Structured inquiry
14	Study of motion using spreadsheet (Self activity)	Structured inquiry

Course Outcomes: Students will be able to

C01	Apply the fundamental concepts of physics to understand advanced principles of oscillations, waves, quantum mechanics, materials properties, photonics and acoustics.
C02	Identify the engineering applications of oscillations and shock waves, quantum mechanics, properties of materials, photonics and acoustics with basic knowledge of physics.
C03	Formulate the mathematical expressions for an advanced physical quantity related to engineering field using theoretical knowledge of physics.
C04	Solve the numerical problems related to engineering field in quantum mechanics, materials properties, photonics and acoustics by the knowledge of mathematics.
C05	Analyze the experimental results with theory by Constructing the circuit/Setting up the experiment related to Applied physics.

COs – POs mapping

COs	POs											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
C01	3	2										1
C02	3	2										1
C03	3	1										1
C04	3	2										
C05	3			2	1				1			1

Levels: 3-Highly mapped; 2- Moderately mapped; 1 – Fairly mapped; 0 – Not mapped

Suggested Learning Resources:

Text Books

1. Materials Science and Engineering by R Balasubramaniam, second edition, Wiley India Pvt. Ltd. Ansari Road, Daryaganj, New Delhi-110002.
2. A text book of Engineering Physics by M .N. Avadhanulu, P G. Kshirsagar and T V S Arun Murthy, Eleventh edition, S Chand and Company Ltd. New Delhi-110055.
3. John Wiley & Sons: Engineering Physics - Wiley India Pvt. Ltd, New Delhi.
4. R.K. Gaur, S. L. Gupta ; Engineering Physics – Dhanpat Rai Publications; 2011 Edition

Reference Books

5. Building Science: Lighting and Accoustics, B. P. Singh and Devaraj Singh, Dhanpat Rai Pub. (P) Ltd.,
6. Building Acoustics: Tor Eric Vigran, Taylor and Francis, 2008 Edition.

7. Photometry Radiometry and Measurements of Optical Losses, Micheal Bukshtab, Springer, 2nd ed.
8. Materials Science for Engineers by James F. Shackelford and Madanapalli K Muralidhara, sixth edition, Pearson Education Asia Pvt. Ltd., New Delhi.
9. Lasers and Non Linear Optics, B B Loud, New Age International, 2011 ed.

Web links and Video Lectures (e-Resources):

Web links:

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

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

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

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

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

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

Uniform Bending: <https://youtu.be/AiwnWoeVhrU>

Diffraction Grating: <https://youtu.be/th9-Ylp0FcU>

Spring Constant: <https://youtu.be/7Ar04wffp08>

Fermi Energy: https://youtu.be/i2bf3_X4h74

Stefan-Boltzmann Constant: <https://youtu.be/pBwn1TMkmJ8>

Planck's constant: <https://youtu.be/nWcejb3S2zY>

Torsional Pendulum: <https://youtu.be/hteYgW9pT6w>

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

<http://nptel.ac.in>

<https://swayam.gov.in>

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

<https://phet.colorado.edu>

<https://www.myphysicslab.com>

Scheme of Evaluation									
Marks distribution for the Evaluation of I/II Sem Applied Physics Course									
Assessment Method	Component	Type of Assessment	Assessment Type used	Max. Marks Assigned	Evaluated for Total Marks	Reduced Marks to 50%	Min. Eligible marks	Min. Marks Required	Max. Marks Allotted
CIE	Theory	AAT	Assignments	10	50	25	10	20	50
		Test - 1	Theory + Quiz	40					
		Test - 2	Theory + Quiz						
	Lab	Conduction of Experiments	Performance with Record	25	50	25	10		
		Lab test	Evaluation & Viva-Voce	25					
SEE	Theory	End Exam	Part - A	10	100	50	35/100	20	50
			Part - B	90					
Note: Min. marks from SEE shall be 35/100, but the aggregate marks from CIE & SEE must be 40/100								40	100

Applied Physics [As per Choice Based Credit System (CBCS) & OBE Scheme] SEMESTER – I			
Course Code:	P24PHCS102/202	CIE Marks	50
Course Type (Theory/Practical/Integrated)	Integrated	SEE Marks	50
		Total Marks	100
Teaching Hours/Week (L:T:P: S)	2:2:2:0	Exam Hours	03
Total Hours of Pedagogy	40 hours Theory + 10 to 12 Lab slots	Credits	04
Course Objectives			
❖ To recall the concepts of physics related to waves and oscillations, quantum mechanics, elastic properties of materials, fundamentals of LASER and optical fibers. ❖ To realize the concepts of modern physics and quantum mechanics used in their applications. ❖ To study the dielectric and superconducting properties of materials and their applications. ❖ To explore the rudimental concepts of semiconductors and their advanced applications. ❖ To learn the basics of photonics in LASERS and optical fibers, and their applications. ❖ To perceive the idea of quantum computing and its mathematical requirements in engineering.			
Pedagogy: Techniques and strategies which teachers may adopt to achieve maximum attainment of the objectives.			
1. Chalk and Talk	4. Interactive simulations and animations		
2. Flipped Class	5. Online learning videos on theory topics		
3. Blended mode of learning	6. Hands-on and Open ended experiments		
Unit-I: Quantum Physics:			8 Hours
Matter Waves - de Broglie Hypothesis, Phase Velocity and Group Velocity, relation between phase velocity and group velocity, relation between group velocity and particle velocity, de Broglie wavelength and its derivation by group velocity concept, Heisenberg's Uncertainty Principle and its application (Non existence of electron inside the nucleus). Wave Mechanics - Wave Function, Probability density and normalization, Time independent Schrodinger wave equation (derivation), Eigen functions and Eigen Values, Application: Eigen values and Eigen functions of particle in a one dimensional potential well of infinite depth (derivation). Numerical Problems. Pre requisites: Quantum theory of Radiation Self-learning component: Blackbody Radiation Spectrum Practical Component: Stefan-Boltzmann law and Planck's Constant.			
Unit-II: Properties of Materials			8 Hours
Dielectric Materials - Polar and non-polar dielectrics, Types of Polarization and their mechanism, internal fields in solid (derivation), Clausius-Mossotti equation (derivation). Application of dielectrics in transformers, Capacitors. Superconducting Materials - Superconductors, Temperature dependence of resistivity, Meissner Effect (diamagnetic property), Critical field, Critical Current, Types of Superconductors, BCS theory (Qualitative), High Temperature superconductors, Applications: Maglev vehicles, SQUIDS (Qualitative). Numerical problems. Pre requisites: Introduction on Dielectrics. Self-learning component: Dielectrics in Electrical Insulation and Super conducting magnets			

Practical component: Dielectric Constant and LCR Resonance Circuits	
Unit-III: Semiconductor and their applications	8 Hours
Semiconductors, Types of semiconductors, Fermi level, variation of Fermi level in intrinsic and extrinsic semiconductors with temperature, Fermi factor and density of states (qualitative), derivation for electron concentration (N_e) and mention the expression for hole concentration (N_h) of an intrinsic semiconductor, Relation between Fermi level and energy gap of an intrinsic semiconductor, Law of mass action, Expression for intrinsic charge carrier concentration (N_i). Electrical conductivity and resistivity of an intrinsic semiconductor (derivation). Variation of conductivity and resistivity with temperature in an intrinsic semiconductor. Applications: Photodiode, LED (construction and working). Hall effect: measurement of hall coefficient, hall voltage and its applications. Numerical problems. Pre requisites: Introduction on semiconductors, Band theory of solids. Self-learning component: Expression for hole concentration of an intrinsic semiconductor. Practical component: Four probe method, Transistor Characteristics and Fermi Energy	
Unit-IV: Photonics	8 Hours
Lasers - Definition and Characteristics of LASER, Interaction of radiation with matter, Expression for energy density (derivation). Requisites of a Laser system. Conditions for Laser action. Principle, Construction and working of Semiconductor LASER. Applications: Bar code scanner, Laser Printer Optical Fibers - Propagation mechanism, angle of acceptance and Numerical aperture (derivation), fractional index change, modes of propagation, Number of modes and V-parameter, Types of optical fibers. Attenuation and expression for attenuation coefficient (no derivation), Applications: Point to point telecommunication. Numerical problems. Pre requisite: Introduction on LASER and Optical fibers. Self-learning component: Construction and working of carbon dioxide laser Practical component: Diffraction Grating and Optical fiber	
Unit-V: Quantum Computing	8 Hours
Wave Function in Ket Notation: Matrix form of wave function, Identity Operator, Determination of $0\rangle$ and $1\rangle$, Pauli Matrices and its operations on 0 and 1 states, Mention of Conjugate and Transpose, Unitary Matrix U, Examples: Row and Column Matrices and their multiplication (Inner Product), Probability, Orthogonality. Quantum computers: Difference between classical and quantum computers, Moore's law and its end. Qubits and working principle of their different types, Dirac bracket notations, Bloch sphere, quantum logic gates, single qubit logic gates - Quantum Not Gate, Pauli - Z Gate, Hadamard Gate, Pauli Matrices, Phase Gate (or S Gate), T Gate and multi qubit logic gates - Controlled gate, CNOT Gate, (Discussion for 4 different input states). Representation of Swap gate, Controlled -Z gate, Toffoli gate. Pre requisites: Introduction to Quantum Computing and quantum gates. Self-learning: Operation of logic gates on single and multi – qubits Practical component:	

Practical Component:

The laboratory experiments are classified as Exercise/hands on, open ended, demonstration and structured inquiry. From the list of experiments given below, student must perform **minimum of 10 experiments**.

Sl. No.	Name of the experiment	Type
1	Spring Constant – Series and Parallel arrangements	Hands on
2	Verification of Stefan - Boltzmann law	Hands on
3	Dielectric constant - Charging and discharging of a capacitor	Hands on
4	LCR resonance – Series and parallel circuits	Hands on
5	output and transfer characteristics of a Transistor	Hands on
6	Wavelength of Laser - Diffraction Grating	Hands on
7	Determination of Fermi energy of copper	Hands on
8	Energy gap of a semiconductor - Four probe	Hands on
9	Velocity of Ultrasonic – Ultrasonic interferometer	Open ended
10	Numerical aperture and acceptance angle of an Optical fiber	Open ended
11	GNU step interactive simulations	Demonstration
12	PHET interactive simulations	Demonstration
13	GNU step interactive simulations (Self activity)	Structured inquiry
14	Study of motion using spreadsheet (Self activity)	Structured inquiry

Course Outcomes: Students will be able to

CO1	Apply the fundamental concepts of physics to understand advanced principles of quantum mechanics, properties of materials, semiconductors, photonics and quantum computing
CO2	Identify the engineering applications of quantum mechanics, properties of materials, semiconductors, photonics and quantum computing with basic knowledge of physics
CO3	Formulate the mathematical expressions for an advanced physical quantity related to engineering field using theoretical knowledge of physics.
CO4	Solve the numerical problems related to engineering field in quantum mechanics, materials properties, photonics and quantum computing with the knowledge of mathematics.
CO5	Analyze the experimental results with theory by Constructing the circuit/Setting up the experiment related to Applied physics.

COs – POs mapping

COs	POs											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
C01	3	2										1
C02	3	2										1
C03	3	1										1
C04	3	2										
C05	3			2	1				1			1

Levels: 3-Highly mapped; 2- Moderately mapped; 1 – Fairly mapped; 0 – Not mapped

Suggested Learning Resources:**Text Books:**

10. John Wiley & Sons: Engineering Physics - Wiley India Pvt. Ltd, New Delhi.
11. R.K. Gaur, S. L. Gupta ; Engineering Physics – Dhanpat Rai Publications; 2011 Edition

Reference Books:

1. N.H. Ayachit, P. K. Mittal: Engineering Physics – I. K. International Publishing House Pvt. Ltd. New Delhi
2. Materials Science and Engineering by R Balasubramaniam, second edition, Wiley India Pvt. Ltd. Ansari Road, Daryaganj, New Delhi-110002.
3. A text book of Engineering Physics by M .N. Avadhanulu, P G. Kshirsagar and T V S Arun Murthy, Eleventh edition, S Chand and Company Ltd. New Delhi-110055.
4. Engineering Physics by R. K. Gaur and S. L. Gupta, 2010 edition, Dhanpat Rai Publications Ltd., New Delhi-110002,
5. Photometry Radiometry and Measurements of Optical Losses, Micheal Bukshtab, Springer, 2nd edition.
6. Materials Science for Engineers by James F. Shackelford and Madanapalli K Muralidhara, sixth edition, Pearson Education Asia Pvt. Ltd., New Delhi.
7. Lasers and Non Linear Optics, B B Loud, New Age Internationals, 2011 edition

Web links and Video Lectures (e-Resources):**Web links:**

Diffraction Grating: <https://youtu.be/th9-Ylp0FcU>
 Transistor Characteristics: <https://youtu.be/tCnNAyHv0s0>
 LCR Resonance Circuit: <https://youtu.be/5qbr-F4H7n0>
 Four Probe Method: <https://youtu.be/OAybDK0T68k>
 Fermi Energy: https://youtu.be/i2bf3_X4h74
 Stefan-Boltzmann Constant: <https://youtu.be/pBwn1TMkmJ8>
 Planck's constant: <https://youtu.be/nWcejb3S2zY>
 Dielectric Constant: <https://youtu.be/vOTbXNs34j8>

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

<http://nptel.ac.in> <https://swayam.gov.in>
https://virtuallabs.merlot.org/vl_physics.html
<https://phet.colorado.edu>
<https://www.myphysicslab.com>

Scheme of Evaluation									
Marks distribution for the Evaluation of I/II Sem Applied Physics Course									
Assessment Method	Component	Type of Assessment	Assessment Type used	Max. Marks Assigned	Evaluated for Total Marks	Reduced Marks to 50%	Min. Eligible marks	Min. Marks Required	Max. Marks Allotted
CIE	Theory	AAT	Assignments	10	50	25	10	20	50
		Test - 1	Theory + Quiz	40					
		Test - 2	Theory + Quiz						
	Lab	Conduction of Experiments	Performance with Record	25	50	25	10		
		Lab test	Evaluation & Viva-Voce	25					
SEE	Theory	End Exam	Part - A	10	100	50	35/100	20	50
			Part - B	90					
Note: Min. marks from SEE shall be 35/100, but the aggregate marks from CIE & SEE must be 40/100								40	100

Applied Physics [As per Choice Based Credit System (CBCS) & OBE Scheme] SEMESTER – I/II			
Course Code:	P24PHEE102/202	CIE Marks	50
Course Type (Theory/Practical/Integrated)	Integrated	SEE Marks	50
		Total Marks	100
Teaching Hours/Week (L:T:P: S)	2:2:2:0	Exam Hours	03
Total Hours of Pedagogy	40 hours Theory + 10 to 12 Lab slots	Credits	04
Course Learning Objectives:			
❖ To recall the concepts of physics related to waves and oscillations, quantum mechanics, elastic properties of materials, fundamentals of LASER and optical fibers ❖ To realize the concepts of modern physics and quantum mechanics in engineering applications ❖ To study the dielectric and superconducting properties of materials and their applications. ❖ To understand the electrical and magnetic properties of materials and their applications ❖ To learn the basics of photonics in understanding the applications of LASERs and optical fibers ❖ To explore the rudimental concepts of semiconductors in construction of electronic devices			
Pedagogy:			
Techniques and strategies which teachers may adopt to achieve maximum attainment of the objectives.			
7. Chalk and Talk	10. Interactive simulations and animations		
8. Flipped Class	11. Online learning videos on theory topics		
9. Blended mode of learning	12. Hands-on and open ended experiments		
Unit-I: Quantum Physics:			8 Hours
Matter Waves - de Broglie Hypothesis, Phase Velocity and Group Velocity, relation between phase velocity and group velocity, relation between group velocity and particle velocity, de Broglie wavelength and its derivation by group velocity concept, Heisenberg's Uncertainty Principle and its application (Non existence of electron inside the nucleus). Wave Mechanics - Wave Function, Probability density and normalization, Time independent Schrodinger wave equation (derivation), Eigen functions and Eigen Values, Application: Eigen values and Eigen functions of particle in a one dimensional potential well of infinite depth (derivation). Numerical Problems. Pre requisites: Quantum theory of Radiation Self-learning component: Blackbody Radiation Spectrum Practical Component: Stefan-Boltzmann law and Planck's Constant.			
Unit-II: Properties of Materials			8 Hours
Dielectric Materials - Polar and non-polar dielectrics, Types of Polarization and their mechanism, internal fields in solid (derivation), Clausius-Mossotti equation (derivation). Application of dielectrics in transformers, Capacitors. Superconducting Materials - Superconductors, Temperature dependence of resistivity, Meissner Effect (diamagnetic property), Critical field, Critical Current, Types of Superconductors, BCS theory (Qualitative), High Temperature superconductors, Applications: Maglev vehicles, SQUIDS (Qualitative). Numerical problems. Pre requisites: Introduction on Dielectrics. Self-learning component: Dielectrics in Electrical Insulation and Superconducting magnets Practical component: Dielectric constant of a material			

Unit-III: Electric and Magnetic properties of materials	8 Hours
Electrical properties – Failures of classical free electron theory, Quantum free electron theory, Assumptions, Fermi-Dirac Statistics (Qualitative). Fermi level, Fermi-energy, Fermi temperature, Fermi velocity and Fermi factor, Variation of Fermi factor with energy and temperature, Expression for density of states (derivation), Mention the expression for Fermi energy and electron density. Merits of quantum free electron theory. Magnetic properties - Classification of magnetic materials, ferromagnetic materials – Weiss domain theory, hysteresis in ferromagnetic materials, explanation of hysteresis using domain theory, soft and hard magnetic materials, ferrites, Applications: magnetic recording and readout, storage of magnetic data. Pre requisites: Classical free electron theory Self-learning: Expression for electron and hole concentration of an intrinsic semiconductor Practical component: Fermi-energy and Hysteresis curve	
Unit-IV: Photonics	8 Hours
Lasers - Definition and Characteristics of LASER, Interaction of radiation with matter, Expression for energy density (derivation). Requisites of a Laser system. Conditions for Laser action. Principle, Construction and working of Semiconductor LASER. Applications: LASER spectroscopy and Holography. Optical Fibers - Propagation mechanism, angle of acceptance and Numerical aperture (derivation), fractional index change, modes of propagation, Number of modes and V - parameter, Types of optical fibers. Attenuation and expression for attenuation coefficient (no derivation), Applications: Communication, Point to point telecommunication. Numerical problems. Pre requisite: Introduction on LASER and Optical fibers. Self-learning component: Construction and working of carbon dioxide laser Practical component: Diffraction Grating and Optical fiber	
Unit-V: Semiconductors and devices	8 Hours
Semiconductors, Types of semiconductors, Fermi level, variation of Fermi level in intrinsic and extrinsic semiconductors with temperature, Fermi factor and density of states (qualitative), derivation for electron concentration (N_e) and mention the expression for hole concentration (N_h) of an intrinsic semiconductor, Relation between Fermi level and energy gap of an intrinsic semiconductor, Law of mass action, Expression for intrinsic charge carrier concentration (N_i). Electrical conductivity and resistivity of an intrinsic semiconductor (derivation). Applications: BJT, FET, MOSFET; IC's: Digital integrated circuits. Numerical problems. Pre requisites: Introduction on semiconductors, Band theory of solids. Self-learning component: Expression for hole concentration of an intrinsic semiconductor. Practical component: Four probe method, Transistor Characteristics and LCR Circuit	

Practical Component:

The laboratory experiments are classified as Exercise/hands on, open ended, demonstration and structured inquiry. From the list of experiments given below, student must perform **minimum of 10**

experiments.

Sl. No.	Name of the Experiment	Type
1	Verification of Stefan - Boltzmann law	Hands on
2	Verification of Planck's Constant	Hands on
3	Charging and discharging of a capacitor - Dielectric Constant	Hands on
4	Wavelength of Laser - Diffraction Grating	Hands on
5	output and transfer characteristics of a Transistor	Hands on
6	Series and parallel circuits - LCR Resonance	Hands on
7	Determination of Fermi energy of copper	Hands on
8	Energy gap of a semiconductor - Four probe	Hands on
9	Velocity of Ultrasonic – Ultrasonic interferometer	Open ended
10	Numerical aperture and acceptance angle of an Optical fiber	Open ended
11	GNU step interactive simulations	Demonstration
12	PHET interactive simulations (Hysteresis)	Demonstration
13	GNU step interactive simulations (Self activity)	Structured inquiry
14	Study of motion using spreadsheet (Self activity)	Structured inquiry

Course Outcomes: Students will be able to

CO1	Apply the fundamental concepts of physics to understand advanced principles of quantum mechanics, dielectric, superconducting, electric and magnetic properties of materials, photonics and semiconductors.
CO2	Identify the engineering applications of quantum mechanics, properties of materials, photonics and semiconductors with basic knowledge of physics.
CO3	Formulate the mathematical expressions for an advanced physical quantity related to engineering field using theoretical knowledge of physics.
CO4	Solve the numerical problems related to engineering field in quantum mechanics, materials properties, photonics and semiconductors by the knowledge of mathematics.
CO5	Analyze the experimental results with theory by Constructing the circuit/Setting up the experiment related to Applied physics.

COs – POs mapping

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

Levels: 3-Highly mapped; 2- Moderately mapped; 1 – Fairly mapped; 0 – Not mapped

Suggested Learning Resources:**Books**

12. Materials Science and Engineering by R Balasubramaniam, second edition, Wiley India Pvt. Ltd. Ansari Road, Daryaganj, New Delhi-110002.
13. A text book of Engineering Physics by M .N. Avadhanulu, P G. Kshirsagar and T V S Arun Murthy, Eleventh edition, S Chand and Company Ltd. New Delhi-110055.

Reference Books

1. Engineering Physics by R. K. Gaur and S. L. Gupta, 2010 edition, Dhanpat Rai Publications Ltd., New Delhi-110002

2. N.H. Ayachit, P. K. Mittal: Engineering Physics – I. K. International Publishing House Pvt. Ltd. New Delhi
3. Photometry Radiometry and Measurements of Optical Losses, Micheal Bukshtab, Springer, 2nd edition.
4. Materials Science for Engineers by James F. Shackelford and Madanapalli K Muralidhara, sixth edition, Pearson Education Asia Pvt. Ltd., New Delhi.
5. Lasers and Non Linear Optics, B B Loud, New Age International, 2011 edition

Web links and Video Lectures (e-Resources):

Web links:

Diffraction Grating: <https://youtu.be/th9-Ylp0FcU>Transistor Characteristics: <https://youtu.be/tCnNAyHv0s0>LCR Resonance Circuit: <https://youtu.be/5qbr-F4H7n0>Four Probe Method: <https://youtu.be/OAybDK0T68k>Fermi Energy: https://youtu.be/i2bf3_X4h74Stefan-Boltzmann Constant: <https://youtu.be/pBwn1TMkmJ8>Planck's constant: <https://youtu.be/nWcejb3S2zY>Dielectric Constant: <https://youtu.be/vOTbXNs34j8>**Activity Based Learning (Suggested Activities in Class)/ Practical Based learning**<http://nptel.ac.in><https://swayam.gov.in>https://virtuallabs.merlot.org/vl_physics.html<https://phet.colorado.edu><https://www.myphysicslab.com>

Scheme of Evaluation									
Marks distribution for the Evaluation of I/II Sem Applied Physics Course									
Assessment Method	Component	Type of Assessment	Assessment Type used	Max. Marks Assigned	Evaluated for Total Marks	Reduced Marks to 50%	Min. Eligible marks	Min. Marks Required	Max. Marks Allotted
CIE	Theory	AAT	Assignments	10	50	25	10	20	50
		Test - 1	Theory + Quiz	40					
		Test - 2	Theory + Quiz						
	Lab	Conduction of Experiments	Performance with Record	25	50	25	10		
		Lab test	Evaluation & Viva-Voce	25					
SEE	Theory	End Exam	Part - A	10	100	50	35/100	20	50
			Part - B	90					
Note: Min. marks from SEE shall be 35/100, but the aggregate marks from CIE & SEE must be 40/100								40	100

Applied Physics [As per Choice Based Credit System (CBCS) & OBE Scheme] SEMESTER – I/II			
Course Code:	P24PHME102/202	CIE Marks	50
Course Type (Theory/Practical/Integrated)	Integrated	SEE Marks	50
		Total Marks	100
Teaching Hours/Week (L:T:P: S)	2:2:2:0	Exam Hours	03
Total Hours of Pedagogy	40 hours Theory + 10 to12 Lab slots	Credits	04
Course Objectives			
❖ To recall the concepts of physics related to waves and oscillations, quantum mechanics, elastic properties of materials, fundamentals of LASER and optical fibers ❖ To understand the concepts of waves and oscillations and their engineering applications ❖ To realize the concepts of modern physics and quantum mechanics in engineering applications ❖ To study elastic properties of materials and factors involved for the failure of engineering materials ❖ To learn the fundamentals of LASERS and optical fibers through photonics related to engineering field ❖ To study the electrical and thermal conductivity of materials by the principles of applied physics			
Pedagogy: Techniques and strategies which teachers may adopt to achieve maximum attainment of the objectives.			
7. Chalk and Talk	10. Interactive simulations and animations		
8. Flipped Class	11. Online learning videos on theory topics		
9. Blended mode of learning	12. Hands-on and open ended experiments		
Unit-I: Oscillations and Shock waves			8 hours
Oscillations - Simple Harmonic motion (SHM), differential equation for SHM (derivation), Springs - Stiffness Factor and its Physical Significance, series and parallel combination of springs (derivation), Types of spring and their applications. Free, damped and forced oscillations (qualitative), Types of damping (Graphical Approach). Engineering applications: damped oscillations, resonance and sharpness of resonance. Shock waves - Mach number and Mach Angle, Mach Regimes, definition and characteristics of Shock waves, Construction and working of Reddy shock tube, Applications of Shock Waves, Numerical problems. Pre requisites: Basics of Oscillations and Waves Self-learning component: Conservation of energy in SHM Practical component: Spring Constant and Reddy shock tube			
Unit-II: Quantum Physics			8 hours
Matter Waves - de Broglie Hypothesis, Phase Velocity and Group Velocity, relation between phase velocity and group velocity, relation between group velocity and particle velocity, de Broglie wavelength and its derivation by group velocity concept, Heisenberg's Uncertainty Principle and its application (Non existence of electron inside the nucleus). Wave Mechanics - Wave Function, Probability density and normalization, Time independent Schrodinger wave equation (derivation), Eigen functions and Eigen Values, Application: Eigen values and Eigen functions of particle in a one dimensional potential well of infinite depth (derivation). Numerical Problems. Pre requisites: Quantum theory of Radiation Self-learning component: Blackbody Radiation Spectrum Practical component: Stefan-Boltzmann law and Planck's Constant.			
Unit-III: Elastic properties of materials:			8 hours

Elastic materials (qualitative). Stress-Strain Curve, Strain hardening and softening. Elastic Moduli, Poisson's ratio and its limiting values. Relation between q , n , k and σ (derivation), Beams, bending moment of rectangular beam (derivation), I-section girders and their Engineering Applications. Twisting couple per unit twist of a cylinder (derivation), Failures of engineering materials - ductile fracture, brittle fracture, stress concentration (qualitative). Numerical problems

Pre requisites: Elasticity, Stress & Strain

Self-learning: Single Cantilever

Practical component: Rigidity modulus and Young's modulus

Unit-IV: Photonics

8 hours

Lasers - Definition and Characteristics of LASER, Interaction of radiation with matter, Expression for energy density (derivation). Requisites of a Laser system. Conditions for Laser action. Principle, construction and working of carbon dioxide laser. Applications: Lasers drilling, cutting, welding.

Optical Fibers - Propagation mechanism, angle of acceptance and numerical aperture (derivation), fractional index change, modes of propagation, Number of modes and V - parameter, Types of optical fibers. Attenuation and expression for attenuation coefficient (no derivation), Applications: Industries and mechanical inspections. Numerical problems.

Pre requisite: Introduction on LASER and Optical fibers

Self-learning component: Construction and working of Semiconductor LASER

Practical component: Diffraction Grating and Optical fiber

Unit-V: Electrical and Thermal conductivity of materials

8 hours

Electrical conductivity - Failures of classical free electron theory (Qualitative), Quantum free electron theory - Assumptions, density of states (derivation), Fermi level, Fermi-energy, Fermi factor, variation of Fermi factor with energy and temperature. Expression for electrical conductivity (no derivation), merits of quantum free electron theory.

Thermal conductivity - Thermal conductivity of good conductor by Searle's method, thermal conductivity of bad conductor by Lee and Charlton method, Wideman-Franz law.

Pre requisites: Introduction on classical free electron theory

Self-learning component: Free electron density in a metal

Practical component: Fermi energy of a metal and Lee & Charlton method

Practical Component:

The laboratory experiments are classified as Exercise/hands on, open ended, demonstration and structured inquiry. From the list of experiments given below, student must perform **minimum of 10 experiments**.

Sl. No.	Name of the experiment	Type
1	Spring Constant – Series and Parallel arrangements	Hands on
2	Verification of Stefan - Boltzmann law	Hands on
3	Verification of Planck's Constant	Hands on
4	Rigidity modulus – Torsional method	Hands on
5	Young's modulus – Uniform bending	Hands on
6	Wavelength of Laser - Diffraction Grating	Hands on
7	Thermal Conductivity - Lee and Charlton method	Hands on
8	Determination of Fermi energy of copper	Hands on
9	Velocity of Ultrasonic – Ultrasonic interferometer	Open ended
10	Young's modulus – Single Cantilever	Open ended
11	Determination of Mach number - Reddy's shock tube	Demonstration

12	PHET Simulation (Spring constant by oscillation method)	Demonstration										
13	GNU step interactive simulations (Self activity)	Structured inquiry										
14	Study of motion using spreadsheet (Self activity)	Structured inquiry										
Course Outcomes: Students will be able to												
C01	Apply the fundamental concepts of physics to understand advanced principles of oscillations, waves, quantum mechanics, materials properties, photonics, electrical and thermal conductivity of materials.											
C02	Identify the engineering applications of oscillations, waves, quantum mechanics, dielectric and superconducting properties of materials, photonics , electrical and thermal conductivity of the materials with basic knowledge of physics											
C03	Formulate the needed mathematical expressions to answer advanced engineering problems using theoretical knowledge of applied physics.											
C04	Solve the numerical problems related to engineering field in quantum mechanics, materials properties, photonics and acoustics by the knowledge of mathematics.											
C05	Analyze the experimental results with theory by constructing the circuit/ Setting up the experiment related to Applied physics.											
COs – POs mapping												
COs	POs											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
C01	3	2										1
C02	3	2										1
C03	3	1										1
C04	3	2										
C05	3			2	1				1			1
Levels: 3-Highly mapped; 2- Moderately mapped; 1 – Fairly mapped; 0 – Not mapped												
Suggested Learning Resources:												
Text Books												
14. Materials Science and Engineering by R Balasubramaniam, second edition, Wiley India Pvt. Ltd. Ansari Road, Daryaganj, New Delhi-110002.												
15. A text book of Engineering Physics by M .N. Avadhanulu, P G. Kshirsagar and T V S Arun Murthy, Eleventh edition, S Chand and Company Ltd. New Delhi-110055.												
16. John Wiley & Sons: Engineering Physics - Wiley India Pvt. Ltd, New Delhi.												
17. R.K. Gaur, S. L. Gupta ; Engineering Physics – Dhanpat Rai Publications; 2011 Edition												
Reference Books:												
18. Engineering Physics by R. K. Gaur and S. L. Gupta, 2010 edition, Dhanpat Rai Publications Ltd., New Delhi												
19. Building Science: Lighting and Accoustics, B. P. Singh and Devaraj Singh, Dhanpat Rai Publications (P) Ltd.,												
20. Building Acoustics : Tor Eric Vigran, Taylor and Francis, 2008 Edition.												
21. Photometry Radiometry and Measurements of Optical Losses, Micheal Bukshtab, Springer, 2 nd edition.												
22. Materials Science for Engineers by James F. Shackelford and M K Muralidhara, 6 th ed, Pearson Ed. Pvt. Ltd												
23. Lasers and Non Linear Optics, B B Loud, New Age Internationals, 2011 edition												
Web links and Video Lectures (e-Resources):												
Web links:												
Simple Harmonic motion: https://www.youtube.com/watch?v=k2FvSzWeVxQ												

Stress- strain curves: <https://web.mit.edu/course/3/3.11/www/modules/ss.pdf>
 Stress curves: <https://www.youtube.com/watch?v=f08Y39UiC-o>
 Oscillations and waves : <https://openstax.org/books/college-physics-2e>
 Uniform Bending: <https://youtu.be/AiwnWoeVhrU>
 Diffraction Grating: <https://youtu.be/th9-Ylp0FcU>
 Spring Constant: <https://youtu.be/7Ar04wffp08>
 Fermi Energy: https://youtu.be/i2bf3_X4h74
 Stefan-Boltzmann Constant: <https://youtu.be/pBwn1TMkmJ8>
 Planck's constant: <https://youtu.be/nWcejb3S2zY>
 Torsional Pendulum: <https://youtu.be/hteYgW9pT6w>

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

<http://nptel.ac.in> <https://swayam.gov.in>
https://virtuallabs.merlot.org/vl_physics.html
<https://phet.colorado.edu>
<https://www.myphysicslab.com>

Scheme of Evaluation									
Marks distribution for the Evaluation of I/II Sem Applied Physics Course									
Assessment Method	Component	Type of Assessment	Assessment Type used	Max. Marks Assigned	Evaluated for Total Marks	Reduced Marks to 50%	Min. Eligible marks	Min. Marks Required	Max. Marks Allotted
CIE	Theory	AAT	Assignments	10	50	25	10	20	50
		Test - 1	Theory + Quiz	40					
		Test - 2	Theory + Quiz						
	Lab	Conduction of Experiments	Performance with Record	25	50	25	10		
		Lab test	Evaluation & Viva-Voce	25					
SEE	Theory	End Exam	Part - A	10	100	50	35/100	20	50
			Part - B	90					
Note: Min. marks from SEE shall be 35/100, but the aggregate marks from CIE & SEE must be 40/100								40	100

Applied Chemistry [As per Choice Based Credit System (CBCS) & OBE Scheme] SEMESTER – I/II			
Course Code:	P24CHCE102/202	CIE Marks	50
Course Type (Theory/Practical/Integrated)	Integrated	SEE Marks	50
		Total Marks	100
Teaching Hours/Week (L:T:P: S)	2:2:2:0	Exam Hours	03+02
Total Hours of Pedagogy	40 hours Theory + 10-12 Lab slots	Credits	04
Course objectives - To enable students to acquire knowledge on principles of chemistry for engineering applications. - To develop an intuitive understanding of chemistry by emphasizing the related branches of engineering. - To provide students with a solid foundation in analytical reasoning required to solve societal problems.			
Teaching-Learning Process These are sample Strategies, which teacher can use to accelerate the attainment of the various course outcomes and make Teaching –Learning more effective - Tutorial & remedial classes for needy students of small batches (not regular T/R) - Demonstration of concepts either by building models or by industry visit - Experiments in laboratories using non- conventional methods - Use of ICT – Online videos, online courses - Use of Google classroom for assignments/Notes - Conducting Make up class / Bridge courses for needy students - Publication of paper in conference or journal on Teaching & Learning Process			
Module-1: Energy Sources and High energy fuels			8 hours
Fuels: Introduction, calorific value, determination of calorific value of solid fuel using bomb calorimeter, and numerical problems. Green fuels: Introduction, power alcohol, synthesis and applications of biodiesel. Energy devices: Introduction, construction, working, and applications of Photovoltaic cells. Batteries: Introduction, Characteristics, Construction & applications of Li-ion battery, Ni-MH battery, Ag ₂ O- Zn battery and methanol-oxygen fuel cell. High energy fuels: Production (water electrolysis), advantages and storage of hydrogen. Self-learning: Plastic recycling to fuels and its monomers or other useful products			
Module-2: Macromolecules for engineering applications			8 hours
Polymers: Introduction, methods of polymerization, molecular weight, number average, weight average, numerical problems, synthesis, properties and industrial applications of Chlorinated polyvinylchloride (CPVC) and polystyrene. Fibers: Introduction, synthesis, properties and industrial applications of Kevlar and Polyester. Plastics & Adhesive: Introduction, synthesis, properties and industrial applications of polyurethane and Epoxy resin. Cement: Introduction, types, properties, testing and industrial applications of cement Lubricants: Introduction, classification, properties and application of lubricants. Self-learning: Biodegradable polymer: Introduction, synthesis, properties and application of Poly-lactic acid.			

Module-3: Corrosion science and Metal finishing	8 hours
Corrosion: Introduction, electrochemical theory of corrosion, types of corrosion-differential metal, differential aeration (waterline and pitting), stress corrosion (caustic embrittlement). Corrosion control: Metal coating-galvanization, surface conversion coating-anodization and cathodic protection-sacrificial anode and impressed current methods. Corrosion testing by weight loss method. Corrosion penetration rate (CPR)-numerical problems. Metal finishing: Introduction, technological importance, differences, Electroplating: Introduction, Electroplating of Nickel (hard and decorative). Electro-less plating: Introduction, electro-less plating of copper on PCB. Self-learning: Factors affecting the rate of corrosion, Factors influencing the nature of quality electro deposit (Current density, concentration of metal ion, pH, and temperature).	
Module-4: Phase rule and Analytical techniques	8 hours
Phase rule: Introduction, Definition of terms: phase, components, degree of freedom, phase rule equation. Phase diagram: one component- water system, Two component-Pb-Ag systems, Desilverisation of lead by pattinson's process. Analytical techniques: Introduction, principle, instrumentation of potentiometric sensors; its application in the estimation of iron, Optical sensors (colorimetric); its application in the estimation of the copper, pH-sensor (Glass electrode); its application in the determination of pH of beverages. Self-learning: Determination of viscosity of bio-fuel and its correlation with temperature.	
Module-5: Engineering Materials and applications	8 hours
Alloys: Introduction, classification, compositions, properties and applications of Stainless Steel, Solders, Brass and Alnico. Ceramics: Introduction, classification based on chemical composition, properties and applications of ceramics (perovskites or CaTiO_3). Nano-Chemistry: Introduction, size dependent properties of nano-material (surface area, electrical, optical and thermal), synthesis of nano-particles by sol-gel, and co-precipitation method. Nano-materials: Introduction, properties and engineering applications of carbon nano-tubes and graphene. Self-learning: Abrasives: Introduction, classification, properties and application of silicon carbide (carborandum).	
<u>PRACTICAL MODULE</u>	
<u>A – Demonstration (any two) offline/virtual:</u>	
A1. . Synthesis of poly-aniline and measurement of its conductivity.	
A2. Synthesis of iron oxide nano-particles	
A3. Determination of COD of industrial waste water	
A4. Determination of Copper in brass alloy.	
<u>B – Exercise (compulsorily any 3 to be conducted):</u>	
B1. Conductometric estimation of acid mixture	
B2. Potentiometric estimation of FAS using $\text{K}_2\text{Cr}_2\text{O}_7$	
B3. Determination of pKa of vinegar using pH sensor (Glass electrode)	
B4. Determination of rate of corrosion of mild steel by weight loss method	
<u>C – Structured Enquiry (compulsorily any 3 to be conducted):</u>	

- C1. Estimation of Copper present in electroplating effluent by optical sensor (colorimetry)
- C2. Determination of Viscosity coefficient of lubricant (Ostwald's viscometer)
- C3. Estimation of iron in TMT bar by external indicator method
- C4. Estimation of Sodium present in soil/effluent sample using flame photometer**

D – Open Ended Experiments (any two):

- D1 Estimation of percentage of iron in stainless steel
- D2. Synthesis of biodiesel from vegetable oil.
- D3. Determination of total hardness of water.
- D4. Analysis of constituents present in Portland cement.

Applied Chemistry [As per Choice Based Credit System (CBCS) & OBE Scheme] SEMESTER – I			
Course Code:	P24CHCS102/202	CIE Marks	50
Course Type (Theory/Practical/Integrated)	Integrated	SEE Marks	50
		Total Marks	100
Teaching Hours/Week (L:T:P: S)	2:2:2:0	Exam Hours	03+02
Total Hours of Pedagogy	40 hours Theory + 10-12 Lab slots	Credits	04
Course objectives - To enable students to acquire knowledge on principles of Chemistry for engineering applications. - To develop an intuitive understanding of Chemistry by emphasizing the related branches of Engineering. - To provide students with a solid foundation in analytical reasoning required to solve societal problems.			
Teaching-Learning Process These are sample Strategies, which teacher can use to accelerate the attainment of the various course outcomes and make Teaching – Learning more effective - Tutorial & remedial classes for needy students of small batches (not regular T/R) - Demonstration of concepts either by building models or by industry visit - Experiments in laboratories using non- conventional methods - Use of ICT – Online videos, online courses - Use of Google classroom for assignments/Notes - Conducting Make up class / Bridge courses for needy students - Publication of paper in conference or journal on Teaching & Learning Process			
MODULE 1: Electronic materials and display systems			8hours
Conductors, semiconductors and Insulators: Introduction, principle with examples, semiconductors- production of electronic grade silicon-Czochralski process (CZ) and float zone (FZ) methods, purification of silicon by Zone refiner. Display systems: Composition, Characteristics, working and applications of Liquid Crystal Displays (LCD's), Organic light emitting diodes (OLED's), Quantum Light emitting diodes (QLED's), Light emitting electrochemical cells. Electro-plating and Electro-less plating –Introduction, technological importance, Differences. Principles and applications of electro-plating of nickel and Electro-less plating of copper on PCB. Self -Learning Topics: Properties and functions of Silicon (Si), Germanium (Ge), Copper (Cu), Aluminum (Al), and Brominated flame retardants in computers			

MODULE 2: Sensors and Energy Systems	8hours
Sensors: Introduction, working principle and applications of Conductometric sensors, Electrochemical sensors, Thermometric sensors, and Optical sensors. Sensors for the measurement of DO. Electrochemical sensors for the pharmaceuticals, surfactants, hydrocarbons, electrochemical gas sensors for SO_x, NO_x, Disposable sensors in the detection of bimolecular and pesticides. Energy Systems: Introduction and characteristics of batteries. Construction, working and applications of Lithium ion, Ni- MH and Ag₂O-Zn batteries. Self -Learning Topics: Type of electrochemical sensors. Gas sensor- O₂ sensor, biosensor- Glucose sensors.	
MODULE 3: Corrosion and electrodes system	8hours
Corrosion: Introduction, electrochemical theory of corrosion, types-differential metal, differential aeration, caustic embrittlement, Corrosion control-galvanization, tinning, anodization and sacrificial anode and impressive current method. Corrosion penetration rate (CPR) - introduction and numerical problems. Electrodes: Introduction, types of electrodes, 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. Electrochemical cells – Definition, construction and Numerical problems. Analytical techniques: Introduction, principle and instrumentation: Conductometry – estimation of weak acid. Potentiometry – estimation of iron, Colorimeter-Copper Self-Study Components: IR and UV- visible spectroscopy.	
MODULE 4: Polymers and Green fuels	8hours
Polymers: Introduction, Molecular weight - Number average, weight average and numerical problems, Synthesis and applications of Epoxy resins, Kevlar. Conducting polymers – synthesis and conducting mechanism of poly-acetylene and commercial applications. Preparation, properties, and commercial applications of graphene oxide. Green fuels: Introduction, construction and working of solar photovoltaic cell, advantages, and disadvantages. Generation of energy (green hydrogen) from water electrolysis, advantages, and storage of hydrogen. Self -Learning Topics: Types of fuel cells-H₂-O₂ fuel cell and methanol - oxygen fuel cell	
MODULE 5: E-Waste Management	8hours
E-Wastes: Introduction, sources of e-waste, Composition, Characteristics, and Need of e-waste management. E - Waste. Toxic materials used in manufacturing electronic and electrical products, health hazards due to exposure to e-waste, recycling and recovery, different approaches of recycling (separation, Thermal treatments, hydrometallurgical extraction, pyro-metallurgical methods, direct recycling). Extraction of gold from E-waste. Role of stake holders in environmental management of e-waste (producers, consumers, recyclers, and statutory bodies). Self -Learning Topics: Impact of heavy metals on environment and human health.	

PRACTICAL
MODULE

A – Demonstration (any two) offline/virtual:

- A1. Synthesis of Iron-oxide Nano-particles
- A2. Electrolysis of water
- A3. Determination of COD of industrial waste water
- A4. Determination of Copper from E-waste (printed circuit board).

B – Exercise (compulsorily any 3 to be conducted):

- B1. Conductometric estimation of acid mixture
- B2. Potentiometric estimation of FAS using $K_2Cr_2O_7$
- B3. Determination of pKa of vinegar using pH sensor (Glass electrode)
- B4. Determination of rate of corrosion of mild steel by weight loss method

C – Structured Enquiry (compulsorily any 3 to be conducted):

- C1. Estimation of Copper present in electroplating effluent by optical sensor (colorimetry)
- C2. Determination of Viscosity coefficient of lubricant (Ostwald's viscometer)
- C3. Estimation of iron in TMT bar by external indicator method
- C4. Estimation of Sodium present in soil/effluent sample using flame photometer

D– Open Ended Experiments (any two):

- D1. Construction of photovoltaic cell.
- D2. Design an experiment to Identify the presence of proteins in given sample
- D3. Determination of total hardness of water.
- D4. Analysis of constituents present in Portland cement.

Applied Chemistry [As per Choice Based Credit System (CBCS) & OBE Scheme] SEMESTER – I/II			
Course Code:	P24CHEE102/202	CIE Marks	50
Course Type (Theory/Practical/Integrated)	Integrated	SEE Marks	50
		Total Marks	100
Teaching Hours/Week (L:T:P: S)	2:2:2:0	Exam Hours	03+02
Total Hours of Pedagogy	40 hours Theory + 10-12 Lab slots	Credits	04
Course objectives - To enable students to acquire knowledge on principles of chemistry for engineering applications. - To develop an intuitive understanding of chemistry by emphasizing the related branches of engineering. - To provide students with a solid foundation in analytical reasoning required to solve societal problems.			
Teaching-Learning Process These are sample Strategies, which teacher can use to accelerate the attainment of the various course outcomes and make Teaching – Learning more effective - Tutorial & remedial classes for needy students of small batches (not regular T/R) - Demonstration of concepts either by building models or by industry visit - Experiments in laboratories using non- conventional methods - Use of ICT – Online videos, online courses - Use of Google classroom for assignments/Notes - Conducting Make up class / Bridge courses for needy students - Publication of paper in conference or journal on Teaching & Learning Process			
MODULE 1: Chemistry of electronic materials			8hours
Conductors , Semiconductors and insulators: Introduction, principle with examples, Semiconductors- production of electronic grade silicon- Czochralski process (CZ) and float zone (FZ) methods. Purification of silicon by zone refiner. Electro-plating and Electro-less plating – Introduction, Factors affecting nature of deposits, Differences, Principles, Technological importance. Electro-plating of nickel and Electro-less plating of copper on PCB and their applications Polymers: Introduction, Molecular weight - Number average, weight average and numerical problems, Conducting polymers – synthesis and conducting mechanism of poly-acetylene. Preparation, properties and commercial applications of graphene oxide. Self-Study components: Electroplating of Gold and Chromium and Electro-less plating of Nickel.			
MODULE 2: Energy conversion and Solar energy			8 Hours
Batteries: Introduction, classification of batteries, characteristics, components, construction, working and applications of modern batteries: Li-ion battery, differences between Li-ion and Na-ion battery and silver oxide-zinc battery. Fuel cells: Introduction, construction, working and applications of methanol–oxygen and polymer electrolyte fuel cell. Solar energy: Introduction, importance of solar PV cell, construction and working solar PV cell, advantages and disadvantages. Self-Study Components: Electrodes for electrostatic double layer capacitors, pseudo capacitors, and hybrid capacitor.			

MODULE 3: Corrosion science and e-waste management	8 Hours
Corrosion: Introduction, electrochemical theory of corrosion, types-differential metal, differential aeration, caustic embrittlement. Corrosion control-galvanization, tinning, anodization and sacrificial anode and impressive current methods. Corrosion penetration rate (CPR) - introduction and numerical problem. E-waste management: Introduction, sources, types of, effects of e-waste on environment and human health, methods of disposal, advantages of recycling, extraction of copper and gold from e-waste. Self-Study Components: Recycling of PCB and battery components	
MODULE 4: Nano-materials and Display systems	8 Hours
Nano-materials: Introduction, size dependent properties of nano-materials (Surface area, Catalytic, Conducting), preparation of nano-materials by sol-gel and co-precipitation method with example. Introduction, properties and applications- nano-fibers, nano-photonics, nano-sensors, Display systems: Liquid crystals - Introduction, classification, properties and application in Liquid Crystal Displays (LCD's). Properties and application in Organic light emitting diodes (OLED's), Quantum Light emitting diodes (QLED's). Perovskite materials- Introduction, properties and applications in optoelectronic devices Self-Study Components: Properties and Electrochemical applications of carbon nano-tubes and graphene.	
MODULE 5: Electrodes, Sensors in Analytical techniques	8 Hours
Electrodes: Introduction, types of electrodes, 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. Electrochemical cell – Definition, classification, construction and applications of Ag_2O-Zn cell. Numerical problems on electrochemical cell. Sensors: Introduction, working principle and applications of Electrochemical sensors, Thermometric sensors, and Optical sensors Analytical techniques: Introduction, principle and instrumentation: Colorimetric sensors – estimation of copper, Potentiometric sensors – estimation of iron, Conductometric sensors – estimation of acid mixture. Self-Study Components: IR and UV- visible spectroscopy.	
<u>PRACTICAL MODULE</u>	
<u>A – Demonstration (any two) offline/virtual:</u>	
A1. Synthesis of poly-aniline and its conductivity measurement.	
A2 Synthesis of iron oxide nano-particles by precipitation method.	
A3. Determination of COD of industrial waste water	
A4. Determination of copper from E-waste (Printed circuit board).	
<u>B – Exercise (compulsorily any 3 to be conducted):</u>	
B1. Conductometric estimation of acid mixture	
B2. Potentiometric estimation of FAS using $\text{K}_2\text{Cr}_2\text{O}_7$	
B3. Determination of pKa of vinegar using pH sensor (Glass electrode)	
B4. Determination of rate of corrosion of mild steel by weight loss method	

C – Structured Enquiry (compulsorily any 3 to be conducted):

- C1. Estimation of Copper present in electroplating effluent by optical sensor (colorimetry)
- C2. Determination of Viscosity coefficient of lubricant (Ostwald's viscometer)
- C3. Estimation of iron in TMT bar by external indicator method
- C4. Estimation of Sodium present in soil/effluent sample using flame photometer**

D – Open Ended Experiments (any two):

- D1. Estimation of metal in e-waste by optical sensors.
- D2. Electro-less plating of Nickel on Copper
- D3. Determination of total hardness of water.
- D4. Analysis of constituents present in Portland cement .

Applied Chemistry [As per Choice Based Credit System (CBCS) & OBE Scheme] SEMESTER – I/II			
Course Code:	P24CHME102/202	CIE Marks	50
Course Type (Theory/Practical/Integrated)	Integrated	SEE Marks	50
		Total Marks	100
Teaching Hours/Week (L:T:P: S)	2:2:2:0	Exam Hours	03+02
Total Hours of Pedagogy	40 hours Theory + 10-12 Lab slots	Credits	04
Course objectives - To enable students to acquire knowledge on principles of chemistry for engineering applications. - To develop an intuitive understanding of chemistry by emphasizing the related branches of engineering. - To provide students with a solid foundation in analytical reasoning required to solve societal problems.			
Teaching-Learning Process These are sample Strategies, which teacher can use to accelerate the attainment of the various course outcomes and make Teaching – Learning more effective - Tutorial & remedial classes for needy students of small batches (not regular T/R) - Demonstration of concepts either by building models or by industry visit - Experiments in laboratories using non- conventional methods - Use of ICT – Online videos, online courses - Use of Google classroom for assignments/Notes - Conducting Make up class / Bridge courses for needy students - Publication of paper in conference or journal on Teaching & Learning Process			
Module-1: Energy Sources, Conversion and storage			8 hours
Fuels: Introduction, calorific value, determination of calorific value of solid fuel using bomb calorimeter and numerical problems. Green fuels: Introduction, power alcohol, synthesis and applications of biodiesel. Energy devices: Introduction, construction, working, and applications of Photovoltaic cells. Batteries: Introduction, Characteristics, Construction & applications of Li-ion battery, Ni-MH battery, Ag ₂ O-Zn battery and methanol-oxygen fuel cell. High energy fuels: Production (water electrolysis), advantages and storage of hydrogen. Self-learning: Plastic recycling to fuels and its monomers or other useful products.			
Module-2: Corrosion science and Engineering			8 hours
Corrosion: Introduction, electrochemical theory of corrosion, types of corrosion-differential metal, differential aeration (waterline and pitting), stress corrosion (caustic embrittlement). Corrosion control: Metal coating-galvanization, tinning, surface conversion coating-anodization and cathodic protection-sacrificial anode and impressed current methods. Corrosion testing by weight loss method. Corrosion penetration rate (CPR)-numerical problems. Metal finishing: Introduction, technological importance, differences, Electroplating: Introduction, Electroplating of Nickel. Electro-less plating: Introduction, electro-less plating of copper on PCB. Self-learning: Factors affecting the rate of corrosion, Factors influencing the nature of quality electro deposit (Current density, concentration of metal ion, pH, and temperature).			

Module-3: Macromolecules for engineering applications	8 hours
Polymers: Introduction, methods of polymerization, molecular weight, number average, weightaverage, numerical problems, synthesis, properties and industrial applications of Chlorinated polyvinylchloride (CPVC), polystyrene and Butyl rubber. Glass transition temperature: factors affecting on T_g and its significances. Biodegradable polymer: Introduction, synthesis, properties and application of PLA. Fibers: Introduction, synthesis, properties and industrial applications of Kevlar and Polyester. Plastics and Adhesive: Introduction, synthesis, properties and industrial applications of polyurethane and Epoxy resin. Lubricants: Introduction, classification, properties and applications of lubricants. Self-learning: Composites: Introduction, properties and industrial applications of carbon based reinforcedmaterials and metal matrix polymer composites.	
Module-4: Phase rule and Analytical techniques	8 hours
Phase rule: Introduction, Definition of terms: phase, components, degree of freedom, phase rule equation. Phase diagram: one component- water system, Two component-Pb-Ag systems, Desilverisation of lead by pattinson's process. Analytical techniques: Introduction, principle, instrumentation of potentiometric sensors; its application in the estimation of iron, Optical sensors (colorimetric); its application in the estimation of the copper, pH-sensor (Glass electrode); its application in the determination of pHof beverages. Self-learning: Determination of viscosity of bio-fuel and its correlation with temperature.	
Module-5: Materials for mechanical applications	8 hours
Alloys: Introduction, classification, composition, properties and application of Stainless Steel, Solders, Brass and Alnico. Ceramics: Introduction, classification based on chemical composition, properties and applications of ceramics (perovskites or CaTiO_3). Nano-Chemistry: Introduction, size dependent properties of nano-material (surface area, electrical, optical and thermal), synthesis of nano-particles by sol-gel, and co-precipitation method. Nano-materials: Introduction, properties and engineering applications of carbon nano-tubes and graphene. Self-learning: Abrasives: Introduction, classification, properties and application of silicon carbide (carborandum).	

PRACTICAL MODULE

A – Demonstration (any two) offline/virtual:

A1. Synthesis of poly-aniline and its conductivity measurement.

A2. Synthesis of iron oxide nano-particles

A3. Determination of COD of industrial waste water

A4. Determination of copper in brass alloy.

B – Exercise (compulsorily any 3 to be conducted):

B1. Conductometric estimation of acid mixture

B2. Potentiometric estimation of FAS using $K_2Cr_2O_7$

B3. Determination of pKa of vinegar using pH sensor (Glass electrode)

B4. Determination of rate of corrosion of mild steel by weight loss method

C – Structured Enquiry (compulsorily any 3 to be conducted):

C1. Estimation of Copper present in electroplating effluent by optical sensor (colorimetry)

C2. Determination of Viscosity coefficient of lubricant (Ostwald's viscometer)

C3. Estimation of iron in TMT bar by External indicator method

C4. Estimation of Sodium present in soil/effluent sample using flame photometry

D – Open Ended Experiments (any two):

D1. Estimation of percentage of iron in steel

D2. Synthesis of biodiesel

D3. Determination of total hardness of water.

D4. Analysis of constituents present in Portland cement.

Engineering Mechanics [As per Choice Based Credit System (CBCS) & OBE Scheme] SEMESTER – I/II			
Course Code:	P24ESCE103/203	CIE Marks:	50
Course Type (Theory/Practical/Integrated)	Theory	SEE Marks:	50
		Total Marks:	100
Teaching Hours/Week (L:T:P):	2:2:0:0	Exam Hours:	03
Total Number of Pedagogy:	25 hrs Lecture+25 hrs Tutorial = 50 hrs	Credits:	03
Course Learning Objectives: This course will enable the students to: 1. To develop students' ability to analyze the problems involving forces, moments with their applications. 2. To analyse the member forces in trusses 3. To make students to learn the effect of friction on different planes 4. To develop the student's ability to find out the centre of gravity and moment of inertia and their applications. 5. To make the students learn about kinematics and kinetics and their applications.			
Teaching-Learning Process: These are sample Strategies; which teachers can use to accelerate the attainment of the various course outcomes. 1. Lecture method (L) does not mean only the traditional lecture method, but a different type of teaching method may be adopted to develop the outcomes. 2. Show Video/animation films to explain the infrastructures and the mechanism involved in the principle. 3. Encourage collaborative (Group) Learning in the class. 4. Ask at least three HOT (Higher-order Thinking) questions in the class, which promotes critical thinking. 5. Adopt Problem Based Learning (PBL), which fosters students' Analytical skills, develop thinking skills such as the ability to evaluate, generalize, and analyze information rather than simply recall it. 6. Topics will be introduced in multiple representations. 7. Show the different ways to solve the same problem and encourage the students to come up with their own creative ways to solve them. 8. Discuss how every concept can be applied to the real world - and when that's possible, it helps improve the students' understanding. 9. Individual teachers can device innovative pedagogy to improve teaching-learning.			
UNIT – I			10 Hours
Resultant of coplanar force system: Basic dimensions and units, Idealizations, 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, Equilibrium of coplanar concurrent force system, Lami's theorem, Equilibrium of coplanar parallel force system, Numerical examples.			

UNIT – II			10 Hours
SUPPORT REACTION: 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. Friction: Introduction, laws of Coulomb friction, equilibrium of blocks on horizontal plane, equilibrium of blocks on inclined plane, ladder friction, wedge friction Numerical examples.			
UNIT – III			10 Hours
Analysis of Trusses: Introduction, Classification of trusses, analysis of plane perfect trusses by the method of joints and method of sections, Numerical examples.			
UNIT – IV			10 Hours
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.			
UNIT – V			10 Hours
DYNAMICS: Introduction to dynamics, Classification, linear and curvilinear motion- projectiles, Centripetal and centrifugal forces, banking/super elevation. Introduction to work, power and energy, impulse – numerical problems.			
Course Outcomes: On completion of this course, students are able to:			
COs	Course Outcomes with <i>Action verbs</i> for the Course topics	Bloom's Taxonomy Level	Level Indicator
CO1	Apply the knowledge of basic science and mathematics to classify the force systems, Compute its resultant and Analyze the trusses.	Applying	L3
CO2	Analyze the system of forces in equilibrium with or without frictional forces.	Analyzing	L4
CO3	Identify the centroid and composite moment of inertia of irregular and built up sections.	Applying	L3
CO4	Analyze the problems with respect to linear motion, curvilinear motion and energy.	Analyzing	L4
Text Book(s): 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 Book(s): 1. Beer F.P. and Johnston E. R., Mechanics for Engineers, Statics and Dynamics, 1987, McGraw Hill			

2. Irving H. Shames, Engineering Mechanics, 2019, Prentice-Hall.
3. Hibbler R. C., Engineering Mechanics: Principles of Statics and Dynamics, 2017, Pearson Press.
4. Timoshenko S, Young D. H., Rao J. V., Engineering Mechanics, 5th Edition, 2017, Pearson Press.
5. Reddy Vijaykumar K and Suresh Kumar K, Engineering Mechanics, 2011, BS publication.

Web links and Video Lectures (e-Resources):

- 1) <https://www.youtube.com/watch?v=nGfVTNfNwnk&list=PLOSWwFV98rfKXq2KBphJz95rao7q8PpwT>
- 2) <https://www.youtube.com/watch?v=nkg7VNW9UCc&list=PLOSWwFV98rfKXq2KBphJz95rao7q8PpwT&index=2>
- 3) <https://www.youtube.com/watch?v=ljDIIMvxeg&list=PLOSWwFV98rfKXq2KBphJz95rao7q8PpwT&index=5>
- 4) <https://www.youtube.com/watch?v=VQRcChR9IkU&list=PLOSWwFV98rfKXq2KBphJz95rao7q8PpwT&index=18>
- 5) <https://www.youtube.com/watch?v=3YBXteL-qY4>
- 6) <https://www.youtube.com/watch?v=z95UW4wwzSc&list=PLOSWwFV98rfKXq2KBphJz95rao7q8PpwT&index=10>
- 7) <https://www.youtube.com/watch?v=lheoBL2QaqU&list=PLOSWwFV98rfKXq2KBphJz95rao7q8PpwT&index=7>
- 8) https://www.youtube.com/watch?v=atoP5_DeTPE
- 9) <https://www.youtube.com/watch?v=ksmsp9OzAsI>
- 10) <https://www.youtube.com/watch?v=x1ef048b3CE>
- 11) https://www.youtube.com/watch?v=l_Nck-X49qc
- 12) https://play.google.com/store/apps/details?id=appinventor.ai_jgarc322.Resultant_Force
- 13) <https://www.youtube.com/watch?v=RIBeeW1DSZg>
- 14) <https://www.youtube.com/watch?v=R8wKV0UQtlo>
- 15) https://www.youtube.com/watch?v=0RZHHgL8m_A
- 16) <https://www.youtube.com/watch?v=Bls5KnQOWkY>

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

- 1) https://www.youtube.com/watch?v=Zrc_gB1YYS0
- 2) <https://play.google.com/store/apps/details?id=vn.edu.best4u.com.bieudonoiluc>
- 3) https://www.youtube.com/watch?v=Hn_iozUo9m4
- 4) <https://play.google.com/store/apps/details?id=com.teobou>
- 5) <https://www.youtube.com/watch?v=WOHRp3V-QA0>

Course Articulation Matrix (CAM)

Sl. No	Course Outcome – CO	Program Outcomes												Program Specific Outcomes		
		1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
01	Apply the knowledge of basic science and mathematics to classify the force systems, Compute its resultant and Analyze the trusses.	2	2											2	1	
02	Analyze the system of forces in equilibrium with or without frictional forces.	2	2											2	1	
03	Identify the centroid and composite moment of inertia of irregular and built up sections.	2	2											2		
04	Analyze the problems with respect to linear motion, curvilinear motion and energy.	2	2											2	1	

Principles of Programming using C [As per Choice Based Credit System (CBCS) & OBE Scheme] SEMESTER – I			
Course Code:	P24ESCS103/203	CIE Marks	50
Course Type (Theory/Practical/Integrated)	Integrated	SEE Marks	50
		Total Marks	100
Teaching Hours/Week(L:T:P: S)	2:0:2:0	Exam Hours	3+2
Total Hours of Pedagogy	40 hours	Credits	03
Course Objectives:			
CLO 1 Elucidate the basic architecture and functionalities of a Computer			
CLO 2 Apply programming constructs of C language to solve the real-worldproblems			
CLO 3 Explore user-defined data structures like arrays, structures and pointers in implementing solutions to problems			
CLO 4.Design and Develop Solutions to problems using structured programmingconstructs such as functions and procedures			
Teaching-Learning Process (General Instructions)			
These are sample Strategies, which teachers can use to accelerate the attainment of the various course outcomes.			
1. Lecturer method (L) need not to be only traditional lecture method, but alternative effective teaching methods could be adopted to attain the outcomes.			
2. Use of Video/Animation to explain functioning of various concepts.			
3. Encourage collaborative (Group Learning) Learning in the class.			
4. Ask at least three HOT (Higher order Thinking) questions in the class, whichpromotes critical thinking.			
5. Adopt Problem Based Learning (PBL), which fosters students' Analytical skills,develop design thinking skills such as the ability to design, evaluate, generalize,and analyze information rather than simply recall it.			
6. Introduce Topics in manifold representations.			
7. Show the different ways to solve the same problem and encourage the studentsto come up with their own creative ways to solve them.			
8. Discuss how every concept can be applied to the real world-and when that'spossible, it helps to improve the students' understanding.			
Use https://pythontutor.com/visualize.html#mode=edit in order to visualize the operations of C Programs			
Module-1		(6 Hours of Pedagogy)	
Introduction to C: Introduction to computers, input and output devices, designing efficientprograms. Introduction to C, Structure of C program, Files used in a C program, Compilers, Compiling and executing C programs, variables, constants, Input/output statements in C,			
Textbook: Chapter 1.1-1.9, 2.1-2.2, 8.1 - 8.6 ,9.1-9.14			
Teaching-LearningProcess	Chalk and talk method/Power Point Presentation/ Web Content: https://tinyurl.com/4xmrexre		

Module-2		(6 Hours of Pedagogy)
Operators in C, Type conversion and typecasting.		
Decision control and Looping statements: Introduction to decision control, Conditional branching statements, iterative statements, nested loops, break and continue statements, go to statement.		
Textbook: Chapter 9.15-9.16, 10.1-10.6		
Teaching-Learning Process	Chalk and talk method/ Power Point Presentation	
Module-3		(8 Hours of Pedagogy)
Functions: Introduction using functions, Function definition, function declaration, function call, return statement, passing parameters to functions, scope of variables, storage classes, recursive functions.		
Arrays: Declaration of arrays, accessing the elements of an array, storing values in arrays, Operations on arrays, Passing arrays to functions, two dimensional arrays, operations on two-dimensional arrays, two-dimensional arrays to functions, multidimensional arrays, applications of arrays.		
Textbook: Chapter 11.1-11.10, 12.1-12.10,12.12		
Teaching-Learning Process	Chalk and talk method/ Power Point Presentation	
Module-4		(6 Hours of Pedagogy)
Strings and Pointers: Introduction, string taxonomy, operations on strings, Miscellaneous string and character functions, arrays of strings. Pointers: Introduction to pointers, declaring pointer variables, Types of pointers, Passing arguments to functions using pointers		
Textbook: Chapter 13.1-13.6, 14-14.7		
Teaching-Learning Process	Chalk and talk method/ Power Point Presentation	
Module-5		(6 Hours of Pedagogy)
Structure, Union, and Enumerated Data Type: Introduction, structures and functions, Unions, unions inside structures, Enumerated data type.		
Files: Introduction to files, using files in C, reading and writing data files. , Detecting end of file		
Textbook: Chapter 15.1 – 15.10, 16.1-16.5		
Teaching-Learning Process	Chalk and talk method/ Power Point Presentation	
Course Outcomes(Course Skill Set)		
At the end of the course the 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	
Programming Assignments		

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

```

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

```

nth row

5. Implement Binary Search on Integers.
6. Implement Matrix multiplication and validate the rules of multiplication.
7. Compute sin(x)/cos(x) using Taylor series approximation. Compare your result with the built-in library function. Print both the results with appropriate inferences.
8. Sort the given set of N numbers using Bubble sort.
9. Write functions to implement string operations such as compare, concatenate, and find string length. Use the parameter passing techniques.
10. Implement structures to read, write and compute average- marks of the students, list the students scoring above and below the average marks for a class of N students.
11. Develop a program using pointers to compute the sum, mean and standard deviation of all elements stored in an array of N real numbers.
12. Write a C program to copy a text file to another, read both the input file name and target file name.

Suggested Learning Resources:

Textbooks:

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

Reference Books:

1. E. Balaguruswamy, Programming in ANSI C, 7th Edition, Tata McGraw-Hill.
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

inunderstanding the topics and verities of problem solving methods.

<https://tinyurl.com/4xmrexre>

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

- Quizzes
- Assignments
- Seminars

COs and POs Mapping :

COs / POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
C01	2											
C02	3	2	2		3							
C03	3	2	2		3							
C04	3	2	3		3							
C05	3	2	3		3							

Elements of Electrical Engineering [As per Choice Based Credit System (CBCS) & OBE Scheme] SEMESTER – I/II			
Course Code:	P24EEE103/203	CIE Marks	50
Course Type (Theory/Practical/Integrated)	Theory	SEE Marks	50
Teaching Hours/Week (L:T:P: S)	2:2:0:0	Total Marks	100
Total Hours of Pedagogy	40 hours	Exam Hours	03
		Credits	03
Course objectives - To explain the basic laws used in the analysis of DC circuits, electromagnetism. - To explain the behavior of circuit elements in single-phase circuits. - To explain three phase circuits, balanced loads and measurement of three phase power. - To explain the concept of construction and working principle of Electrical Machines and Transformers. - To explain electricity billing, equipment and personal safety measures.			
Teaching-Learning Process These are sample Strategies, which teacher can use to accelerate the attainment of the various course outcomes and make Teaching –Learning more effective - Chalk and talk - Animated/NPTEL videos - Cut sections - PPTs			
Module-1			8 Hours
DC circuits: Ohm's law and Kirchhoff's laws, analysis of series, parallel and series-parallel circuits. Power and energy. Electromagnetism: Faraday's Laws of Electromagnetic Induction, Lenz's Law, Flemings rules, statically and dynamically induced EMF; concepts of self and mutual inductance. Coefficient of Coupling. Energy stored in magnetic field. Simple Numerical.			
Module-2			8 Hours
Single-phase AC circuits: Generation of sinusoidal voltage, frequency of generated voltage, average value, RMS value, form factor and peak factor of sinusoidal voltage and currents. Phasor representation of alternating quantities. Analysis of R-L, R-C and R-L-C circuits with phasor diagrams, Real power, reactive power, apparent power, and Power factor. Series and Parallel circuits. Simple Numerical.			
Module-3			8 Hours
Three-phase AC circuits: Necessity and advantage of 3-phase system. Generation of 3-phase power. Definition of phase sequence. Balanced supply and balanced load. Relationship between line and phase values of balanced star and delta connections. Power in balanced 3-phase circuits. Measurement of 3-phase power by 2-wattmeter method. Simple Numerical.			
Module-4			8 Hours
DC & AC Machines: Working principle of DC machine as generator and motor, constructional features, EMF equation of generator, types of armature winding, problems on EMF equation. Back EMF and its significance, types of DC motors, torque equation of DC motor and numerical problems, Applications of DC Motors Transformer and Synchronous generator: Construction and working principle of transformer, Construction and working principle of synchronous generator.			

Module-5		8 Hours
Electricity bill: Power rating of household appliances including air conditioners, PCs, laptops, printers, etc. Definition of “unit” used for consumption of electrical energy, two-part electricity tariff, calculation of electricity bill for domestic consumers. Equipment Safety measures: Working principle of Fuse and Miniature circuit breaker (MCB), merits and demerits. Personal safety measures: Electric Shock, Earthing and its types, Safety Precautions to avoid shock, and Residual Current Circuit Breaker (RCCB) and Earth Leakage Circuit Breaker (ELCB).		
Course outcome (Course Skill Set) At the end of the course the student will be able to:		
CO1	Apply the knowledge of mathematics & electrical laws to solve problems related to electrical circuits.	
CO2	Analyze single phase and three phase AC systems to obtain desired expressions.	
CO3	Describe the construction and working of DC-AC Machines & transformer	
CO4	Explain the concepts of electricity billing, circuit protective devices and personal safety measures.	
Suggested Learning Resources: Books (Title of the Book/Name of the author/Name of the publisher/Edition and Year) Text Books: 1. Basic Electrical Engineering by D C Kulshreshtha, Tata McGraw Hill, First Edition 2019. 2. A text book of Electrical Technology by B.L. Theraja, S Chand and Company, reprint edition 2014. Reference Books: 1. Basic Electrical Engineering, D. P. Kothari and I. J. Nagrath, Tata McGraw Hill 4th edition, 2019. 2. Principles of Electrical Engineering & Electronics by V. K. Mehta, Rohit Mehta, S. Chand and Company Publications, 2nd edition, 2015. 3. Electrical Technology by E. Hughes, Pearson, 12th Edition, 2016. 4. Electrical and electronic measurements and instrumentation by A K Sawhney, Dhanapat Rai and Co. edition, January 2015		
Web links and Video Lectures (e-Resources):		
• www.nptel.ac.in		
Activity Based Learning (Suggested Activities in Class)/ Practical Based learning Wherever required, faculty shall demonstrate the concepts through laboratory experiments.		

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

Course Articulation Matrix														
Course Outcomes (CO)	Program Outcomes													
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2
Apply the knowledge of mathematics & electrical laws to solve problems related to electrical circuits.	3	-	-	-	-	-	-	-	-	-	-	-	2	-
Analyze single phase and three phase AC systems to obtain desired expressions.	-	3	-	-	-	-	-	-	-	-	-	-	-	2
Describe the construction and working of DC-AC Machines & transformer	-	3	-	-	-	-	-	-	-	-	-	-	-	2
Explain the concepts of electricity billing, circuit protective devices and personal safety measures.	-	3	-	-	-	-	-	-	-	-	-	-	-	2

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

Basic Electronics (For ECE and Allied Branches) [As per Choice Based Credit System (CBCS) & OBE Scheme] SEMESTER – I/II			
Course Code:	P24BEE103/203	CIE Marks	50
Course Type (Theory/Practical /Integrated)	Theory	SEE Marks	50
		Total Marks	100
Teaching Hours/Week (L:T:P: S)	3:0:0:0	Exam Hours	03
Total Hours of Pedagogy	40 hours	Credits	03
Course objectives: Students will be taught • Operation of Semiconductor diode, Zener diode and Special purpose diodes and their applications. • Biasing circuits for FET as an amplifier. • Study of linear Op-amps and its applications. • Logic circuits and their optimization. • Principles of Transducers and Communication.			
Teaching-Learning Process These are sample Strategies, which teacher can use to accelerate the attainment of the various course outcomes and make Teaching –Learning more effective 1. Lecture method (L) does not mean only the traditional lecture method, but a different type of teaching method may be adopted to develop the outcomes. 2. Show Video/animation films to explain the functioning of various analog and digital circuits. 3. Adopt Problem Based Learning (PBL), which fosters students’ Analytical skills, develop thinking skills such as the ability to evaluate, generalize, and analyze information rather than simply recall it. 4. Show the different ways to solve the same problem and encourage the students to come up with their own creative ways to solve them. 5. Discuss how every concept can be applied to the real world - and when that's possible, it helps improve the students' understanding.			
Module-1		(8 Hours)	
Semiconductor Diodes: Introduction, Semiconductor diode, Diode equivalent circuits (Text 1: 1.1,1.6,1.9) Diode Applications: Introduction ,Load Line analysis, , Half Wave Rectification, Full Wave Rectification, Full Wave Rectification, Zener diodes (Text 1: 2.1,2.2,2.6,2.7,2.11) Power Supplies: Introduction, General Filter Considerations, Capacitor Filter (Text1: 15.1,15.2,15.3)			
Module-2		(8 Hours)	
Bipolar Junction Transistors: Introduction, Transistor construction, Transistor operation (Text 1: 3.1,3.2,3.3) Field Effect Transistors: Introduction, MOSFETs, Depletion type MOSFETs, Enhancement type MOSFETs , FET Biasing(only voltage divider method): Depletion type MOSFET, Enhancement type MOSFET, FET Amplifiers: Depletion type MoSFET, Enhancement type MOSFET, E-MOSFET Voltage divider configuration, Feedback and Oscillator Circuits: Feedback amplifier- Phase and frequency considerations. (Text 1: 6.1, 6.7, 6.8,7.7,7.8,8.8,8.9,8.11,14.4)			
Module-3		(8 Hours)	
Operational Amplifiers: Introduction, Op-amp Basics, Practical Op-amp Circuits, Op-amp Specifications- DC offset parameters, Op-amp Specifications- Frequency parameters, Differential and Common –mode operation. Op-Amp Applications: Constant-Gain multiplier, Voltage summing, Controlled sources, Active Filters (Text 1: 10.1, 10.4, 10.5,10.6,10.7,10.9,11.1,11.2,11.4,11.6).			

Module-4	(8 Hours)
Digital Electronics: Introduction, Boolean Algebra Theorems, Digital circuits Boolean Algebra and Combinational circuits: Introduction, Binary number system, Octal number system, Hexa Decimal number system, Algebraic simplifications, NAND and NOR implementation. (Text 2:10.1,10.3,10.4,11.1,11.2,11.3,11.4,11.7,11.8)	
Module-5	(8 Hours)
Transducers: Introduction, Resistive Transducers, Inductive Transducers, Capacitive Transducers, Thermoelectric transducers, Piezoelectric transducers and Photoelectric transducers(Text 2:15.1,15.3,15.4.1,15.4.2,15.4.3) Communication Engineering: Introduction, Elements of Communication systems, Modulation, Transmitter, Digital Communication, The telephone systems, Satellite communication, Principle of operation of mobile phone, Optical fibre communication(Text 2: 18.1,18.2,18.3,18.4,18.6,18.9,18.17,18.18,18.22)	
Course outcome (Course Skill Set) At the end of the course the student will be able to: CO1: Apply the basic knowledge of physics and mathematics to understand the principles of Semiconductor devices, Transducers, Boolean algebra, digital gates and basic communication systems. CO2: Analyze the working of transistor circuits, Digital circuits and Transducers. CO3: Analyze the applications of diodes, Transistors and gates. CO4: Design the circuits using Op-amp and gates.	

A. CO v/s PO Mapping Table

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

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

1. Electronic Devices and Circuit Theory, 11th Edition, by Robert L. Boylestad and Louis Nashelsky, PHI,2015,ISBN:978-93-325-4260-0.
2. Basic Electronics, D.P Kothari and I. J Nagarath, McGraw Hill Education, 2014
ISBN: 978-93-329-0158-2

Web links and Video Lectures (e-Resources):

- <https://nptel.ac.in/courses/122106025>
- <https://nptel.ac.in/courses/108105132>
- <https://nptel.ac.in/courses/117104072>

Elements of Mechanical Engineering [As per Choice Based Credit System (CBCS) & OBE Scheme] SEMESTER – I/II			
Course Code:	P24ESME103/203	CIE Marks	50
Course Type (Theory/Practical/Integrated)	Theory	SEE Marks	50
		Total Marks	100
Teaching Hours/Week (L:T:P: S)	2:2:0:0	Exam Hours	03
Total Hours of Pedagogy	40 hours	Credits	03
Course learning Objectives: The objectives of this course are, • To provide essential basic knowledge of mechanical engineering science in technology. • To understand the technical and operational features of components and systems used in engineering practices. • To acquire the knowledge of sources of energy and energy conversion systems. • To acquire the knowledge of conventional and non-conventional methods of manufacturing processes. • To understand the modern manufacturing technologies in mechanical engineering science.			
Course Content			
UNIT-I			
Introduction: Role of mechanical engineering science in technology, definitions with examples: Prime movers, Mechanisms, Machines and Machine Tools. Source of Energy: Conventional (Fossil fuels, hydel energy) and Non-Conventional (Solar flat plate collector, Wind, Tidal, Geothermal, Bio-gas and Nuclear). Properties of steam: Formation of steam with constant pressure, type and properties of steam-specific volume, internal energy and dryness fraction (numerical problems).			
			8 Hrs
UNIT-II			
Energy Conversion Systems: Steam turbine: Introduction, classification, working principle of impulse and reaction turbines. Gas turbine: Introduction, classification, working principle of open and closed type. Hydraulic turbine: Introduction, classification, working principle of impulse (Pelton Wheel) and reaction (Francis) turbines. IC Engines: Classification, parts and its nomenclature, Four-stroke petrol and diesel engines (P-V diagram of Otto and Diesel cycles), diesel engine vs petrol engine, simple numericals on engine performance parameters- indicated power, brake power, indicated thermal efficiency, brake thermal efficiency, mechanical efficiency and specific fuel consumption. Automobiles-Transmission systems, suspension system, E-Vehicles, Hybrid vehicles.			
			8 Hrs
UNIT-III			
Refrigeration and Air Conditioning: Introduction, types of refrigerants and their properties, working principle of vapour compression refrigeration system, window and split air conditioners, simple numericals on COP of refrigerator. Power Transmission: Belt Drives: Flat belt drives-open and cross (No derivation), slip and creep, velocity ratio, and idler pulley (No numerical). Gear drives: Classification of gears, velocity ratio for simple and compound gear trains (No derivation and numerical).			
			8 Hrs
UNIT-IV			
Manufacturing Processes and Machine Tools: Castings processes: Patterns and moulding, hot working and cold working. Metal forming processes: Extrusion, drawing, rolling, forging, forging operations. Metal Joining Processes: Soldering, Brazing, Arc Welding and Gas Welding.			

Machine Tools: Lathe: working principle, lathe specifications, operations - turning, facing, knurling, thread cutting, taper turning by swiveling of compound rest. Drilling machine tool: working principle, operations- drilling, reaming, boring, counter boring, counter sinking and tapping.

8 Hrs

UNIT-V

Modern Manufacturing Technologies:

Non-conventional manufacturing: Working principle and applications of EDM, ECM and WJM.

Additive manufacturing: Definition, classification, advantages and dis-advantages and Basics of 3-D printing technology.

Robotics: Introduction, joints and links, end effectors, common robot configurations; cartesian, cylindrical, polar and spherical coordinates. Sensors in robotics and applications of robots.

Automation: Introduction, types of Automation, Computer Numerical Control (CNC) machines: Basic elements of CNC, advantages and disadvantages.

8 Hrs

Text Books

1. K R Gopala Krishna, “**Elements of Mechanical Engineering**”, 30th Edition, Subhas Publications, 2015, ISBN:13-1234567153375.
2. Mikell P.Groover, “**Principles of modern manufacturing**”, SI Version, Wiley India, 2018, ISBN:108126573058.

Reference Books

1. S Trymbaka Murthy, “**A text book of Elements of Mechanical Engineering**”, IK International Publishing House Pvt. Ltd, 2008, ISBN-3980578571.
2. P.K.Nag, “**Basic and applied Thermodynamics**”, 2nd Edition, McGraw Hill Education, 2017, ISBN:100070151318.
3. K.P. Roy, S K Hajra Choudhury, A K Hajra Choudhury, “**Elements of Mechanical Engineering**”, Media Promoters, 2012.
4. R.K. Rajput, “**Elements of Mechanical Engineering**”, Firewall Media, 2005.

Web Resources

1. [https://www.youtube.com/watch?v=Zgp86PVXXuQ\(Energyresources\)](https://www.youtube.com/watch?v=Zgp86PVXXuQ(Energyresources))
2. [https://nptel.ac.in/courses/112/103/112103249/\(HydraulicMachines\)](https://nptel.ac.in/courses/112/103/112103249/(HydraulicMachines))
3. [https://www.youtube.com/watch?v=c52hmb-IPJw\(TypesofBoilers\)](https://www.youtube.com/watch?v=c52hmb-IPJw(TypesofBoilers))
4. [https://nptel.ac.in/courses/112/103/112103262/\(ICEngine\)](https://nptel.ac.in/courses/112/103/112103262/(ICEngine))
5. [https://nptel.ac.in/courses/112/105/112105128/\(Refrigeration\)](https://nptel.ac.in/courses/112/105/112105128/(Refrigeration))
6. [https://nptel.ac.in/courses/116/102/116102012/\(NotesonDrives\)](https://nptel.ac.in/courses/116/102/116102012/(NotesonDrives))
7. [https://nptel.ac.in/courses/112/107/112107213/\(ManufacturingandJoining\)](https://nptel.ac.in/courses/112/107/112107213/(ManufacturingandJoining))
8. [https://nptel.ac.in/courses/112/105/112105233/\(MetalformingProcesses\)](https://nptel.ac.in/courses/112/105/112105233/(MetalformingProcesses))
9. [https://nptel.ac.in/courses/112/105/112105211/\(CNC\)](https://nptel.ac.in/courses/112/105/112105211/(CNC))
10. [https://nptel.ac.in/courses/112/105/112105249/\(Robotics\)](https://nptel.ac.in/courses/112/105/112105249/(Robotics))

Course Outcomes: At the end of the course, the student will be able to:

1. **Apply** the fundamentals of mechanical engineering to understand the technical and operational features of components and systems used in engineering practices.
2. **Identify** the different sources of energy to **analyse** the energy conversion and transmission systems through the application of engineering principles.
3. **Apply** the knowledge of machinery, tools, and other equipment used in conventional and non-conventional methods of manufacturing process.
4. **Apply** the knowledge of various automation encountered in manufacturing process and engineering practices.

Course Articulation Matrix																
Course Outcomes		Program Outcomes												PSO		
		1	2	3	4	5	6	7	8	9	10	11	12	1	2	
CO1	Apply the fundamentals of mechanical engineering to understand the technical and operational features of components and systems used in engineering practices.	3													1	
CO2	Identify the different sources of energy to analyse the energy conversion and transmission systems through the application of engineering principles.	3	2												1	
CO3	Apply the knowledge of machinery, tools, and other equipment used in conventional and non-conventional methods of manufacturing process	3														
CO4	Apply the knowledge of various automation encountered in manufacturing process and engineering practices.	3														
SEE- Course Assessment Plan																
COs	Marks Distribution					Total Marks		Weightage								
	Unit I	Unit II	Unit III	Unit IV	Unit V											
CO1	2+9	9	9	9		38		38%								
CO2	9	2+9	2+9			31		31%								
CO3				2+9	9	20		20%								
CO4					2+9	11		11%								
	20	20	20	20	20	100		100%								
Application =80% Analysis = 20%																

Computer-Aided Engineering Drawing [As per Choice Based Credit System (CBCS) & OBE Scheme] SEMESTER – I/II			
Course Code:	P24CED103/203	CIE Marks:	50
Course Type (Theory/Practical/Integrated)	Theory	SEE Marks:	50
		Total Marks:	100
Teaching Hours/Week (L:T:P):	2-0-2	Exam Hours:	03
Total teaching hours	40 hours	Credits:	03
Course Learning Objectives: The objectives of this course are to: • Understand fundamentals of drawing for enhancing imagination and visualization capacity. • Imparting the knowledge of drafting skills. • Acquire the knowledge of generating the orthographic projection. • Acquire the knowledge of generating the isometric projection. • Use sketching and drawing as communication tool.			
Course Content			
UNIT-I			
Orthographic Projections of Points: Introduction to drawing standards, creation of 2D environment using CAD software, principles of orthographic projections, projections of points in all the four quadrants. Orthographic Projections of Lines: Projections of straight lines using first angle Projection, true and apparent lengths, true and apparent inclinations with reference planes.			
			6 Hours
UNIT-II			
Orthographic Projections of Plane Surfaces: Triangle, square, rectangle, pentagon, hexagon and circular plates resting on HP in different positions by change of position method only.			
			8 Hours
UNIT-III			
Projections of Solids: Projections of hexahedron, right regular prisms, cylinders, pyramids and cones resting on HP.			
			10 Hours
UNIT-IV			
Isometric Projections: Introduction to isometric scale, isometric projection of cube, right regular prisms, pyramids, cylinders, cones, spheres, cut spheres, frustums of cones and pyramids in simple positions, combination of solids (Maximum of two solids).			
			8 Hours
UNIT-V			
Multidisciplinary Applications & Practice (For CIE Only): Free hand Sketching; True free hand, Guided Free hand, Roads, Buildings, Utensils, Hand tools & Furniture's etc Drawing Simple Mechanisms; Bicycles, Tricycles, Gear trains, Ratchets, two-wheeler cart & Four-wheeler carts to dimensions etc Electric Wiring and lighting diagrams; Like, Automatic fire alarm, Call bell system, UPS system, Basic power distribution system using suitable software. Basic Building Drawing; Like, Architectural floor plan, basic foundation drawing, steel structures-Frames, bridges, trusses using CAD software. Electronics Engineering Drawings- Like, Simple Electronics Circuit Drawings, practice on layers concept.			
			8 Hours

Text Books															
1 “ Engineering Graphics ”, K. R. Gopala Krishna, Subhas Publications Bangalore, 32 nd edition, 2005, ISBN:5551234018854.															
2 “ Engineering Drawing ”, N.D.Bhatt and V.M.Panchal, Charotar Publishing House, Gujarat, 48 th edition, 2005, ISBN:978-93-80358-96-3.															
Reference Books															
1 “ Computer Aided Engineering Drawing ”, S.Trymbaka Murthy, I.K. International Publishing House Pvt. Ltd., New Delhi, 3 rd revised edition, 2006, ISBN:9788188237944.															
2 “ Fundamentals of Engineering Drawing with an Introduction to Interactive Computer Graphics for Design and Production ”, Luzadder Warren J., Duff John M., Prentice Hall of India Pvt. Ltd., Eastern Economy Edition, 2005, ISBN:9788188237944.															
Web Resources															
1. https://nptel.ac.in/courses/112103019															
Course Outcomes: At the end of the course, students will be able to,															
1. Apply basics of engineering graphics for enhancing the imagination and visualization skills.															
2. Apply theory of projection to identify the location and position of an object with respect to the reference planes.															
3. Analyze the orthographic and isometric projections of an object.															
4. Apply the basics of computer skills in implementing the principles of engineering graphics to develop interdisciplinary engineering components.															
5. Articulate in lifelong learning using sketching and drawing as communication tool.															
Course Articulation Matrix															
Course Outcomes		Program Outcomes												PSO	
		1	2	3	4	5	6	7	8	9	10	12	1	2	
CO1	Apply basics of engineering graphics for enhancing the imagination and visualization skills.	3													
CO2	Apply theory of projection to identify the location and position of an object with respect to the reference planes.	3													
CO3	Analyze the orthographic and isometric projections of an object.		3												
CO4	Apply the basics of computer skills in implementing the principles of engineering graphics to develop interdisciplinary engineering components.	3		2		3								3	
CO5	Articulate in lifelong learning using sketching and drawing as communication tool.										3	2			

Introduction to Civil Engineering [As per Choice Based Credit System (CBCS) & OBE Scheme] SEMESTER – I/II			
Course Code:	P24ESC1041/2041	CIE Marks:	50
Course Type: (Theory/Practical /Integrated)	Theory	SEE Marks:	50
		Total Marks :	100
Teaching Hours/Week (L:T:P:S)	3:0:0:0	Exam Hours:	03
Total Hours of Pedagogy:	25 hrs. Lecture + 25 hrs. Tutorial = 50 hrs.	Credits:	03
Course Learning Objectives: This course will enable the students to: 1. To make students learn the scope of various specializations of civil engineering. 2. To make students learn the concepts of sustainable infrastructure. 3. To develop students' ability to analyze the problems involving forces, moments with their applications. 4. To develop the student's ability to find out the center of gravity and moment of inertia and their applications. 5. To make the students learn about kinematics.			
Teaching-Learning Process: These are sample Strategies; which teachers can use to accelerate the attainment of the various course outcomes. 1. Lecture method (L) does not mean only the traditional lecture method, but a different type of teaching method may be adopted to develop the outcomes. 2. Arrange visits to nearby sites to give brief information about the Civil Engineering structures. 3. Show Video/animation films to explain the infrastructures and the mechanism involved in the principle. 4. Encourage collaborative (Group) Learning in the class. 5. Ask at least three HOT (Higher-order Thinking) questions in the class, which promotes critical thinking. 6. Adopt Problem Based Learning (PBL), which fosters students' Analytical skills, develop thinking skills such as the ability to evaluate, generalize, and analyze information rather than simply recall it. 7. Topics will be introduced in multiple representations. 8. Show the different ways to solve the same problem and encourage the students to come up with their own creative ways to solve them. 9. Discuss how every concept can be applied to the real world - and when that's possible, it helps improve the students' understanding. 10. Individual teachers can device innovative pedagogy to improve teaching-learning.			
Module-1			10 Hours
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.			
Module-2			10 Hours
Societal and Global Impact of Infrastructure			
Infrastructure: Introduction to sustainable development goals, Smart city concept, clean city 2 concept, Safe city concept			
Environment: Importance and necessities for planned water supplies, Need for sanitation, Types of sewerage system, Sources & types of air pollution, Definition and types of Solid waste management.			
Built-environment: Energy efficient buildings, recycling, Temperature and Sound control in buildings, Security systems; Smart buildings.			
Module-3			10 Hours
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.			
Module-4			10 Hours
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.			
Module-5			10 Hours
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.			
Course Outcomes: On completion of this course, students are able to:			
COs	Course Outcomes with <i>Action verbs</i> for the Course topics	Bloom’s Taxonomy Level	Level Indicator
CO1	<i>Identify</i> the fields of Civil Engineering and its basic materials usage and their functions.	Applying	L3
CO2	<i>Identify</i> the need of infrastructure and environment for societal and global impact.	Applying	L3
CO3	<i>Solve</i> the system of forces by equilibrium conditions.	Applying	L3
CO4	<i>Identify the</i> centroid and moment of inertia of plane and built up sections from first principles.	Applying	L3

Text Book(s):

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 Book(s):

1. Beer F.P. and Johnston E. R., Mechanics for Engineers, Statics and Dynamics, 1987, McGraw Hill.
2. Irving H. Shames, Engineering Mechanics, 2019, Prentice-Hall.
3. Hibbler R. C., Engineering Mechanics: Principles of Statics and Dynamics, 2017, Pearson Press.
4. Timoshenko S, Young D. H., Rao J. V., Engineering Mechanics, 5th Edition, 2017, Pearson Press.
5. Reddy Vijaykumar K and Suresh Kumar K, Engineering Mechanics, 2011, BS publication.

Web links and Video Lectures (e-Resources):

1. <https://www.youtube.com/watch?v=nGfVTNfNwnk&list=PLOSWwFV98rfKXq2KBphJz95rao7q8PpwT>
2. <https://www.youtube.com/watch?v=nkg7VNW9UCc&list=PLOSWwFV98rfKXq2KBphJz95rao7q8PpwT&index=3>
3. <https://www.youtube.com/watch?v=ljDIIMvxeg&list=PLOSWwFV98rfKXq2KBphJz95rao7q8PpwT&index=6>
4. <https://www.youtube.com/watch?v=VQRcChR9IkU&list=PLOSWwFV98rfKXq2KBphJz95rao7q8PpwT&index=19>
5. <https://www.youtube.com/watch?v=3YBXteL-qY4>
6. <https://www.youtube.com/watch?v=z95UW4wwzSc&list=PLOSWwFV98rfKXq2KBphJz95rao7q8PpwT&index=11>
7. <https://www.youtube.com/watch?v=lheoBL2QaQU&list=PLOSWwFV98rfKXq2KBphJz95rao7q8PpwT&index=8>
8. https://www.youtube.com/watch?v=atoP5_DeTPE
9. <https://www.youtube.com/watch?v=ksmsp9OzAsI>
10. <https://www.youtube.com/watch?v=x1ef048b3CE>
11. https://www.youtube.com/watch?v=l_Nck-X49qc
12. https://play.google.com/store/apps/details?id=appinventor.ai_jgarc322.Resultant_Force&pli=1
13. <https://www.youtube.com/watch?v=RIBeeW1DSZg>
14. <https://www.youtube.com/watch?v=R8wKV0UQtlo>
15. https://www.youtube.com/watch?v=0RZHHgL8m_A
16. <https://www.youtube.com/watch?v=BlS5KnQOWkY>

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

1. https://www.youtube.com/watch?v=Zrc_gB1YYS0
2. <https://play.google.com/store/apps/details?id=vn.edu.best4u.com.bieudonoiluc>
3. https://www.youtube.com/watch?v=Hn_iozUo9m4
4. <https://play.google.com/store/apps/details?id=com.teobou>
5. <https://www.youtube.com/watch?v=WOHRp3V-QA0>

Course Articulation Matrix (CAM)

Sl. No	Course Outcome – CO	Program Outcomes												Program Specific Outcomes		
		1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	Identify the fields of Civil Engineering and its basic materials usage and their functions.	1					1							1		
2	Identify the need of infrastructure and environment for societal and global impact.						1	1						1	1	
3	Solve the system of forces by equilibrium conditions.	2	2											1	1	
4	Identify the centroid and moment of inertia of plane and built up sections from first principles.	2	2											1		
3- Highly Mapped, 2-Moderately Mapped, 1-Low Mapped, 0- Not Mapped																

Introduction to Electrical Engineering [As per Choice Based Credit System (CBCS) & OBE Scheme] SEMESTER – I/II			
Course Code:	P24ESC1042/2042	CIE Marks	50
Course Type (Theory/Practical/Integrated)	Theory	SEE Marks	50
		Total Marks	100
Teaching Hours/Week (L:T:P: S)	3:0:0:0	Exam Hours	03
Total Hours of Pedagogy	40 hours	Credits	03
Course objectives - To explain the laws used in the analysis of DC and AC circuits. - To explain the behavior of circuit elements in single-phase circuits. - To explain the construction and operation of transformers, DC generators and motors and induction motors. - To introduce concepts of circuit protecting devices and earthing. - To explain electric power generation, transmission and distribution, electricity billing, equipment and personal safety measures.			
Teaching-Learning Process These are sample Strategies, which teacher can use to accelerate the attainment of the various course outcomes and make Teaching –Learning more effective - Chalk and talk - Animated/NPTEL videos - Cut sections - PPTs			
Module-1			8 Hours
Introduction: Conventional and non-conventional energy resources; General structure of electrical power systems using single line diagram approach. Power Generation: Hydel, Nuclear, Solar & wind power generation (Block Diagram approach). DC Circuits: Ohm's Law and its limitations. KCL & KVL, series, parallel, series-parallel circuits. Simple Numerical.			
Module-2			8 Hours
A.C. Fundamentals: Equation of AC Voltage and current, waveform, time period, frequency, amplitude, phase, phase difference, average value, RMS value, form factor, peak factor. (only definitions) Voltage and current relationship with phasor diagrams in R, L, and C circuits. Concept of Impedance. Analysis of R-L, R-C, R-L-C Series circuits. Active power, reactive power and apparent power. Concept of power factor. (Simple Numerical).			
Module-3			8 Hours
DC Machines: DC Generator: Principle of operation, constructional details, induced emf expression, types of generators. Relation between induced emf and terminal voltage. Simple numerical. DC Motor: Principle of operation, back emf and its significance. Torque equation, types of motors, applications of DC motors. Simple numerical.			

Module-4		8 Hours
Transformers: Necessity of transformer, principle of operation, Types and construction of single- phase transformers, EMF equation, losses, efficiency and simple numerical.		
Three-phase induction Motors: Concept of rotating magnetic field, Principle of operation, constructional features of motor, types – squirrel cage and wound rotor. Slip and its significance simple numerical.		
Module-5		8 Hours
Domestic Wiring: Two way and three way control of load.		
Electricity Bill: Power rating of household appliances including air conditioners, PCs, laptops, printers, etc. Definition of “unit” used for consumption of electrical energy, two-part electricity tariff, calculation of electricity bill for domestic consumers.		
Equipment Safety measures: Working principle of Fuse and Miniature circuit breaker (MCB), merits and demerits.		
Personal safety measures: Electric Shock, Earthing and its types, Safety Precautions to avoid shock.		
Course outcome (Course Skill Set)		
At the end of the course the student will be able to:		
CO1	Apply the knowledge of mathematics & electrical laws to solve problems related to electrical circuits.	
CO2	Analyze single phase and three phase AC systems to obtain desired expressions.	
CO3	Describe the construction and working of different Electrical Machines and transformers	
CO4	Explain the concepts of electric power transmission and distribution, electricity billing, circuit protective devices and personal safety measures and green energy sources	
Suggested Learning Resources:		
Books (Title of the Book/Name of the author/Name of the publisher/Edition and Year)Text Books:		
1. Basic Electrical Engineering by D C Kulshreshtha, Tata McGraw Hill, First Edition 2019.		
2. A text book of Electrical Technology by B.L. Theraja, S Chand and Company, reprint edition 2014.		
Reference Books:		
1. Basic Electrical Engineering, D. P. Kothari and I. J. Nagrath, Tata McGraw Hill 4th edition, 2019.		
2. Principles of Electrical Engineering & Electronics by V. K. Mehta, Rohit Mehta, S. Chand and Company Publications, 2nd edition, 2015.		
3. Fundamentals of Electrical Engineering by Rajendra Prasad, PHI, 3 rd edition, 2014.		
Web links and Video Lectures (e-Resources):		
• www.nptel.ac.in		

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

Course Articulation Matrix														
Course Outcomes (CO)	Program Outcomes													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
Apply the knowledge of mathematics & electrical laws to solve problems related to electrical circuits.	3	-	-	-	-	-	-	-	-	-	-	-	2	-
Analyze single phase and three phase AC systems to obtain desired expressions.	-	3	-	-	-	-	-	-	-	-	-	-	-	2
Describe the construction and working of different Electrical Machines and transformers.	-	3	-	-	-	-	-	-	-	-	-	-	-	2
Explain the concepts of electricity billing, circuit protective devices and personal safety measures.	-	3	-	-	-	-	-	-	-	-	-	-	-	2

Introduction to Electronics Engineering [As per Choice Based Credit System (CBCS) & OBE Scheme] SEMESTER – I/II			
Course Code:	P24ESC1043/2043	CIE Marks	50
Course Type (Theory/Practical/Integrated)	Theory	SEE Marks	50
		Total Marks	100
Teaching Hours/Week (L:T:P: S)	3:0:0:0	Exam Hours	03
Total Hours of Pedagogy	40 hours	Credits	03
Course objectives 1. To prepare students with fundamental knowledge/ overview in the field of Electronics and Communication Engineering. 2. To equip students with a basic foundation in electronic engineering required for comprehending the operation and application of electronic circuits, logic design, embedded systems, and communication systems. 3. Professionalism & Learning Environment: To inculcate in first-year engineering students an ethical and professional attitude by providing an academic environment inclusive of effective communication, teamwork, ability to relate engineering issues to a broader social 4. Context, and life-long learning needed for a successful professional career.			
Teaching-Learning Process These are sample Strategies, which teacher can use to accelerate the attainment of the various course outcomes and make Teaching –Learning more effective 1. Lecturer method (L) does not mean only the traditional lecture method, but a different type of teaching method may be adopted to develop the outcomes. 2. Arrange visits to nearby PSUs such as BHEL, BEL, ISRO, etc., and small-scale hardware Industries to give brief information about the electronics manufacturing industry. 3. Show Video/animation films to explain the functioning of various analog and digital circuits. 4. Encourage collaborative (Group) Learning in the class 5. Ask at least three HOTS (Higher-order Thinking) questions in the class, which promotes critical thinking 6. Adopt Problem Based Learning (PBL), which fosters students' Analytical skills, develop thinking skills such as the ability to evaluate, generalize, and analyze information rather than simply recall it. 7. Topics will be introduced in multiple representations. 8. Show the different ways to solve the same problem and encourage the students to come up with their own creative ways to solve them. 9. Discuss how every concept can be applied to the real world - and when that's possible, it helps improve the students' understanding.			

Module-1	8 hours
Diode Applications: Half-wave rectification, Full-wave rectification, Zener diodes, Voltage multiplier circuits Power Supplies: Introduction, General filter considerations, Capacitor filter Field Effect Transistors: Introduction, Depletion-type MOSFET, Enhancement-type MOSFET (Text 1:2.6,2.7,2.11,15.1,15.2,15.3,6.1,6.7,6.8,)	
Module-2	8 hours
Feedback and Oscillator Circuits: Feedback Concepts, Oscillator Operation, Phase-shift Oscillator, Wein bridge oscillator, Crystal Oscillators. Operational amplifiers – Introduction, Op-amp Basics, Practical opamp circuits, Constant gain Multiplier (Text 1: 14.1,14.5,14.6,14.7,14.9,10.1,10.4,10.5,11.1)	
Module-3	8 hours
Boolean Algebra and Combinational Circuits: Introduction, Binary number system, Octal number system, Hexadecimal number system, Digital circuits, Boolean algebra theorems, Algebraic simplification, NAND and NOR Implementation (Text 2: 11.1,11.2,11.3,11.4,10.4,10.3,11.7,11.8)	
Module-4	8 hours
Introduction to Embedded Systems: What is an Embedded system, Embedded systems vs general computing systems, History of Embedded systems, Classification of Embedded Systems, Major application areas of Embedded Systems, Purpose of Embedded Systems, Core of the Embedded System, Memory (Text 3: 1.1,1.2,1.3,1.4,1.5,1.6,2.1,2.2)	
Module-5	8 hours
Communication Engineering: Introduction, Elements of Communication Systems, Modulation, Transmitter, Automatic Gain control circuit, Digital communication, Multiplexing, Pulse Demodulation, The telephone systems, Data Transmission, Digital modulation, Multiplexing and Multi-Acess, Transmission lines, Radio waves, Antennas, Television, Satellite Communication, Principle of Operation of Mobile phone, FAX, ISDN, Microwave communication, Optical fibre Communication. (Text2:18.1,18.2,18.3,18.4,18.5,18.6,18.7,18.8,18.9,18.10,18.11,18.12,18.13,18.14,18.15,18.16,18.17,18.18,18.19,18.20,18.21,18.22)	

Course outcome (Course Skill Set)

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

- CO1:** Apply the basic knowledge of physics and mathematics to understand the principles of Semiconductor devices, Boolean algebra, digital gates, Basic communication systems and embedded systems.
- CO2:** Analyze the working of transistor circuits, Digital circuits.
- CO3:** Analyze the applications of diodes, Transistors, gates and embedded systems.
- CO4:** Design the circuits using Op-amp and gates.

A. CO v/s PO Mapping Table

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3													
CO2		2												
CO3		2												
CO4			1											

Suggested Learning Resources:

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

1. Electronic Devices and Circuit Theory, 11th Edition, by Robert L. Boylestad and Louis Nashelsky, PHI, 2015, ISBN: 978-93-325-4260-0.
2. Basic Electronics, D.P Kothari and I. J Nagarath, McGraw Hill Education, 2014, ISBN: 978-93-329-0158-2
3. Introduction to Embedded Systems, Shibhu K V, McGraw Hill Education, 2011, ISBN: 978-0-07-014589-4

Introduction to Mechanical Engineering [As per Choice Based Credit System (CBCS) & OBE Scheme] SEMESTER – I/II			
Course Code:	P24ESC1044/2044	CIE Marks	50
Course Type (Theory/Practical/Integrated)	Theory	SEE Marks	50
		Total Marks	100
Teaching Hours/Week (L:T:P: S)	3:0:0:0	Exam Hours	03
Total Hours of Pedagogy	40 hours	Credits	03
Course Learning Objectives: The objectives of this course are, - To develop fundamental knowledge of Mechanical Engineering and Energy Sources. - To understand the concept of Modern Manufacturing Processes like CNC and 3D printing. - To understand the working concepts of IC engines and Electric Vehicles. - To give exposure in the field of Engineering Materials and Manufacturing Processes Technology and its applications. - To acquire a basic knowledge of Robotics and Automation in industrial applications.			
Course Content			
UNIT-I			
Introduction: Role of Mechanical Engineering in Industries and Society- Emerging Trends and Technologies in different sectors such as Energy, Manufacturing, Automotive, Aerospace and Marine sectors. Energy: Introduction and applications of Energy sources like Fossil fuels, Nuclear fuels, Hydel, Solar, wind and bio-fuels, Environmental issues like Global warming and Ozone depletion.			
			8 Hours
UNIT-II			
Mechanical and Electrical Drives: Mechanical Drives: Classification of IC Engines, Working Principles of 4-Stroke Petrol and Diesel Engines, Application of IC Engines. Electrical Drives: History, components of electric vehicles, Basic structure of electric vehicle, EV/ICE comparison, Concept of Hybrid Electric Drive Trains, Classification of hybrid electric vehicles. Classification of gears, velocity ratio for simple and compound gear trains.			
			8 Hours
UNIT-III			
Engineering Materials: Types and applications of Ferrous and Nonferrous Metals, silica, ceramics, glass, graphite, diamond, polymer and Shape Memory Alloys. Joining Processes: Soldering, Brazing and Welding, definitions, classification of welding process, Arc welding, Gas welding and types of flames.			
			8 Hours
UNIT-IV			
Machine Tool Operations: Working Principle of lathe, Lathe operations: Turning, facing, knurling. Working principles of Drilling Machine, drilling operations: drilling, boring, reaming. Working principle of Milling Machine, Milling operations: plane milling and slot milling (No sketches of machine tools, sketches to be used only for explaining the operations). Introduction to Advanced Manufacturing Systems: Introduction, components of CNC, advantages and applications of CNC, 3D printing and its applications.			
			8 Hours

UNIT-V

Introduction to Mechatronics and Robotics: Open-loop and Closed-loop mechatronic systems. Classification based on robotics configuration: Polar, Cylindrical, Cartesian coordinate, Jointed arm and SCARA, advantages, limitations and applications.

Automation in Industry: Definition, types – Fixed, flexible and programmable automation, basic elements with block diagrams and advantages.

Introduction to Internet of Things (IoT): Definition and Characteristics, Physical design, protocols, Logical design of IoT, Functional blocks and communication models.

8 Hours**Text Books**

1. K. R. Gopalakrishna, “**Elements of Mechanical Engineering**”, Subhash Publishers, Bangalore, 2018, ISBN:978-93-8681-924-6.
2. Jonathan Wickert and Kemper Lewis, “**An Introduction to Mechanical Engineering**”, Third Edition, 2012, ISBN-13: 978-1-111-57680-6.

Reference Books

1. R K Rajput, “**Material Science and Engineering**”, S. K. Kataria and Sons-New Delhi, 2013, ISBN:108185749108.
2. Mikell P Grover, “**Automation, Production Systems and Computer Integrated Manufacturing**”, Prentice hall of India Pvt. Ltd, 2002, ISBN:1292076119.
3. MehrdadEhsani, YiminGao, Sebastien E. Gay and Li Emadi, “**Modern Electric, Hybrid Electric and Fuel Cell Vehicles**”, CRC Press LLC, 2005, ISBN:10-8493-3154-4.
4. Raj kamal, “**Internet of Things: Architecture and Design**”, McGraw hill, ISBN:9352605225.

Web Resources

11. <https://nptel.ac.in/courses/116/102/116102012/>
12. <https://www.youtube.com/watch?v=Zgp86PVXXuQ>
13. <https://nptel.ac.in/courses/112/105/112105211/>
14. <https://nptel.ac.in/courses/112/105/112105249/>
15. <https://nptel.ac.in/courses/112/107/112107213>

Course Outcomes: At the end of the course, students will be able to,

1. **Apply** the fundamentals of mechanical engineering in the operational features of mechanical systems used in engineering practices.
2. **Identify** the different sources of energy and energy conversion in IC Engines and Electric Vehicles.
3. **Apply** the knowledge of engineering material properties and metal joining processes in engineering industrial applications.
4. **Apply** the knowledge of traditional and advanced manufacturing processes in mechanical engineering.

Course Articulation Matrix

Course Outcomes		Program Outcomes												PSO	
		1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	Apply the fundamentals of mechanical engineering in the operational features of mechanical systems used in engineering practices.	3												1	
CO2	Identify the different sources of energy and energy conversion in IC Engines and Electric Vehicles.	3													1
CO3	Apply the knowledge of engineering material properties	3												1	

	and metal joining processes in engineering industrial applications.																
CO4	Apply the knowledge of traditional and advanced manufacturing processes in mechanical engineering.					3											1
SEE- Course Assessment Plan																	
COs	Marks Distribution					Total Marks		Weightage (%)									
	Unit I	Unit II	Unit III	Unit IV	Unit V												
CO1	2+9	9			9	29		29%									
CO2	9	2+9				20		20%									
CO3			2+9+9			20		20%									
CO4				2+9+9	2+9	31		31%									
	20	20	20	20	20	100		100%									
Application = 100%																	

Introduction to C Programming [As per Choice Based Credit System (CBCS) & OBE Scheme] SEMESTER – I/II			
Course Code:	P24ESC1045/2045	CIE Marks	50
Course Type (Theory/Practical/Integrated)	Theory	SEE Marks	50
		Total Marks	100
Teaching Hours/Week (L:T:P: S)	3:0:0:0	Exam Hours	03
Total Hours of Pedagogy	40 hours	Credits	03
Course objectives			
CLO 1. Elucidate the basic architecture and functionalities of a Computer			
CLO 2. Apply programming constructs of C language to solve the real-world problems			
CLO 3. Explore user-defined data structures like arrays, structures and pointers in implementing solutions to problems			
CLO 4. Design and Develop Solutions to problems using modular programming constructs such as functions and procedures			
Teaching-Learning Process(General Instructions)			
These are sample Strategies, which teachers can use to accelerate the attainment of the various course outcomes.			
1. Lecturer method (L) need not to be only traditional lecture method, but alternative effective teaching methods could be adopted to attain the outcomes.			
2. Use of Video/Animation to explain functioning of various concepts.			
3. Encourage collaborative (Group Learning) Learning in the class.			
4. Ask at least three HOT (Higher order Thinking) questions in the class, which promotes critical thinking.			
5. Adopt Problem Based Learning (PBL), which fosters students' Analytical skills, develop design thinking skills such as the ability to design, evaluate, generalize, and analyze information rather than simply recall it.			
6. Introduce Topics in manifold representations.			
7. Show the different ways to solve the same problem and encourage the students to come up with their own creative ways to solve them.			
8. Discuss how every concept can be applied to the real world-and when that's possible, it helps to improve the students' understanding.			
9. Use https://pythontutor.com/visualize.html#mode=edit in order to visualize the operations of C Programs			
Module-1		(6 Hours of Pedagogy)	
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,			
Textbook: Chapter 1.1-1.9, 2.1-2.2, 8.1 – 8.6, 9.1-9.14			
Teaching-Learning Process		Chalk and talk method/Power Point Presentation	
Module-2		(6 Hours of Pedagogy)	
Operators in C, Type conversion and typecasting.			
Decision control and Looping statements: Introduction to decision control, Conditional branching statements, iterative statements, nested loops, break and continue statements, go to statement.			
Textbook: Chapter 9.15-9.16, 10.1-10.6			
Teaching-Learning Process		Chalk and talk method/Power Point Presentation	

Module-3		(6 Hours of Pedagogy)
Functions: Introduction using functions, Function definition, function declaration, function call, return statement, passing parameters to functions, scope of variables, storage classes, recursive functions. Arrays: Declaration of arrays, accessing the elements of an array, storing values in arrays, Operations on arrays, Passing arrays to functions.		
Textbook: Chapter 11.1-11.13, 12.1-12.6		
Teaching-Learning Process	Chalk and talk method/Power Point Presentation	
Module-4		(6 Hours of Pedagogy)
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 Scan set.		
Textbook: Chapter 12.7-12.12		
Teaching-Learning Process	Chalk and talk method/Power Point Presentation	
Module-5		(6 Hours of Pedagogy)
Strings: String taxonomy, operations on strings, Miscellaneous string and character functions, arrays of strings.		
Pointers: Understanding the Computer's Memory, Introduction to Pointers, Declaring Pointer Variables		
Structures: Introduction to structures		
Textbook: Chapter 13.1-13.6, 14.1-14.3, 15.1		
Teaching-Learning Process	Chalk and talk method/Power Point Presentation	
Course Outcomes(Course Skill Set)		
At the end of the course the 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		
CO 3. 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		
Suggested Learning Resources:		
Textbooks		
1. Computer fundamentals and programming in c, "Reema Thareja", Oxford University, Second edition, 2017.		
Reference Books:		
1. E. Balaguruswamy, Programming in ANSI C, 7th Edition, Tata McGraw-Hill.		
2. Brian W. Kernighan and Dennis M. Ritchie, the 'C' Programming Language, Prentice Hall of India.		
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.

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

- Quizzes
- Assignments
- Seminars

Lab Assignments

1	C Program to find Mechanical Energy of a particle using $E = mgh + \frac{1}{2}mv^2$.
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 b ₁ , b ₂ , b ₃ 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 built-in library function. Print both the results with appropriate inferences.
7	Sort the given set of N numbers using Bubble sort.
8	Write functions to implement string operations such as compare, concatenate, string length. Convince the parameter passing techniques.
9	Implement structures to read, 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.

COs and POs Mapping

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

Renewable Energy Sources			
[As per Choice Based Credit System (CBCS) & OBE Scheme]			
SEMESTER – I/II			
Course Code:	P24ETC1054/2054	Credits:	03
Teaching Hours/Week (L:T:P:S)	3:0:0:0	CIE Marks:	50
Total Hours of Pedagogy:	40 Hours	SEE Marks:	50
Course Learning Objectives: This course will enable the students to: 1) To understand energy scenario, energy sources and their utilization. 2) To explore society’s present needs and future energy demands. 3) To Study the principles of renewable energy conversion systems. 4) To exposed to energy conservation methods.			
Teaching-Learning Process: These are sample Strategies, which teacher can use to accelerate the attainment of the various course outcomes and make Teaching –Learning more effective. 1) Use pie chart showing distribution of renewable energy sources. 2) Use wind turbine models. 3) Use sun path diagrams			
Module-1		(08 hours)	
Introduction: Principles of renewable energy; energy and sustainable development, fundamentals and social implications. worldwide renewable energy availability, renewable energy availability in India, brief descriptions on solar energy, wind energy, tidal energy, wave energy, ocean thermal energy, biomass energy, geothermal energy, oil shale. Introduction to Internet of energy (IOE).			
Module-2		(08 hours)	
Solar Energy: Fundamentals; Solar Radiation; Estimation of solar radiation on horizontal and inclined surfaces; Solar radiation Measurements- Pyrheliometers, Pyrometer, Sunshine Recorder. Solar Thermal systems: Flat plate collector; Solar distillation; Solar pond electric power plant. Solar electric power generation: Principle of Solar cell, Photovoltaic system for electric power generation, advantages, Disadvantages and applications of solar photovoltaic system.			
Module-3		(08 hours)	
Wind Energy: Properties of wind, availability of wind energy in India, wind velocity and power from wind; major problems associated with wind power, Basic components of wind energy conversion system (WECS); Classification of WECS- Horizontal axis- single, double and muliblade system. Vertical axis- Savonius and darrieus types. Biomass Energy: Introduction; Photosynthesis Process; Biofuels; Biomass Resources; Biomass conversion technologies -fixed dome; Urban waste to energy conversion; Biomass gasification (Downdraft).			
Module-4		(08 hours)	
Tidal Power: Tides and waves as energy suppliers and their mechanics; fundamental characteristics of tidal power, harnessing tidal energy, advantages and limitations. Ocean Thermal Energy Conversion: Principle of working, OTEC power stations in the world, problems associated with OTEC.			

Module-5			(08 hours)
Green Energy: Introduction, Fuel cells: Classification of fuel cells – H ₂ ; Operating principles, Zero energy Concepts. Benefits of hydrogen energy, hydrogen production technologies (electrolysis method only), hydrogen energy storage, applications of hydrogen energy, problem associated with hydrogen energy.			
Course Outcomes: On completion of this course, students are able to:			
COs	Course Outcomes with <i>Action verbs</i> for the Course topics	Bloom's Taxonomy Level	Level Indicator
CO1	Apply the basics and thereby to acquire knowledge about renewable resources like Solar, Wind, Tidal etc	Understanding	L2
CO2	Explain the environmental aspects of renewable energy resources in Comparison with various conventional energy systems, their prospects and limitations.	Applying	L3
CO3	Identify to get adequate inputs on a variety of issues in harnessing renewable energy	Understanding	L2
CO4	Identify the various renewable energy resources like Solar, Wind, Tidal etc and their applications.	Applying	L3
Text Book(s): 1. Non conventional Energy sources, G D Rai, Khanna Publication, Fourth Edition. 2. Energy Technology, S. Rao and Dr. B.B. Parulekar, Khanna Publication. 3. Solar energy, Subhas P Sukhatme, Tata McGraw Hill, second Edition, 1996.			
Reference Book(s): 1. Principles of Energy conversion, A. W. Culp Jr., McGraw Hill, 1996 2. Non-Convention EnergyResources, Shobh Nath Singh, Pearson, 2018.			
Web links and Video Lectures (e-Resources): 1. E-book URL: https://www.pdfdrive.com/non-conventional-energy-sources-e10086374.html 2. E-book URL: https://www.pdfdrive.com/non-conventional-energy-systems-nptel-d17376903.html 3. E-book URL: https://www.pdfdrive.com/renewable-energy-sources-and-their-applications-e33423592.html 4. E-book URL: https://www.pdfdrive.com/lecture-notes-on-renewable-energy-sources-e34339149.html 5. https://onlinecourses.nptel.ac.in/noc18_ge09/preview			
Activity Based Learning (Suggested Activities in Class)/ Practical Based learning: 1) Poster presentation on the theme of renewable energy sources. 2) Industry Visit.			

Course Articulation Matrix (CAM)

Sl. No	Course Outcome – CO	Program Outcomes												Program Specific Outcomes		
		1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
01	Apply the basics and thereby to acquire knowledge about renewable resources like Solar, Wind, Tidal etc	1	1				1							1	1	
02	Explain the environmental aspects of renewable energy resources in Comparison with various conventional energy systems, their prospects and limitations.		1		1		1							1	1	
03	Identify to get adequate inputs on a variety of issues in harnessing renewable energy		1				1	1						1	1	
04	Identify the various renewable energy resources like Solar, Wind, Tidal etc and their applications.			1			1	1						1	1	
3- Highly Mapped, 2-Moderately Mapped, 1-Low Mapped, 0- Not Mapped																

Introduction to Internet of Things(IOT) [As per Choice Based Credit System (CBCS) & OBE Scheme] SEMESTER – I/II			
Course Code:	P24ETC1055/2055	CIE Marks:	50
Course Type (Theory/Practical/Integrated):	Theory	SEE Marks	50
		Total Marks	100
Teaching Hours/Week (L:T:P: S)	3-0-0-0	Exam Hours	03
Total Hours of Pedagogy	40 hours	Credits	03
Course objectives 1. Understand about the fundamentals of Internet of Things and its building blocks along with their characteristics. 2. Understand the recent application domains of IOT in everyday life. 3. Gain insights about the current trends of Associated IOT technologies and IOT Analytics.			
Teaching-Learning Process These are sample Strategies, which teachers can use to accelerate the attainment of the various course outcomes. 1. Lecturer method (L) needs not to be only a traditional lecture method, but alternative effective teaching methods could be adopted to attain the outcomes. 2. Use of Video/Animation to explain functioning of various concepts. 3. Encourage collaborative (Group Learning) Learning in the class. 4. Ask at least three HOT (Higher order Thinking) questions in the class, which promotes critical thinking. 5. Adopt Problem Based Learning (PBL), which fosters students' Analytical skills, develop design thinking skills such as the ability to design, evaluate, generalize, and analyze information rather than simply recall it. 6. Introduce Topics in manifold representations. 7. Show the different ways to solve the same problem with different circuits/logic and encourage the students to come up with their own creative ways to solve them. 8. Discuss how every concept can be applied to the real world - and when that's possible, it helps improve the students' understanding. 9. Use any of these methods: Chalk and board, Active Learning, Case Studies			
Module-1			8 hours
Basics of Networking: Introduction, Network Types, Layered network models Emergence of IoT: Introduction, Evolution of IoT, Enabling IoT and the Complex Interdependence of Technologies, IoT Networking Components Textbook 1: Chapter 1- 1.1 to 1.3 Chapter 4 – 4.1 to 4.4			
Module-2			8 hours
IoT Sensing and Actuation: Introduction, Sensors, Sensor Characteristics, Sensorial Deviations, Sensing Types, Sensing Considerations, Actuators, Actuator Types, Actuator Characteristics. Textbook 1: Chapter 5 – 5.1 to 5.9			

Module-3		8 hours
IoT Processing Topologies and Types: Data Format, Importance of Processing in IoT, Processing Topologies, IoT Device Design and Selection Considerations, Processing Offloading. Textbook 1: Chapter 6 – 6.1 to 6.5		
Module-4		8 hours
Associated IoT Technologies: Cloud Computing: Introduction, Virtualization, Cloud Models, Service-Level Agreement in Cloud Computing, Cloud Implementation, Sensor-Cloud: Sensors-as-a-Service. IoT Case Studies Agricultural IoT – Introduction and Case Studies Textbook 1: Chapter 10– 10.1 to 10.6; Chapter 12- 12.1-12.2		
Module-5		8 hours
IoT Case Studies and Future Trends: Vehicular IoT – Introduction Healthcare IoT – Introduction, Case Studies IoT Analytics – Introduction Textbook 1: Chapter 13– 13.1; Chapter 14- 14.1-14.2; Chapter 17- 17.1		
Course outcome (Course Skill Set) : At the end of the course the student will be able to:		
CO1	Describe the evolution of IoT, IoT networking components, and addressing strategies in IOT.	
CO2	Classify various sensing devices and actuator types.	
CO3	Demonstrate the processing in IOT.	
CO4	Explain Associated IOT Technologies	
CO5	Illustrate architecture of IOT Applications	
Suggested Learning Resources: Books (Title of the Book/Name of the author/Name of the publisher/Edition and Year) 1. Sudip Misra, Anandarup Mukherjee, Arijit Roy, “Introduction to IoT”, Cambridge University Press 2021. Reference: 1. S. Misra, C. Roy, and A. Mukherjee, 2020. Introduction to Industrial Internet of Things and Industry 4.0. CRCPress. 2. Vijay Madisetti and Arshdeep Bahga, “Internet of Things (A Hands-on-Approach)”, 1st Edition, VPT, 2014. 3. Francis daCosta, “Rethinking the Internet of Things: A Scalable Approach to Connecting Everything”, 1 st Edition, Apress Publications, 2013.		
Web links and Video Lectures (e-Resources): 1. https://nptel.ac.in/noc/courses/noc19/SEM1/noc19-cs31/		
Activity Based Learning (Suggested Activities in Class)/ Practical Based learning: Demonstrate a sensor based application		

COs and POs Mapping:

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

Smart Materials and Systems [As per Choice Based Credit System (CBCS) & OBE Scheme] SEMESTER – I/II			
Course Code:	P24ETC1056/2056	CIE Marks:	50
Course Type (Theory/Practical/Integrated):	Theory	SEE Marks	50
		Total Marks	100
Teaching Hours/Week (L:T:P: S)	3-0-0-0	Exam Hours	03
Total Hours of Pedagogy	40 hours	Credits	03
Course Learning Objectives: The objectives of this course are, - To study various types of smart materials used in engineering application. - To study processing of smart materials. - To study the basic working principles of sensors and actuators in engineering application.			
Course Content			
UNIT-I			
Introduction: Characteristics of metals, polymers and ceramics. Introduction to smart materials, Classification of smart materials, Components of a smart System: Sensors, actuators and transducers. Advantages, Limitations and Applications of smart materials.			
			8 Hours
UNIT-II			
Electro-rheological and Magneto-rheological Fluids: Mechanisms, Characteristics, Fluid composition and Behavior, Discovery and Early developments, Applications of Electro-rheological and Magneto-rheological fluids.			
			8 Hours
UNIT-III			
Processing of Smart Materials: Introduction to Semiconductors and their processing, Metals and metallization techniques, Ceramics and their processing, Polymers and their synthesis, UV radiation curing of polymers.			
			8 Hours
UNIT-IV			
Sensors: Working principles of Conductometric sensors, Capacitive sensors, Piezoelectric sensors, Magnetostrictive sensors, Piezo-resistive sensors, Optical sensors, Resonant sensors, semiconductor-based sensors, Acoustic sensors, polymerize sensors and Carbon nanotube sensors.			
			8 Hours
UNIT-V			
Actuators: Working principles of Electrostatic transducers, Electromagnetic transducers, Electrodynamic transducers, Piezoelectric transducers, Electrostrictive transducers, Magnetostrictive transducers, Electro thermal actuators, Comparison of actuation and Applications.			
			8 Hours
Text Books			
1. V. K. Varadan, K. J. Vinoy, S. Gopalakrishnan, “ Smart Material Systems and MEMS: Design and Development Methodologies ”, John Wiley and Sons, Oct 2006, ISBN: 978-0-470-09361-0. 2. Brain Culshaw, “ Smart Structures and Materials ”, Artech House, London, Sep 2004, ISBN: 9780890066812. 3. Mukesh V. Gandhi, Brian S. Thompson, “ Smart Materials and Structures ”, Springer, May1992, ISBN: 9780412370106.			

Reference Books

3. A. V. Srinivasan, “**Smart Structures: Analysis and Design**”, Cambridge University Press, Cambridge, New York, 2001, ISBN: 978-0521659772.
4. P. Gauenzi, “**Smart Structures**”, Wiley, Oct 2009, ISBN: 978-0-470-68243-2.
5. G. Gautschi, “**Piezoelectric Sensorics: Force, Strain, Pressure, Acceleration and Acoustic Emission Sensors, Materials and Amplifiers**”, Springer, Berlin, New York, 2002, ISBN: 978-3-662-04732-3.

Web Resources

16. <https://nptel.ac.in/courses/112104173/>
17. <https://nptel.ac.in/courses/112104173/>
18. <https://nptel.ac.in/courses/112104251/>
19. www.iop.org/EJ/article/0964-1726/5/3/002/sm6301.ps.gz

Course Outcomes: At the end of the course, students will be able to,

5. **Apply** the fundamental characteristics of metals, polymers, ceramics and shape memory alloys in different engineering applications.
6. **Apply** the knowledge of fluid characteristics in analysing the behavior of electro-rheological and magneto-rheological fluids.
7. **Identify** the different sensors and actuators used in engineering applications.
8. **Apply** the knowledge of various processing techniques and basic applications of smart materials in developing components of smart system.

Course Articulation Matrix

Course Outcomes		Program Outcomes												PSO	
		1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	Apply the fundamental characteristics of metals, polymers, ceramics and shape memory alloys in different engineering applications.	3													
CO2	Apply the knowledge of fluid characteristics in analysing the behavior of electro-rheological and magneto-rheological fluids.	3	1											1	
CO3	Identify the different sensors and actuators used in engineering applications.	3												1	
CO4	Apply the knowledge of various processing techniques and basic applications of smart materials in developing components of smart system.	3													1

SEE- Course Assessment Plan

COs	Marks Distribution					Total Marks	Weightage (%)
	Unit I	Unit II	Unit III	Unit IV	Unit V		
CO1	2+9		9			20	20%
CO2		2+9			9	20	20%
CO3		9		2+9	2+9	31	31%
CO4	9		2+9	9		29	29%
	20	20	20	20	20	100	100%

Application =80% Analysis = 20%

Introduction to Cyber Security [As per Choice Based Credit System (CBCS) & OBE Scheme] SEMESTER – I/II			
Course Code:	22ETC1057/2057	CIE Marks	50
Course Type (Theory/Practical /Integrated)	Theory	SEE Marks	50
		Total Marks	100
Teaching Hours/Week (L:T:P: S)	3-0-0-0	Exam Hours	03
Total Hours of Pedagogy	40 hours	Credits	03
Course objectives • To familiarize cybercrime terminologies and perspectives • To understand Cyber Offenses and Botnets • To gain knowledge on tools and methods used in cybercrimes • To understand phishing and computer forensics			
Teaching-Learning Process These are sample Strategies, which teacher can use to accelerate the attainment of the various course outcomes and make Teaching –Learning more effective 1. Chalk and Board 2. Demonstration 3. Interactive learning 4. Videos and online material			
Module-1		(8 hours of pedagogy)	
Introduction to Cybercrime: Cybercrime: Definition and Origins of the Word, Cybercrime and Information Security, Who are Cybercriminals? Classifications of Cybercrimes, An Indian Perspective, Hacking and Indian Laws., Global Perspectives Textbook:1 Chapter 1 (1.1 to 1.5, 1.7-1.9)			
Module-2		(8 hours of pedagogy)	
Cyber Offenses: How Criminals Plan Them: Introduction, How criminals plan the attacks, Social Engineering, Cyber Stalking, Cybercaafe & cybercrimes. Botnets: The fuel for cybercrime, Attack Vector.Textbook:1 Chapter 2 (2.1 to 2.7)			
Module-3		(8 hours of pedagogy)	
Tools and Methods used in Cybercrime: Introduction, Proxy Servers, Anonymizers, Phishing, Password Cracking, Key Loggers and Spyways, Virus and Worms, Trozen Horses and Backdoors, Steganography, DoS and DDOS Attacks, Attacks on Wireless networks. Textbook:1 Chapter 4 (4.1 to 4.9, 4.12)			
Module-4		(8 hours of pedagogy)	
Phishing and Identity Theft: Introduction, methods of phishing, phishing,phising techniques, spear phishing, types of phishing scams, phishing toolkits and spy phishing, counter measures, Identity Theft			
Textbook:1 Chapter 5 (5.1. to 5.3)			

Module-5	(8 hours of pedagogy)
Understnading Computer Forensics: Introdcution, Historical Background of Cyberforensics, Digital Foresics Science, Need for Computer Foresics, Cyber Forensics and Digital Evidence, Digital Forensic Life cycle, Chain of Custody Concepts, network forensics. Textbook:1 Chapter 7 (7.1. to 7.5, 7.7 to 7.9)	
Course outcome (Course Skill Set) At the end of the course the student will be able to: CO1 Explain the cybercrime terminologies CO2 Describe Cyber offenses and Botnets CO3 Illustrate Tools and Methods used on Cybercrime CO4 Explain Phishing and Identity Theft CO5 Justify the need of computer forensics	

Course outcome (Course Skill Set)

Suggested Learning Resources: Books (Title of the Book/Name of the author/Name of the publisher/Edition and Year) 1. Sunit Belapure and Nina Godbole, “Cyber Security: Understanding Cyber Crimes, Computer Forensics And Legal Perspectives”, Wiley India Pvt Ltd, ISBN: 978-81- 265-21791, 2011, First Edition (Reprinted 2018)
Web links and Video Lectures (e-Resources): • https://www.youtube.com/watch?v=yC_hFm0BX28&list=PLxApjaSnQG6Jm7LLSxvmNQjS_rt9swsu • https://www.youtube.com/watch?v=nzZkKoREEGo&list=PL9ooVrP1hQOGPQVeapGsJCktzIO4DtI4_ • https://www.youtube.com/watch?v=6wi5DI6du-4&list=PL_uaeekrhGzJlB8XQBxU3zhDwT95xIk • https://www.youtube.com/watch?v=KqSqyKwVuA8
Activity Based Learning (Suggested Activities in Class)/ Practical Based learning • Illustration of standard case study of cyber crime • Setup a cyber court at Institute level

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

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

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

Introduction to Web Programming [As per Choice Based Credit System (CBCS) & OBE Scheme] SEMESTER – I/II			
Course Code:	P24PLC1051/2051	CIE Marks	50
Course Type (Theory/Practical/Integrated)	Integrated	SEE Marks	50
		Total Marks	100
Teaching Hours/Week (L:T:P: S)	2:0:2:0	Exam Hours	03
Total Hours of Pedagogy	40 hours	Credits	03
Course objectives 1. To use the syntax and semantics of HTML and XHTML 2. To develop different parts of a web page 3. To understand how CSS can enhance the design of a webpage. 4. To create and apply CSS styling to a webpage 5. To get familiarity with the JavaScript language and understand Document Object Model handling of Java Script			
Teaching-Learning Process These are sample Strategies, which teacher can use to accelerate the attainment of the various course outcomes and make Teaching –Learning more effective 1. Use https://pythontutor.com/visualize.html#mode=edit in order to visualize the operations of Java scripts 2. Chalk and talk 3. Online demonstration 4. Hands on problem solving			
Module-1			8 hours
Module-1: Traditional HTML and XHTML: First Look at HTML and XHTML, Hello HTML and XHTML World, HTML and XHTML: Version History, HTML and XHTML DTDs: The Specifications Up Close, (X) HTML Document Structure, Browsers and (X) HTML, The Rules of (X)HTML, Major Themes of (X)HTML, The Future of Markup—Two Paths?			
TextBook1: Chapter 1			
Module-2			8 hours
Module-2: HTML5: Hello HTML5, Loose Syntax Returns, XHTML5, HTML5: Embracing the Reality of Web Markup, Presentational Markup Removed and Redefined, HTML5 Document Structure Changes, Adding Semantics, HTML5's Open Media Effort, Client-Side Graphics with <canvas>, HTML5 Form Changes, Emerging Elements and Attributes to Support Web Applications			
TextBook1: Chapter 2			

Module-3		8 hours
Module-3: Cascading Style Sheets (CSS) Introduction, CSS Overview , CSS Rules, Example with Type Selectors and the Universal Selector, CSS Syntax and Style, Class Selectors, ID Selectors, span and div Elements, Cascading, styleAttribute, style Container, External CSS Files, CSS Properties, Color Properties, RGB Values for Color, Opacity Values for Color, HSL and HSLA Values for Color, Font Properties, line-height Property, Text Properties, Border Properties, Element Box, padding Property, margin Property. Case Study: Description of a Small City’s Core Area. TextBook2:- Chapter 3		
Module-4		8 hours
Module-4: Tables and CSS, Links and Images Table Elements, Formatting a Data Table: Borders, Alignment, and Padding, CSS Structural Pseudo-Class Selectors, thead and tbody Elements, Cell Spanning, Web Accessibility, CSS display Property with Table Values, a Element, Relative URLs, Navigation Within a Web Page, CSS for Links, Bitmap Image Formats: GIF, JPEG, PNG, img Element, Responsive Images, Positioning Images, Shortcut Icon, iframe Element . TextBook2: 5.2 to 5.8, 6.2, 6.3, 6.6., 6.7, 6.9, 6.10, 6.12, 7.2 to 7.4		
Module-5		8 hours
Module-5: Introduction to JavaScript: Functions, DOM, Forms, and Event Handlers History of JavaScript, Hello World Web Page, Buttons, Functions, Variables, Identifiers, Assignment Statements and Objects, Document Object Model, Forms and How They’re Processed: Client-Side Versus Server-Side, form Element, Controls, Text Control, Accessing a Form’s Control Values, reset and focus Methods TextBook2: 8.2 to 8,13, 8.15, 8.16		
Course outcome (Course Skill Set) At the end of the course the student will be able to:		
CO1	Explain the historical context and justification for HTML over XHTML	
CO2	Develop HTML5 documents and adding various semantic markup tags	
CO3	Analyze various attributes, values and types of CSS	
CO4	Implement core constructs and event handling mechanisms of JavaScript.	

Programming Assignments:

- Create an XHTML page using tags to accomplish the following:
 - A paragraph containing text “All that glitters is not gold”. Bold face and italicize this text
 - Create equation:

$$x = 1/3(y_1^2 + z_1^2)$$
 - Put a background image to a page and demonstrate all attributes of background image
Create unordered list of 5 fruits and ordered list of 3 flowers
- Create following table using XHTML tags. Properly align cells, give suitable cell padding and cell spacing, and apply background color, bold and emphasis necessary

Department	Sem1	SubjectA
		SubjectB
		SubjectC
	Sem2	SubjectE
		SubjectF
		SubjectG
	Sem3	SubjectH
		SubjectI
		SubjectJ

- Use HTML5 for performing following tasks:
 - Draw a square using HTML5 SVG , fill the square with green color and make 6px brown stroke width
 - Write the following mathematical expression by using HTML5 MathML.
$$d=x^2-y^2$$
 - Redirecting current page to another page after 5 seconds using HTML5 metatag
- Demonstrate the following HTML5 Semantic tags- <article>, <aside>, <details>, <figcaption>, <figure>, <footer>, <header>, <main>, <mark>, <section> for a webpage that gives information about travel experience.
- Create a class called **income**, and make it a background color of #0ff. Create a class called **expenses**, and make it a background color of #f0f. Create a class called **profit**, and make it a background color of #f00.

Throughout the document, any text that mentions income, expenses, or profit, attach the appropriate class to that piece of text. Further create following line of text in the same document:

~~The current price is 50₹~~ and new price is 40₹

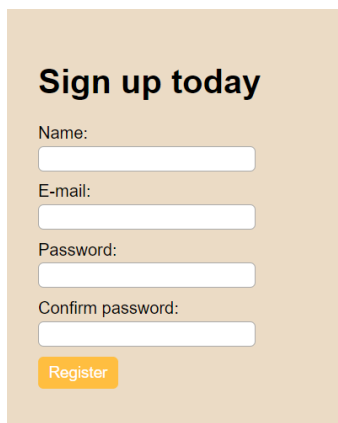
- Change the tag **li** to have the following properties:
 - A display status of inline
 - A medium, double-lined, black border
 - No list style type

Add the following properties to the style for **li**:

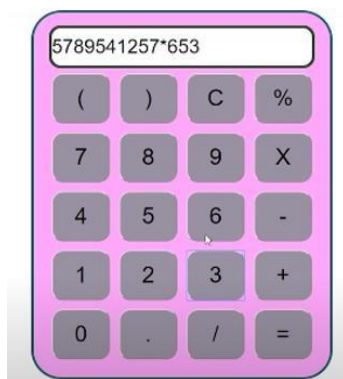
- Margin of 5px
- Padding of 10px to the top, 20px to the right, 10px to the bottom, and 20px to the left

Also demonstrate list style type with user defined image logos

7. Create following web page using HTML and CSS with tabular layout



8. Create following calculator interface with HTML and CSS



9. Write a Java Script program that on clicking a button, displays scrolling text which moves from left to right with a small delay
10. Create a webpage containing 3 overlapping images using HTML, CSS and JS. Further when the mouse is over any image, it should be on the top and fully displayed.

Suggested Learning Resources:

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

TextBook-1: HTML & CSS: The Complete Reference Thomas A. Powell, , Fifth Edition, Tata McGraw Hill

TextBook-2: WEB PROGRAMMING with HTML5, CSS and JavaScript, John Dean, Jones & Bartlett Learning, First Edition

Web links and Video Lectures (e-Resources):

https://onlinecourses.swayam2.ac.in/aic20_sp11/preview

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

- Develop simple GUI interfaces for a computer program to interact with users

COs and POs Mapping :

COs / POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2											1
CO2	3	3	3									1
CO3	3	3										1
CO4	3	3	3									1

Introduction to Python Programming [As per Choice Based Credit System (CBCS) & OBE Scheme] SEMESTER – I/II			
Course Code:	P24PLC1052/2052	CIE Marks	50
Course Type (Theory/Practical/Integrated)	Integrated	SEE Marks	50
		Total Marks	100
Teaching Hours/Week (L:T:P: S)	2:0:2:0	Exam Hours	03
Total Hours of Pedagogy	40 hours	Credits	03
Course objectives • Learn the syntax and semantics of the Python programming language. • Illustrate the process of structuring the data using lists, tuples • Appraise the need for working with various documents like Excel, PDF, Word and Others. • Demonstrate the use of built-in functions to navigate the file system. • Implement the Object Oriented Programming concepts in Python.			
Teaching-Learning Process These are sample Strategies, which teacher can use to accelerate the attainment of the various course outcomes and make Teaching –Learning more effective 1. Use https://pythontutor.com/visualize.html#mode=edit in order to visualize the python code 2. Demonstrate and visualize basic data types (list, tuple, and dictionary). 3. Chalk and talk 4. online and videos			
Module-1			8 Hours
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, and Boolean Operators, Mixing Boolean and Comparison Operators, Elements of Flow Control, Program Execution, Flow Control Statements, Importing Modules, Ending a Program Early with sys. exit() Functions: def. Statements with Parameters, Return Values and return Statements, The None Value, Keyword Arguments and print(), Local and Global Scope, The global Statement, Exception Handling, A Short Program: Guess the Number Textbook 1: Chapters 1 – 3			
Module-2			8 Hours
Lists: The List Data Type, Working with Lists, Augmented Assignment Operators, Methods, Example Program: Magic 8 Ball with a List, List-like Types: Strings and Tuples, References. Dictionaries and Structuring Data: The Dictionary Data Type, Pretty Printing, Using DataStructures to Model Real-World Things, Textbook 1: Chapters 4 – 5			

Module-3		8 Hours
Manipulating Strings: Working with Strings, Useful String Methods, Project: Password Locker, Project: Adding Bullets to Wiki Markup		
Reading and Writing Files: Files and File Paths, The OS .path Module, The File Reading/Writing Process, Saving Variables with the shelve Module, Saving Variables with the print.format() Function, Project: Generating Random Quiz Files, Project: Multi clip board,		
Textbook 1: Chapters 6 , 8		
Module-4		8 Hours
Organizing Files: The shutil Module, Walking a Directory Tree, Compressing Files with the zip file Module, Project: Renaming Files with American-Style Dates to European-Style Dates, Project: Backing Up a Folder into a ZIP File,		
Debugging: Raising Exceptions, Getting the Trackback as a String, Assertions, Logging, IDLE's Debugger.		
Textbook 1: Chapters 9-10		
Module-5		8 Hours
Classes and objects: Programmer-defined types, Attributes, Rectangles, Instances as return values, Objects are mutable, Copying,		
Classes and functions: Time, Pure functions, Modifiers, Prototyping versus planning,		
Classes and methods: Object-oriented features, Printing objects, Another example, A more complicated example, The init method, The _str_ method, Operator overloading, Type-based dispatch, Polymorphism, Interface and implementation,		
Textbook 2: Chapters 15 – 17		
Course outcome (Course Skill Set)		
At the end of the course the student will be able to:		
	CO1	Demonstrate proficiency in handling loops and creation of functions.
	CO2	Identify the methods to create and manipulate lists, tuples and dictionaries.
	CO3	Develop programs for string processing and file organization
	CO4	Interpret the concepts of Object-Oriented Programming as used in Python.

Programming Exercises:

1.
 - a. Develop a program to read the student details like Name, USN, and Marks in three subjects. Display the student details, total marks and percentage with suitable messages.
 - b. Develop a program to read the name and year of birth of a person. Display whether the person is a senior citizen or not.
2.
 - a. Develop a program to generate Fibonacci sequence of length (N). Read N from the console.
 - b. Write a function to calculate factorial of a number. Develop a program to compute binomial coefficient (Given N and R).
3. Read N numbers from the console and create a list. Develop a program to print mean, variance and standard deviation with suitable messages.
4. Read a multi-digit number (as chars) from the console. Develop a program to print the frequency of each digit with suitable message.
5. Develop a program to print 10 most frequently appearing words in a text file. [Hint: Use dictionary With distinct words and their frequency of occurrences. Sort the dictionary in the reverse order of frequency and display dictionary slice of first 10 items]
6. Develop a program to sort the contents of a text file and write the sorted contents into a separate text file. [Hint: Use string methods strip (), len (), list methods sort (), append (), and file methods open (), read lines (), and write ()].
7. Develop a program to backing up a given Folder (Folder in a current working directory) into a ZIP File by using relevant modules and suitable methods.
8. Write a function named DivExp which takes TWO parameters a, b and returns a value c ($c=a/b$). Write suitable assertion for $a>0$ in function DivExp and raise an exception for when $b=0$. Develop a suitable program which reads two values from the console and calls a function DivExp.
9. Define a function which takes TWO objects representing complex numbers and returns new complex number with addition of two complex numbers. Define a suitable class 'Complex' to represent the complex number. Develop a program to read N ($N \geq 2$) complex numbers and to compute the addition of N complex numbers.
10. Develop a program that uses class Student which prompts the user to enter marks in three subjects and calculates total marks, percentage and displays the score card details. [Hint: Use list to store the marks in three subjects and total marks. Use `__init__()` method to initialize name, USN and the lists to store marks and total, Use `getMarks()` method to read marks into the list, and `display()` method to display the score card details.]

Suggested Learning Resources:**Text Books**

1. Al Sweigart, “Automate the Boring Stuff with Python”, 1st Edition, No Starch Press, 2015. (Available under CC-BY-NC-SA license at <https://automatetheboringstuff.com/>)
(Chapters 1 to 18, except 12) for lambda functions use this link: <https://www.learnbyexample.org/python-lambda-function/>
2. Allen B. Downey, “Think Python: How to Think Like a Computer Scientist”, 2nd Edition, Green Tea Press, 2015. (Available under CC-BY-NC license at <http://greenteapress.com/thinkpython2/thinkpython2.pdf>)
(Chapters 13, 15, 16, 17, 18) (Download pdf/html files from the above link)

Web links and Video Lectures (e-Resources):

- <https://www.learnbyexample.org/python/>
- <https://www.learnpython.org/>
- <https://pythontutor.com/visualize.html#mode=edit>

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

- Quizzes for list, tuple, string dictionary slicing operations using below link
<https://github.com/sushantkhara/Data-Structures-And-Algorithms-with-Python/raw/main/Python%203%20%20400%20exercises%20and%20solutions%20for%20beginners.pdf>

COs and POs Mapping :

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

Basics of Java Programming [As per Choice Based Credit System (CBCS) & OBE Scheme] SEMESTER – I/II			
Course Code:	P24PLC1053/2053	CIE Marks	50
Course Type (Theory/Practical/Integrated)	Integrated	SEE Marks	50
		Total Marks	100
Teaching Hours/Week (L:T:P: S)	2:0:2	Exam Hours	03
Total Hours of Pedagogy	40 hours	Credits	03
Course objectives • Learn fundamental features of object oriented language and JAVA • Set up Java JDK environment to create, debug and run simple Java programs. • Learn object oriented concepts using programming examples. • Study the concepts of importing of packages and exception handling mechanism.			
Teaching-Learning Process These are sample Strategies, which teacher can use to accelerate the attainment of the various course outcomes and make Teaching –Learning more effective 1. Use https://pythontutor.com/visualize.html#mode=edit in order to visualize the Java programs 2. Chalk and talk 3. Online demonstration 4. Hands on problem solving			
Module-1			8 Hours
An Overview of Java: Object-Oriented Programming, A First Simple Program, A Second Short Program, Two Control Statements, Using Blocks of Code, Lexical Issues, The Java Class Libraries, Data Types, Variables, and Arrays: Java Is a Strongly Typed Language, The Primitive Types, Integers, Floating-Point Types, Characters, Booleans, A Closer Look at Literals, Variables, Type Conversion and Casting, Automatic Type Promotion in Expressions, Arrays, A Few Words About Strings Text book 1: Ch 2, Ch 3			
Module-2			8 Hours
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: Ch 4, Ch 5			
Module-3			8 Hours
Introducing Classes: Class Fundamentals, Declaring Objects, Assigning Object Reference Variables, Introducing Methods, Constructors, The this Keyword, Garbage Collection, The finalize() Method, A Stack Class, A Closer Look at Methods and Classes: Overloading Methods, Using Objects as Parameters, A Closer Look at Argument Passing, Returning Objects, Recursion, Introducing Access Control, Understanding static, Introducing final, Arrays Revisited Text book 1: Ch 6, Ch 7 (7.1-7.9)			

Module-4		8 Hours
Inheritance: Inheritance, Using super, Creating a Multilevel Hierarchy, When Constructors Are Called, Method Overriding, Dynamic Method Dispatch, Using Abstract Classes, Using final with Inheritance, The Object Class.		
Text book 1: Ch 8		
Module-5		8 Hours
Packages and Interfaces: Packages, Access Protection, Importing Packages, Interfaces, Exception Handling: Exception-Handling Fundamentals, Exception Types, Uncaught Exceptions, Using try and catch, Multiple catch Clauses, Nested try Statements, throw, throws, finally, Java's Built-in Exceptions, Creating Your Own Exception Subclasses, Chained Exceptions, Using Exceptions.		
Text book 1: Ch 9, Ch 10		
Course outcome (Course Skill Set)		
At the end of the course the student will be able to:		
CO1	To explain the features and object oriented concepts in JAVA programming	
CO2	To analyze working of bitwise operators in JAVA	
CO3	To develop simple programs based on polymorphism and inheritance	
CO4	To describe the concepts of importing packages and exception handling mechanism	
Programming Assignments		
1. Write a JAVA program that prints all real solutions to the quadratic equation $ax^2+bx+c=0$. Read in a,b, c and use the quadratic formula. 2. Write a JAVA program for multiplication of two arrays. 3. Demonstrate the following operations and sign extension with Java programs (i) << (ii) >> (iii) >>> 4. Write a JAVA program to sort list of elements in ascending and descending order 5. Create a JAVA class called Student with the following details as variables within it. USN , NAME, BRANCH, PHONE, PERCENTAGE Write a JAVA program to create n Student objects and print the USN, Name, Branch, Phone, and percentage of these objects with suitable headings. 6. Write a JAVA program demonstrating Method overloading and Constructor overloading. 7. Design a super class called Staff with details as StaffId, Name, Phone, Salary. Extend this class by writing three subclasses namely Teaching (domain, publications), Technical (skills), and Contract (period). Write a JAVA program to read and display at least 3 staff objects of all three categories. 8. Demonstrate dynamic dispatch using abstract class in JAVA. 9. Create two packages P1 and P2. In package P1, create class A, class B inherited from A, class C. In package P2, create class D inherited from class A in package P1 and class E. Demonstrate working of access modifiers (private, public, protected, default) in all these classes using JAVA. Write a JAVA program to read two integers a and b. Compute a/b and print, when b is not zero. Raise an exception when b is equal to zero. Also demonstrate working of Array Index Out Of Bound Exception.		

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

1. Herbert Scheldt, Java The Complete Reference, 7th Edition, Tata McGraw Hill, 2007.

Web links and Video Lectures (e-Resources):

https://onlinecourses.nptel.ac.in/noc22_cs47/preview

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

- Conduct on spot problem solving based on JAVA
- Develop simple GUI interfaces for a computer program to interact with users

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

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

Introduction to C++ Programming [As per Choice Based Credit System (CBCS) & OBE Scheme] SEMESTER – I/II			
Course Code:	P24PLC1054/2054	CIE Marks	50
Course Type (Theory/Practical/Integrated)	Integrated	SEE Marks	50
		Total Marks	100
Teaching Hours/Week (L:T:P:S)	2:0:2:0	Exam Hours	03
Total Hours of Pedagogy	40 hours	Credits	03
Module-1			8 hours
Limitations of procedure Oriented programming. Object Oriented Programming: Object, Classes, methods and messages, abstraction and encapsulation, inheritance, abstract classes, polymorphism. Functions in C++: Tokens– Keywords, Identifiers and constants. I/O function, simple C++ program, Data Types, Operators in C++, Scope resolution operator. Expressions and their types, Special assignment expressions, control structures. Textbook 1: Chapter 1 (1.1 to 1.8) Textbook 2: Chapter 2 (2.1, 2.2, 2.3) Chapter 3 (3.2 to 3.8,3.13,3.14,3.19,3.20, 3.24)			
Module-2			8 hours
Function in C++ – Call by value, Call by reference, Inline functions, Default arguments, Function Overloading. Classes and Objects: Defining class with data member and member Functions .C++ Program with access specifiers. Static Data Members and Member Functions, Objects as function arguments, Friend Functions. Textbook 2: Chapter 4(4.3,4.4,4.6,4.7,4.9) Chapter 5(5.3,5.4,5.8,5.11,5.12,5.14,5.15)			
Module-3			8 hours
Constructors and Destructors -Types of Constructors, Destructors Inheritance - Types of Inheritance - Defining Derived classes, Single, Multi-level Multiple, Hierarchical & Hybrid Inheritance. Textbook 2: Chapter 6 (6.2,6.3,6.4,6.5,6.7,6.11), Chapter 8 (8.1 to8.8)			
Module-4			8 hours
Polymorphism: Operator Overloading(unary operator(++,-),binary operator(+,-)) Exception Handling: Introduction to Exception - Benefits of Exception handling- , Exception handling Mechanism. Textbook 2:Chapter 7(7.2 to 7.4) Chapter 13(13.2 to 13.5)			
Module-5			8 hours
I/O Streams: C++ Class Hierarchy, File Stream-Text File Handling- Binary File Handling during file Operations. Textbook 1:, Chapter 12(12.5),Chapter 13 (13.6,13.7)			

Programming Assignments:

1	Write a C++ program to sort the elements in ascending and descending order.
2	Write a C++ program to find the sum of all the natural numbers from 1 to n.
3	Write a C++ program to swap 2 values by writing a function that uses call by reference technique.
4	Write a C++ program to demonstrate function overloading for the following prototypes. <i>add(int a, int b)</i> <i>add(double a, double b)</i>
5	Create a class named Shape with a function that prints "This is a shape". Create another class named Polygon inheriting the Shape class with the same function that prints "Polygon is a shape". Create two other classes named Rectangle and Triangle having the same function which prints "Rectangle is a polygon" and "Triangle is a polygon" respectively. Again, make another class named Square having the same function which prints "Square is a rectangle". Now, try calling the function by the object of each of these classes
6	Suppose we have three classes Vehicle, Four Wheeler, and Car. The class Vehicle is the base class, the class Four Wheeler is derived from it and the class Car is derived from the class Four Wheeler. Class Vehicle has a method 'vehicle' that prints 'I am a vehicle', class Four Wheeler has a method 'four Wheeler' that prints 'I have four wheels', and class Car has a method 'car' that prints 'I am a car'. So, as this is a multi-level inheritance; we can have access to all the other classes methods from the object of the class Car. We invoke all the methods from a Car object and print the corresponding outputs of the methods So, if we invoke the methods in this order, car(), four Wheeler(), and vehicle(), then the output will be I am a car I have four wheels I am a vehicle Write a C++ program to demonstrate multilevel inheritance using this.
7	Write a C++ program to create a text file, check file created or not, if created it will write some text into the file and then read the text from the file.
8	Write a C++ program to write and read time in/from binary file using fstream
9	Write a function which throws a division by zero exception and catch it in catch block. Write a C++ program to demonstrate usage of try, catch and throw to handle exception.
10	Write a C++ program function which handles array of bounds exception using C++.

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

1. Bhushan Trivedi, "Programming with ANSI C++", Oxford Press, Second Edition, 2012.
2. Balagurusamy E, Object Oriented Programming with C++, Tata McGraw Hill Education Pvt. Ltd, Fourth Edition 2010.

Web links and Video Lectures (e-Resources):

1. Basics of C++ - <https://www.youtube.com/watch?v=BCIS40yzssA>
2. Functions of C++ - <https://www.youtube.com/watch?v=p8ehAjZWjPw>

Tutorial Link:

1. https://www.w3schools.com/cpp/cpp_intro.asp
2. <https://www.edx.org/course/introduction-to-c-3>

COs and POs Mapping:

CO's	Statement	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	Apply the knowledge of object-based programming concepts to solve a given problem.	2	2	2		2								1		
CO2	Analyze the given C++ code snippet to identify the bugs and write correct code.	2	2											1		
CO3	Design the code to achieve reusability and extensibility by means of Inheritance and Polymorphism.	2	2	2		2								1		
CO4	Develop solutions to handle exceptions and files.	2	2	2		2								1		

Course Title:	Communicative English – I		
Course Code:	P24ENG106	CIE Marks	50
Course Type (Theory/Practical /Integrated)	Theory	SEE Marks	50
		Total Marks	100
Teaching Hours/Week (L:T:P:S)	0:2:0:0	Exam Hours	01 Theory
Total Hours of Pedagogy	30 hours	Credits	01
Module-1			
Introduction to Communication Skills			6 Hours
Introduction to communication, Meaning and process, Channels of communication, Elements of communication, Barriers to effective communication. Activities - Making introductions, Sharing personal information, Describing feelings and opinions.			
Module-2			
Listening Skills I			4 Hours
Hearing vs. Listening, Types of listening, Determinants of good listening, Active listening process, Barriers to listening, Activities - Listening for pronunciation practice, Listening for personal communication, Listening for communication - language functions			
Module-3			
Speaking Skills I			6 Hours
Basics of speaking, Elements and Functions of speaking, Structuring your speech, Focusing on fluency, Homographs and Signpost words. Activities – Free Speech and Pick and Speak			
Module-4			
Reading Skills I			4 Hours
Developing reading as a habit, Building confidence in reading, improving reading skills, Techniques of reading - skimming and scanning. Activities - understanding students' attitudes towards reading, countering common errors in reading, developing efficiency in reading.			
Writing Skills I			4 Hours
Improving writing skills, Spellings and punctuation, Letter and Paragraph writing. Activity – Writing your personal story			
Module-5			
Body Language and Presentation Skills			6 Hours
Elements of body language, Types, Adapting positive body language, Cultural differences in body language. 4 Ps in presentations, Overcoming the fear of public speaking, Effective use of verbal and nonverbal presentation techniques. Activity – Group presentations			
Course Outcomes: On completion of this course, students will be able to,			
CO 1: Understand the role of communication in personal and professional success			
CO 2: Comprehend the types of technical literature to develop the competency of students to apprehend the nature of formal communication requirements.			
CO 3: Construct grammatically correct sentences to strengthen essential skills in speaking & writing and to develop critical thinking by emphasizing cohesion and coherence			
CO 4: Demonstrate effective individual and teamwork to accomplish communication goals.			

Textbooks and Reference Books:

1. Communication Skills by Sanjay Kumar and Pushpa Lata, Oxford University Press - 2015.
2. Everyday Dialogues in English by Robert J. Dixson, Prentice-Hall of India Ltd., 2006.
3. Developing Communication Skills by Krishna Mohan & Meera Banerjee (Macmillan)
4. The Oxford Guide to Writing and Speaking, John Seely, Oxford.
5. English Language Communication Skills - Lab Manual cum Workbook by Rajesh Kumar Singh, Cengage learning India Pvt Limited – 2018

CO – PO – PSO Matrix

CO	PO												PSO		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1												2			
CO2										2					
CO3										2					
CO4									2						
CO									2	2		2			

Rapid Prototyping [As per Choice Based Credit System (CBCS) & OBE Scheme] SEMESTER - I			
Course Code:	P24RP107	Credits:	01
Teaching Hours/Week (L:T:P):	0:1:1	CIE Marks:	50
Total Number of Teaching Hours:	24	SEE Marks:	50
Course objectives: 1) To turn ideas into working prototypes showcasing their technical proficiency. 2) Students will learn how to design and prototype their ideas. 3) Through a series of lectures and exercises students will learn and practice different prototyping techniques.			
Unit - 1 <u>Introduction to Prototyping</u>			6 Hrs
Introducing to innovation and Design Thinking, User Interface and User Experience using paper prototyping and Figma			
Unit - 2 <u>CAD modelling and Hand tools</u>			6 Hrs
2D CAD Modeling using onshape and 3D CAD Modeling, Introduction to Laser Cutting, 3D printing and Hand tools			
Unit - 3 <u>Prototyping using Electronic Tools</u>			6 Hrs
Introduction to basic electronics components, Arduino programming, sensors and their applications			
Unit - 4 <u>BOT CODING, building and Testing</u>			6 Hrs
Designing of bots for specific applications, building and testing the performance of Bots			
Students will be challenged to build bots for a specific application of choice and will be given access to competitions in state and national levels to exhibit their applications and prototypes			

Integral Calculus, Partial Differential Equations and Numerical methods [As per Choice Based Credit System (CBCS) & OBE Scheme] SEMESTER – II			
Course Code:	P24MACE201	CIE Marks:	50
Course Type (Theory/Practical/Integrated)	Theory	SEE Marks:	50
		Total Marks:	100
Teaching Hours/Week (L:T:P):	2:2:2:0	Exam Hours:	03
Total Hours of Pedagogy	40 hours Theory + 10 to 12 Lab slots	Credits:	04
Course Learning Objectives:			
1	Familiarize the fundamentals of Integral calculus, Vector calculus, Numerical Techniques		
2	Analyze Engineering problems by applying Partial Differential Equations Methods		
3	Develop the knowledge of solving engineering problems by using numerical Technique.		
Unit	Syllabus content	No. of hours	
		Theory	Tutorial
I	Integral Calculus: Multiple Integrals: Evaluation of double and triple integrals, evaluation of double integrals by change of order of integration, changing into polar coordinates. Applications to find: Area and Volume by double integral. Problems. Beta and Gamma functions: Definitions, properties, relation between Beta and Gamma functions. Problems. Self-Study: Volume by triple integration, Center of gravity	06	02
II	Vector Calculus: Vector Differentiation: Scalar and vector fields. Gradient, directional derivative, curl and divergence - physical interpretation, solenoidal and irrotational vector fields. Problems. Vector Integration: Line integrals, Surface integrals. Applications to work done by a force and flux. Statement of Green's theorem and Stoke's theorem. Problems. Self-Study: Volume integral and Gauss divergence theorem.	06	02
III	Partial Differential Equations (PDE's): Formation of PDE's by elimination of arbitrary constants and functions. Solution of non-homogeneous PDE by direct integration. Homogeneous PDEs involving derivative with respect to one independent variable only. Method of separation of variables. Solution of one-dimensional heat equation and wave equation by the method of separation of variables. Self-Study: Derivation of one-dimensional heat equation and wave equation.	06	02
IV	Numerical methods-1: Finite differences: Interpolation using Newton's forward and backward difference formulae, Newton's divided difference formula (All formulae without proof). Problems. Numerical differentiation: Numerical differentiation using Newton's forward and backward interpolation formulae, (All formulae without proof)-problems only and Applications to Maxima and Minima Numerical integration: Trapezoidal rule, Simpson's $(\frac{1}{3})^{\text{rd}}$ rule, Simpson's	06	02

	($\frac{3}{8}$) th rule, and Weddle's rule (All rules without proof)- Illustrative problems Self-Study: Sterling's formula, Lagrange's interpolation and Lagrange's inverse Interpolation formula. Boole's rule		
V	Numerical methods -2: Solution of algebraic and transcendental equations: Regula-Falsi and Newton-Raphson methods (only formulae). Problems. Numerical Solution of Ordinary Differential Equations (ODE's): Numerical solution of ordinary differential equations of first order and first degree - Taylor's series method, Modified Euler's method, Runge-Kutta method of fourth order and Milne's predictor-corrector formula (No derivations of formulae). Problems. Self-Study: Bisection method. Euler's method Adam-Bashforth method	06	02

COURSE OUTCOMES: On completion of the course, student should be able to:

- CO1: Knowledge** to Evaluate double and triple integration and identify the scalar, vector notation of functions of two and three dimensions, recognize the partial differential equations and Numerical differences.
- CO2: Understand** to explain Area, Volume by double integration, change to polar coordinates describe divergence and flux in vector field; classify method of solutions of PDE's, Numerical differentiation and integrations.
- CO3: Apply** the Mathematical properties to evaluate triple integral and improper integral to interpret the irrotational and solenoidal vector field, find the solutions to problem arises in engineering field.
- CO4: Analyze** multiple integrals, vector differentiations and integration, the Mathematical model by partial differential equations, Numerical solution to algebraic and transcendental, ordinary differential equations and familiarize with modern mathematical tools namely SCILAB/PYTHON/MATLAB

TEACHING - LEARNING PROCESS: Chalk and Talk, power point presentation, animations, videos.

TEXT BOOKS

1. B.S. Grewal, Higher Engineering Mathematics (44th Edition 2018), Khanna Publishers, New Delhi.
2. E. Kreyszig, Advanced Engineering Mathematics, John Wiley and sons, 10th Ed. (Reprint) 2016.

REFERENCE BOOKS

1. V. Ramana: Higher Engineering Mathematics, McGraw –Hill Education, 11th Ed.
2. H. C. Taneja, Advanced Engineering Mathematics, Volume I & II, I.K. International Publishing House Pvt. Ltd., New Delhi.
3. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2010.

ONLINE RESOURCES

1. <http://www.nptel.ac.in>
2. <https://en.wikipedia.org>
3. <https://ocw.mit.edu/courses/18-303-linear-partial-differential-equations-fall-2006/>
4. <https://ocw.mit.edu/courses/18-152-introduction-to-partial-differential-equations-fall-2011/>
5. <http://mcatutorials.com/mca-tutorials-numerical-methods-tutorial.php>

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2										
CO2	2	3										
CO3	3	2										
CO4	2	3										
Strength of correlation: Low-1, Medium- 2, High-3												

Integral Calculus, Partial Differential Equations and Numerical methods [As per Choice Based Credit System (CBCS) & OBE Scheme] SEMESTER – II			
Course Code:	P24MACS201	CIE Marks:	50
Course Type (Theory/Practical/Integrated)	Integrated	SEE Marks:	50
		Total Marks:	100
Teaching Hours/Week (L:T:P):	2:2:2:0	Exam Hours:	03
Total Hours of Pedagogy	40 hours Theory + 10 to 12 Lab slots	Credits:	04
Course Learning Objectives:			
1	Familiarize the fundamentals of Integral calculus and Vector calculus		
2	Analyze Engineering problems by applying Partial Differential Equations		
3	Develop the knowledge of solving engineering problems by using numerical Technique.		
Unit	Syllabus content	No. of hours	
		Theory	Tutorial
I	Integral Calculus: Multiple Integrals: Evaluation of double and triple integrals, evaluation of double integrals by change of order of integration, changing into polar coordinates. Applications to find: Area and Volume by double integral. Problems. Beta and Gamma functions: Definitions, properties, relation between Beta and Gamma functions. Problems. Self-Study: Volume by triple integration, Center of gravity	06	02
II	Vector Calculus: Vector Differentiation: Scalar and vector fields. Gradient, directional derivative, curl and divergence - physical interpretation, solenoidal and irrotational vector fields. Problems. Vector Integration: Line integrals, Surface integrals. Applications to work done by a force and flux. Statement of Green's theorem and Stoke's theorem. Problems. Self-Study: Volume integral and Gauss divergence theorem.	06	02
III	Partial Differential Equations (PDE's): Formation of PDE's by elimination of arbitrary constants and functions. Solution of non-homogeneous PDE by direct integration. Homogeneous PDEs involving derivative with respect to one independent variable only. Method of separation of variables. Solution of one-dimensional heat equation and wave equation by the method of separation of variables. Self-Study: Derivation of one-dimensional heat equation and wave equation.	06	02
IV	Numerical methods-1: Finite differences: Interpolation using Newton's forward and backward difference formulae, Newton's divided difference formula (All formulae without proof). Problems. Numerical differentiation: Numerical differentiation using Newton's forward and backward interpolation formulae, (All formulae without proof)-problems only and Applications to Maxima and Minima	06	02

	Numerical integration: Trapezoidal rule, Simpson's $(\frac{1}{3})^{\text{rd}}$ rule, Simpson's $(\frac{3}{8})^{\text{th}}$ rule, and Weddle's rule (All rules without proof)- Illustrative problems Self-Study: Sterling's formula, Lagrange's interpolation and Lagrange's inverse Interpolation formula. Boole's rule		
V	Numerical methods -2: Solution of algebraic and transcendental equations: Regula-Falsi and Newton-Raphson methods (only formulae). Problems. Numerical Solution of Ordinary Differential Equations (ODE's): Numerical solution of ordinary differential equations of first order and first degree - Taylor's series method, Modified Euler's method, Runge-Kutta method of fourth order and Milne's predictor-corrector formula (No derivations of formulae). Problems. Self-Study: Bisection method. Euler's method Adam-Bashforth method	06	02

COURSE OUTCOMES: On completion of the course, student should be able to:

- CO1: Knowledge** to Evaluate double and triple integration and identify the scalar, vector notation of functions of two and three dimensions ,recognize the partial differential equations and Numerical differences.
- CO2: Understand** to explain Area, Volume by double integration, change to polar coordinates describe divergence and flux in vector field; classify method of solutions of PDE's, Numerical differentiation and integrations.
- CO3: Apply** the Mathematical properties to evaluate triple integral and improper integral to interpret the irrotational and solenoidal vector field, find the solutions to problem arises in engineering field.
- CO4: Analyze** multiple integrals ,vector differentiations and integration, the Mathematical model by partial differential equations, Numerical solution to algebraic and transcendental, ordinary differential equations and familiarize with modern mathematical tools namely SCILAB/PYTHON/MATLAB

TEACHING - LEARNING PROCESS: Chalk and Talk, power point presentation, animations, videos.

TEXT BOOKS

1. B.S. Grewal, Higher Engineering Mathematics (44th Edition 2018), Khanna Publishers, New Delhi.
2. E. Kreyszig, Advanced Engineering Mathematics, John Wiley and sons, 10th Ed. (Reprint) 2016.

REFERENCE BOOKS

1. V. Ramana: Higher Engineering Mathematics, McGraw –Hill Education, 11th Ed..
2. H. C. Taneja, Advanced Engineering Mathematics, Volume I & II, I.K. International Publishing House Pvt. Ltd., New Delhi.
3. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2010.

ONLINE RESOURCES

1. <http://www.nptel.ac.in>
2. <https://en.wikipedia.org>
3. <https://ocw.mit.edu/courses/18-303-linear-partial-differential-equations-fall-2006/>
4. <https://ocw.mit.edu/courses/18-152-introduction-to-partial-differential-equations-fall-2011/>
5. <http://mcatutorials.com/mca-tutorials-numerical-methods-tutorial.php>

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2										
CO2	2	3										
CO3	3	2										
CO4	2	3										
Strength of correlation: Low-1, Medium- 2, High-3												

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

1. **Srimanta Pal & Subodh C. Bhunia:** “Engineering Mathematics” Oxford University Press, 3rd Ed., 2016.
2. **C. Ray Wylie, Louis C. Barrett:** “Advanced Engineering Mathematics” McGraw – Hill Book Co., Newyork, 6th Ed., 2017.
3. **Gupta C.B, Sing S. R., and Mukesh Kumar:** “Engineering Mathematic for Semester I and II”, McGraw Hill Education(India) Pvt. Ltd 2015.
4. **H. K. Dass and Er. Rajnish Verma:** “Higher Engineering Mathematics” S. Chand Publication, 3rd Ed., 2014.
5. **James Stewart:** “Calculus” Cengage Publications, 7th Ed., 2019.
6. **David C Lay:** “Linear Algebra and its Applications”, Pearson Publishers, 4th Ed., 2018.
7. **Gareth Williams:** “Linear Algebra with applications”, Jones Bartlett Publishers Inc., 6thEd., 2017.

Integral Calculus, Partial Differential Equations and Numerical methods [As per Choice Based Credit System (CBCS) & OBE Scheme] SEMESTER – II			
Course Code:	P24MAEE201	CIE Marks:	50
Course Type (Theory/Practical/Integrated)	Theory	SEE Marks:	50
		Total Marks:	100
Teaching Hours/Week (L:T:P):	2:2:2:0	Exam Hours:	03
Total Hours of Pedagogy	40 hours Theory + 10 to 12 Lab slots	Credits:	04
Course Learning Objectives:			
1	Familiarize the fundamentals of Integral calculus and Vector calculus		
2	Analyze Engineering problems by applying Partial Differential Equations		
3	Develop the knowledge of solving engineering problems by using numerical Technique.		
Unit	Syllabus content	No. of hours	
		Theory	Tutorial
I	Integral Calculus: Multiple Integrals: Evaluation of double and triple integrals, evaluation of double integrals by change of order of integration, changing into polar coordinates. Applications to find: Area and Volume by double integral. Problems. Beta and Gamma functions: Definitions, properties, relation between Beta and Gamma functions. Problems. Self-Study: Volume by triple integration, Center of gravity	06	02
II	Vector Calculus: Vector Differentiation: Scalar and vector fields. Gradient, directional derivative, curl and divergence - physical interpretation, solenoidal and irrotational vector fields. Problems. Vector Integration: Line integrals, Surface integrals. Applications to work done by a force and flux. Statement of Green's theorem and Stoke's theorem. Problems. Self-Study: Volume integral and Gauss divergence theorem.	06	02
III	Partial Differential Equations (PDE's): Formation of PDE's by elimination of arbitrary constants and functions. Solution of non-homogeneous PDE by direct integration. Homogeneous PDEs involving derivative with respect to one independent variable only. Method of separation of variables. Solution of one-dimensional heat equation and wave equation by the method of separation of variables. Self-Study: Derivation of one-dimensional heat equation and wave equation.	06	02
IV	Numerical methods-1: Finite differences: Interpolation using Newton's forward and backward difference formulae, Newton's divided difference formula (All formulae without proof). Problems. Numerical differentiation: Numerical differentiation using Newton's forward and backward interpolation formulae, (All formulae without proof)- problems only and Applications to Maxima and Minima	06	02

	Numerical integration: Trapezoidal rule, Simpson's ($\frac{1}{3}$) rd rule, Simpson's ($\frac{3}{8}$) th rule, and Weddle's rule (All rules without proof)- Illustrative problems Self-Study: Sterling's formula, Lagrange's interpolation and Lagrange's inverse Interpolation formula. Boole's rule		
V	Numerical methods -2: Solution of algebraic and transcendental equations: Regula-Falsi and Newton-Raphson methods (only formulae). Problems. Numerical Solution of Ordinary Differential Equations (ODE's): Numerical solution of ordinary differential equations of first order and first degree - Taylor's series method, Modified Euler's method, Runge-Kutta method of fourth order and Milne's predictor-corrector formula (No derivations of formulae). Problems. Self-Study: Bisection method. Euler's method Adam-Bashforth method	06	02

COURSE OUTCOMES: On completion of the course, student should be able to:

- CO1: Knowledge** to Evaluate double and triple integration and identify the scalar, vector notation of functions of two and three dimensions ,recognize the partial differential equations and Numerical differences.
- CO2: Understand** to explain Area, Volume by double integration, change to polar coordinates describe divergence and flux in vector field; classify method of solutions of PDE's, Numerical differentiation and integrations.
- CO3: Apply** the Mathematical properties to evaluate triple integral and improper integral to interpret the irrotational and solenoidal vector field, find the solutions to problem arises in engineering field.
- CO4: Analyze** multiple integrals ,vector differentiations and integration, the Mathematical model by partial differential equations, Numerical solution to algebraic and transcendental, ordinary differential equations and familiarize with modern mathematical tools namely SCILAB/PYTHON/MATLAB

TEACHING - LEARNING PROCESS: Chalk and Talk, power point presentation, animations, videos.

TEXT BOOKS

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2. H. C. Taneja, Advanced Engineering Mathematics, Volume I & II, I.K. International Publishing House Pvt. Ltd., New Delhi.
3. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2010.

ONLINE RESOURCES

1. <http://www.nptel.ac.in>
2. <https://en.wikipedia.org>
3. <https://ocw.mit.edu/courses/18-303-linear-partial-differential-equations-fall-2006/>
4. <https://ocw.mit.edu/courses/18-152-introduction-to-partial-differential-equations-fall-2011/>
5. <http://mcatutorials.com/mca-tutorials-numerical-methods-tutorial.php>

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2										
CO2	2	3										
CO3	3	2										
CO4	2	3										
Strength of correlation: Low-1, Medium- 2, High-3												

Integral Calculus, Partial Differential Equations and Numerical methods [As per Choice Based Credit System (CBCS) & OBE Scheme] SEMESTER – II			
Course Code:	P24MAME201	CIE Marks:	50
Course Type (Theory/Practical/Integrated)	Theory	SEE Marks:	50
		Total Marks:	100
Teaching Hours/Week (L:T:P):	2:2:2:0	Exam Hours:	03
Total Hours of Pedagogy	40 hours Theory + 10 to 12 Lab slots	Credits:	04
Course Learning Objectives:			
1	Familiarize the fundamentals of Integral calculus and Vector calculus		
2	Analyze Engineering problems by applying Partial Differential Equations		
3	Develop the knowledge of solving engineering problems by using numerical Technique.		
Unit	Syllabus content	No. of hours	
		Theory	Tutorial
I	Integral Calculus: Multiple Integrals: Evaluation of double and triple integrals, evaluation of double integrals by change of order of integration, changing into polar coordinates. Applications to find: Area and Volume by double integral. Problems. Beta and Gamma functions: Definitions, properties, relation between Beta and Gamma functions. Problems. Self-Study: Volume by triple integration, Center of gravity	06	02
II	Vector Calculus: Vector Differentiation: Scalar and vector fields. Gradient, directional derivative, curl and divergence - physical interpretation, solenoidal and irrotational vector fields. Problems. Vector Integration: Line integrals, Surface integrals. Applications to work done by a force and flux. Statement of Green's theorem and Stoke's theorem. Problems. Self-Study: Volume integral and Gauss divergence theorem.	06	02
III	Partial Differential Equations (PDE's): Formation of PDE's by elimination of arbitrary constants and functions. Solution of non-homogeneous PDE by direct integration. Homogeneous PDEs involving derivative with respect to one independent variable only. Method of separation of variables. Solution of one-dimensional heat equation and wave equation by the method of separation of variables. Self-Study: Derivation of one-dimensional heat equation and wave equation.	06	02
IV	Numerical methods-1: Finite differences: Interpolation using Newton's forward and backward difference formulae, Newton's divided difference formula (All formulae without proof). Problems. Numerical differentiation: Numerical differentiation using Newton's forward and backward interpolation formulae, (All formulae without proof)- problems only and Applications to Maxima and Minima Numerical integration: Trapezoidal rule, Simpson's $(\frac{1}{3})^{th}$ rule, Simpson's	06	02

	($\frac{3}{8}$) th rule, and Weddle's rule (All rules without proof)- Illustrative problems Self-Study: Sterling's formula, Lagrange's interpolation and Lagrange's inverse Interpolation formula. Boole's rule		
V	Numerical methods -2: Solution of algebraic and transcendental equations: Regula-Falsi and Newton-Raphson methods (only formulae). Problems. Numerical Solution of Ordinary Differential Equations (ODE's): Numerical solution of ordinary differential equations of first order and first degree - Taylor's series method, Modified Euler's method, Runge-Kutta method of fourth order and Milne's predictor-corrector formula (No derivations of formulae). Problems. Self-Study: Bisection method. Euler's method Adam-Bashforth method	06	02

COURSE OUTCOMES: On completion of the course, student should be able to:

- CO1: Knowledge** to Evaluate double and triple integration and identify the scalar, vector notation of functions of two and three dimensions ,recognize the partial differential equations and Numerical differences.
- CO2: Understand** to explain Area, Volume by double integration, change to polar coordinates describe divergence and flux in vector field; classify method of solutions of PDE's, Numerical differentiation and integrations.
- CO3: Apply** the Mathematical properties to evaluate triple integral and improper integral to interpret the irrotational and solenoidal vector field, find the solutions to problem arises in engineering field.
- CO4: Analyze** multiple integrals ,vector differentiations and integration, the Mathematical model by partial differential equations, Numerical solution to algebraic and transcendental, ordinary differential equations and familiarize with modern mathematical tools namely SCILAB/PYTHON/MATLAB

TEACHING - LEARNING PROCESS: Chalk and Talk, power point presentation, animations, videos.

TEXT BOOKS

1. B.S. Grewal, Higher Engineering Mathematics (44th Edition 2018), Khanna Publishers, New Delhi.
2. E. Kreyszig, Advanced Engineering Mathematics, John Wiley and sons, 10th Ed. (Reprint) 2016.

REFERENCE BOOKS

1. V. Ramana: Higher Engineering Mathematics, McGraw –Hill Education, 11th Ed..
2. H. C. Taneja, Advanced Engineering Mathematics, Volume I & II, I.K. International Publishing House Pvt. Ltd., New Delhi.
3. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2010.

ONLINE RESOURCES

1. <http://www.nptel.ac.in>
2. <https://en.wikipedia.org>
3. <https://ocw.mit.edu/courses/18-303-linear-partial-differential-equations-fall-2006/>
4. <https://ocw.mit.edu/courses/18-152-introduction-to-partial-differential-equations-fall-2011/>
5. <http://mcatutorials.com/mca-tutorials-numerical-methods-tutorial.php>

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2										
CO2	2	3										
CO3	3	2										
CO4	2	3										
Strength of correlation: Low-1, Medium- 2, High-3												

Course Title:	Communicative English - II		
Course Code:	P24ENG206	CIE Marks	50
Course Type (Theory/Practical /Integrated)	Theory	SEE Marks	50
		Total Marks	100
Teaching Hours/Week (L:T:P:S)	0:2:0:0	Exam Hours	01 Theory
Total Hours of Pedagogy	30 hours	Credits	01
Module-1			
Listening Skills II			2 Hours
Levels of listening, Active listening, Techniques of listening. Activity: Listening for main ideas and Listening for specific information			
Speaking Skills II			6 Hours
Language of discussion – Giving opinion, agreeing / disagreeing, asking questions, making suggestions. Sentence stress – content and structure words, Speaking situations, Intonations and Summarizing skills			
Module-2			
Reading Skills II			2 Hours
Guessing meaning from the context, Understanding graphical information, Summarizing. Activity: Book review			
Writing Skills II			4 Hours
Linkers and connectives, Sentence and paragraph transformation, Mind mapping techniques, Letter writing, Essay writing			
Module-3			
Email Etiquette			4 Hours
Parts of an email, Writing an effective subject line, email language and tone. Activity: Email writing practice - Scenario based emails			
Group Presentations			2 Hours
Group presentations by the students			
Module-4			
Goal Setting			2 Hours
Defining goals, types of goals, Establishing SMART goals, Steps in setting goals, Goal setting activity			
Individual Presentations			4 Hours
Individual presentation by the students			
Module-5			
Teamwork			4 Hours
Defining teams, Team vs. Group, Benefits and challenges of working in teams, Stages of team building, Building effective teams, Case studies on teamwork			
Course Outcomes: On completion of this course, students will be able to,			
CO 1: Understand the role of communication in personal and professional success			
CO 2: Comprehend the types of technical literature to develop the competency of students to apprehend the nature of formal communication requirements.			
CO 3: Construct grammatically correct sentences to strengthen essential skills in speaking & writing and to develop critical thinking by emphasizing cohesion and coherence			
CO 4: Demonstrate effective individual and teamwork to accomplish communication goals.			
Textbooks and Reference Books:			

6. Communication Skills by Sanjay Kumar and Pushpa Lata, Oxford University Press - 2015.
7. Everyday Dialogues in English by Robert J. Dixson, Prentice-Hall of India Ltd., 2006.
8. Developing Communication Skills by Krishna Mohan & Meera Banerjee (Macmillan)
9. The Oxford Guide to Writing and Speaking, John Seely, Oxford.
10. English Language Communication Skills - Lab Manual cum Workbook by Rajesh Kumar Singh, Cengage learning India Pvt Limited – 2018
11. The 7 habits of highly effective people by Stephen R Covey, Simon & Schuster – 2020
12. You Are the Team: 6 Simple Ways Teammates Can Go from Good to Great by Michael G. Rogers

CO – PO – PSO Matrix

CO	PO												PSO		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1												2			
CO2										2					
CO3										2					
CO4									2						
CO									2	2		2			

Social Innovation [As per Choice Based Credit System (CBCS) & OBE Scheme] SEMESTER - II			
Course Code:	P24SI207	Credits:	01
Teaching Hours/Week (L:T:P):	1:0:1	CIE Marks:	50
Total Number of Teaching Hours:	24	SEE Marks:	50
Course objectives: 1) To turn ideas into working prototypes showcasing their technical proficiency. 2) Students will learn how to design and prototype their ideas. 3) Through a series of lectures and exercises students will learn and practice different prototyping techniques.			
Unit - 1: Foundations of Social Innovation • Session 1: Introduction to Sustainable Development Goals (SDGs) – 2 Hrs <i>Overview of SDGs and an introduction to how design thinking can address global challenges.</i> • Session 2: Fundamentals of Research for Social Impact – 2 Hrs <i>Covers research types, methodologies, and strategies for effective social innovation research.</i> • Session 3: Stakeholder Mapping and Analysis – 2 Hrs <i>Understanding stakeholders, mapping them, and identifying their roles in social innovation.</i>			6 Hrs
Unit - 2: Field Engagement and Problem Framing • Session 4: Interview Techniques and Data Collection – 2 Hrs <i>Developing skills in interview preparation, questioning, and field observation.</i> • Session 5: Field Visit and Practical Application – 4 Hrs <i>Real-world engagement with stakeholders to apply theoretical knowledge in a practical setting.</i> • Session 6: Continuous Internal Evaluation I - Problem Validation – 2 Hrs <i>Teams submit research mind maps, validate case study problems, and discuss project ideas.</i>			6 Hrs
Unit - 3: Problem Solving and Idea Development • Session 7: Analyzing and Defining the Problem – 2 Hrs <i>Using problem analysis tools to identify root causes and structure problem definitions.</i> • Session 8: Creative Ideation and Concept Generation – 2 Hrs <i>Techniques for generating innovative ideas and making strategic decisions.</i> • Session 9: Business and Value Proposition Canvases – 2 Hrs <i>Introduction to business modeling, focusing on customer needs, pain points, and value creation.</i>			6 Hrs
Unit - 4: Prototype Development and Presentation • Session 10: Idea Pitching – 2 Hrs <i>Students pitch problem definitions and solutions, refining ideas for further development.</i> • Session 11: Prototype Design and Concept Refinement – 2 Hrs <i>Concept development, materials selection, and building early-stage prototypes.</i> • Session 12: Advanced Prototyping Techniques – 2 Hrs <i>Hands-on prototype development, exploring tools and techniques for refinement.</i>			6 Hrs
Students will design prototypes addressing real-world societal needs, create a compelling pitch deck for stakeholders, and present their innovative solutions for social impact			

Course Title:	Innovation and Design Thinking		
Course Code:	P24IDT108/208	CIE Marks	50
Teaching Hours/Week (L:T:P:S)	0:2:0:0	SEE Marks	50
Total Hours of Pedagogy	25 hours	Total Marks	100
Credits	01	Exam Hours 02	02
Course Category: Foundation Preamble: This course provides an introduction to the basic concepts and techniques of engineering and reverses engineering, the process of design, analytical thinking and ideas, basics and development of engineering drawing, application of engineering drawing with computer aide. Course objectives: - To explain the concept of design thinking for product and service development - To explain the fundamental concept of design thinking - To discuss the methods of implementing design thinking in the real world.			
Module-1			
Understanding Design Thinking Definition of design - Design Vs Engineering Design– Difference between Design and Engineering Design– The General Design process Model – Design to Design thinking - Time line of Design thinking.			
Module-2			
Features of Design Thinking Venn diagram of design thinking– Design thinking resources – Design thinking process Models – Design thinking methodologies			
Module-3			
Models to Do Design Thinking Different kinds of thinking – 5 Stage d.School Process - 5 stages of Stanford – Empathize – Define- Ideate – Prototype – Test – Iterate - Applications of Design Thinking			
Module-4			
Design thinking for Engineering - Concept models for comparing design thinking and engineering systems thinking - The Distinctive Concept Model - The Comparative Concept Model - The Inclusive Concept Model - The Integrative Concept Model.			
Module-5			
Design Thinking Tools and Methods - Purposeful Use of Tools and Alignment with Process - What Is: Visualization - What Is: Journey Mapping - What Is: Value Chain Analysis - What Is: Mind Mapping - What If: Brainstorming - What If: Concept Development - What Wows: Assumption Testing - What Wows: Rapid Prototyping - What Works: Customer Co-Creation - What Works: Learning Launch.			

Course Outcomes:

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

CO Nos.	Course Outcomes	Knowledge Level (Based on revised Bloom's Taxonomy)
CO1	Understanding Design Thinking process	L2
CO2	Appreciate various design process procedure	L2
CO3	Generate and develop design ideas through different Technique.	L2
CO4	Identify the significance of reverse Engineering to Understand products	L3
CO5	Practice the methods, processes, and tools of Design Thinking	L2

Suggested Learning Resources:**Text Books :**

1. John.R.Karsnitz, Stephen O'Brien and John P. Hutchinson, "Engineering Design", Cengage Learning (International edition) Second Edition, 2013.
2. Roger Martin, "The Design of Business: Why Design Thinking is the Next Competitive Advantage", Harvard Business Press, 2009.

References:

1. Jake Knapp, John Karsky and Braden Kowitz "Sprint how to solve big problems and test new ideas in just five days"
2. Tim Brown "Change by design"
3. Steve Krug "Don't make me think; Revisited"
4. Roger Martin "The design of Business"
5. Yousef Haik and Tamer M. Shahin, "Engineering Design Process", Cengage Learning, Second Edition, 2011.
6. Idris Mootee, "Design Thinking for Strategic Innovation: What They Can't Teach You at Business or Design School", John Wiley & Sons 2013.
7. Hasso Plattner, Christoph Meinel and Larry Leifer (eds), "Design Thinking: Understand – Improve – Apply", Springer, 2011

Scientific Foundations for Health

Course Title:	Scientific Foundations for Health		
Course Code:	P24SFH108/208	CIE Marks	50
Course Type (Theory/Practical /Integrated)	Theory	SEE Marks	50
		Total Marks	100
Teaching Hours/Week (L:T:P:S)	0:2:0:0	Exam Hours	01 Theory
Total Hours of Pedagogy	15 hours	Credits	01
Course objectives The course Scientific Foundations of Health (P24SFH108/208) will enable the students, 1. To know about Health and wellness (and its Beliefs) & It’s balance for positive mindset. 2. To build the healthy lifestyles for good health for their better future. 3. To Create a Healthy and caring relationships to meet the requirements of good/social/positive life. 4. To learn about Avoiding risks and harmful habits in their campus and outside the campus for their bright future 5. To Prevent and fight against harmful diseases for good health through positive mindset			
Teaching-Learning Process These are sample Strategies, which teacher can use to accelerate the attainment of the various course outcomes and make Teaching –Learning more effective: Teachers shall adopt suitable pedagogy for effective teaching - learning process. The pedagogy shall involve the combination of different methodologies which suit modern technological tools. (i) Direct instructional method (Low/Old Technology), (ii) Flipped classrooms (High/advanced Technological tools), (iii) Blended learning (Combination of both), (iv) Enquiry and evaluation based learning, (v) Personalized learning, (vi) Problems based learning through discussion, (vii) Following the method of expeditionary learning Tools and techniques, (viii) Use of audio visual methods. Apart from conventional lecture methods, various types of innovative teaching techniques through videos, animation films may be adapted so that the delivered lesson can progress the students In theoretical applied and practical skills.			
Module-1		(03 hours of pedagogy)	
Good Health & It’s balance for positive mindset: Health -Importance of Health, Influencing factors of Health, Health beliefs, Advantages of good health, Health & Behavior, Health & Society, Health & family, Health & Personality, Psychological disorders-Methods to improve good psychological health, Changing health habits for good health.			
Module-2		(03 hours of pedagogy)	
Building of healthy lifestyles for better future: Developing healthy diet for good health, Food & health, Nutritional guidelines for good health, Obesity & overweight disorders and its management, Eating disorders, Fitness components for health, Wellness and physical function, How to avoid exercise injuries.			
Module-3		(03 hours of pedagogy)	
Creation of Healthy and caring relationships: Building communication skills, Friends and friendship - Education, the value of relationship and communication skills, Relationships for Better or worsening of life, understanding of basic instincts of life (more than a biology), Changing health behaviours through social engineering.			
Module-4		(03 hours of pedagogy)	
Avoiding risks and harmful habits: Characteristics of health compromising 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.

Module-5

(03 hours of pedagogy)

Preventing & fighting against diseases for good health: How to protect from different types of infections, How to reduce risks for good health, Reducing risks & coping with chronic conditions, Management of chronic illness for Quality of life, Health & Wellness of youth :a challenge for upcoming future, Measuring of health & wealth status.

Course outcome (Course Skill Set):

At the end of the course Scientific Foundations of Health (P24SFH108/208) the student will be able to:

CO1 To understand and analyse about Health and wellness (and its Beliefs) & It's balance for positive Mindset.

CO2 Develop the healthy lifestyles for good health for their better future.

CO3 Build a Healthy and caring relationships to meet the requirements of good/social/positive life.

CO4 To learn about Avoiding risks and harmful habits in their campus and outside the campus for Their bright future.

CO5 Prevent and fight against harmful diseases for good health through positive mindset.

Suggested Learning Resources:

Textbook:

1. **"Scientific Foundations of Health"** – Study Material Prepared by Dr. L Thimmesh, Published in VTU University Website.
2. **"Scientific Foundations of Health"**, (ISBN-978-81-955465-6-5) published by Infinite Learning Solutions, Bangalore – 2022.
3. **Health Psychology** - A Textbook, FOURTH EDITION by Jane Ogden McGraw Hill Education (India) Private Limited - Open University Press.

Reference Books:

1. Health Psychology (Second edition) by Charles Abraham, Mark Conner, Fiona Jones and Daryl O'Connor – Published by Rutledge 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 Outcome	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2
1. To understand and analyse about Health and wellness (and its Beliefs) & It's balance for positive mindset.	3											1		
2. Develop the healthy lifestyles for good health for their better future.	3											1		
3. Build a Healthy and caring relationships to meet the requirements of good/social/positive life.	3					1				2		1		
4. To learn about Avoiding risks and harmful habits in their campus and outside the campus for their bright future.	3											1		
5. Prevent and fight against harmful diseases for good health through positive mindset.	3											1		

ಸಾಂಸ್ಕೃತಿಕ ಕನ್ನಡ – ಕನ್ನಡ ಬಲ್ಲ ಮತ್ತು ಕನ್ನಡ ಮಾತೃಭಾಷೆಯ ವಿದ್ಯಾರ್ಥಿಗಳಿಗೆ ನಿಗದಿಪಡಿಸಿದ ಪಠ್ಯಕ್ರಮ

Course Title:	ಸಾಂಸ್ಕೃತಿಕ ಕನ್ನಡ		
Course Code:	P24KSK109/209	CIE Marks	50
Course Type (Theory/Practical /Integrated)	Theory	SEE Marks	50
		Total Marks	100
Teaching Hours/Week (L:T:P:S)	0:2:0:0	Exam Hours	01 Theory
Total Hours of Pedagogy	15 hours	Credits	00
Course Objectives : ಸಾಂಸ್ಕೃತಿಕ ಕನ್ನಡ ಪಠ್ಯದ ಕಲಿಕೆಯ ಉದ್ದೇಶಗಳು: The course (P24KSK107/207) will enable the students, ೧. ಪದವಿ ವಿದ್ಯಾರ್ಥಿಗಳಾಗಿರುವುದರಿಂದ ಕನ್ನಡ ಭಾಷೆ, ಸಾಹಿತ್ಯ ಮತ್ತು ಕನ್ನಡದ ಸಾಂಸ್ಕೃತಿಯ ಪರಿಚಯ ಮಾಡಿಕೊಡುವುದು. ೨. ಕನ್ನಡ ಸಾಹಿತ್ಯದ ಪ್ರಧಾನ ಭಾಗವಾದ ಆಧುನಿಕ ಪೂರ್ವ ಮತ್ತು ಆಧುನಿಕ ಕಾವ್ಯಗಳನ್ನು ಸಾಂಕೇತಿಕವಾಗಿ ಪರಿಚಯಿಸುವುದು. ೩. ವಿದ್ಯಾರ್ಥಿಗಳಲ್ಲಿ ಸಾಹಿತ್ಯ ಮತ್ತು ಸಾಂಸ್ಕೃತಿಯ ಬಗ್ಗೆ ಅರಿವು ಹಾಗೂ ಆಸಕ್ತಿಯನ್ನು ಮೂಡಿಸುವುದು. ೪. ತಾಂತ್ರಿಕ ವ್ಯಕ್ತಿಗಳ ಪರಿಚಯವನ್ನು ಹಾಗೂ ಅವರುಗಳ ಸಾಧಿಸಿದ ವಿಷಯಗಳನ್ನು ಪರಿಚಯಿಸುವುದು. ೫. ಸಾಂಸ್ಕೃತಿಕ, ಜನಪದ ಹಾಗೂ ಪ್ರವಾಸ ಕಥನಗಳ ಪರಿಚಯ ಮಾಡಿಕೊಡುವುದು.			
ಬೋಧನೆ ಮತ್ತು ಕಲಿಕಾ ವ್ಯವಸ್ಥೆ (Teaching-Learning Process – General Instructions): These are sample Strategies, which teacher can use to accelerate the attainment of the course outcomes. ೧. ಸಾಂಸ್ಕೃತಿಕ ಕನ್ನಡವನ್ನು ಬೋಧಿಸಲು ತರಗತಿಯಲ್ಲಿ ಶಿಕ್ಷಕರು ಪ್ರಸ್ತುತ ಪುಸ್ತಕ ಆಧಾರಿಸಿ ಬ್ಲಾಕ್ ಬೋರ್ಡ್ ವಿಧಾನವನ್ನು ಅನುಸರಿಸುವುದು. ಪ್ರಮುಖ ಅಂಶಗಳ ಚಾರ್ಟ್‌ಗಳನ್ನು ತಯಾರಿಸಲು ವಿದ್ಯಾರ್ಥಿಗಳನ್ನು ಪ್ರೇರೇಪಿಸುವುದು ಮತ್ತು ತರಗತಿಯಲ್ಲಿ ಅವುಗಳನ್ನು ಚರ್ಚಿಸಲು ಅವಕಾಶ ಮಾಡಿಕೊಡುವುದು. ೨. ಇತ್ತೀಚಿನ ತಂತ್ರಜ್ಞಾನದ ಅನುಕೂಲಗಳನ್ನು ಬಳಸಿಕೊಳ್ಳುವುದು – ಅಂದರೆ ಕವಿ-ಕಾವ್ಯ ಪರಿಚಯದಲ್ಲಿ ಕವಿಗಳ ಚಿತ್ರಣ ಮತ್ತು ಲೇಖನಗಳು ಮತ್ತು ಕಥೆ ಕಾವ್ಯಗಳ ಮೂಲ ಅಂಶಗಳಿಗೆ ಸಂಬಂಧಪಟ್ಟ ಧ್ವನಿ ಚಿತ್ರಗಳು, ಸಂಭಾಷಣೆಗಳು, ಈಗಾಗಲೇ ಇತರ ವಿಮರ್ಶಕರು ಬರೆದಿರುವ ವಿಮರ್ಶಾತ್ಮಕ ವಿಷಯಗಳನ್ನು ಟಿಪ್ಪಣಿ, ಡಿಜಿಟಲ್ ಮಾಧ್ಯಮಗಳ ಮುಖಾಂತರ ವಿಶ್ಲೇಷಿಸುವುದು. ೩. ನವೀನ ಮಾದರಿಯ ಸಾಹಿತ್ಯ ಬೋಧನೆಗೆ ಸಂಬಂಧಪಟ್ಟ ವಿಧಾನಗಳನ್ನು ಶಿಕ್ಷಕರು ವಿದ್ಯಾರ್ಥಿಗಳಿಗೆ ಅನುಕೂಲವಾಗುವ ರೀತಿಯಲ್ಲಿ ಅಳವಡಿಸಿಕೊಳ್ಳಬಹುದು.			
Module-1 ಕನ್ನಡ ಸಂಸ್ಕೃತಿ ಮತ್ತು ಭಾಷೆ ಕುರಿತಾದ ಲೇಖನಗಳು		(03 hours of pedagogy)	
೧. ಕರ್ನಾಟಕ ಸಂಸ್ಕೃತಿ – ಹಂಪ ನಾಗರಾಜಯ್ಯ ೨. ಕರ್ನಾಟಕದ ಏಕೀಕರಣ : ಒಂದು ಅಪೂರ್ವ ಚರಿತ್ರೆ – ಜಿ. ವೆಂಕಟಸುಬ್ಬಯ್ಯ ೩. ಆಡಳಿತ ಭಾಷೆಯಾಗಿ ಕನ್ನಡ – ಡಾ. ಎಲ್. ತಿಮ್ಮೇಶ ಮತ್ತು ಪ್ರೊ. ವಿ. ಕೇಶವಮೂರ್ತಿ			
Module-2 ಆಧುನಿಕ ಪೂರ್ವದ ಕಾವ್ಯ ಭಾಗ		(03 hours of pedagogy)	
೧. ವಚನಗಳು: ಬಸವಣ್ಣ, ಅಕ್ಕಮಹದೇವಿ, ಅಲ್ಲಮಪ್ರಭು, ಆಯ್ದಕ್ಕಿ ಮಾರಯ್ಯ, ಜೇಡರದಾಸಿಮಯ್ಯ, ಆಯ್ದಕ್ಕಿ ಲಕ್ಕಮ್ಮ. ೨. ಕೀರ್ತನೆಗಳು: ಅದರಿಂದೇನು ಫಲ ಇದರಿಂದೇನು ಫಲ – ಪುರಂದರದಾಸರು ತಲ್ಲಣಿಸಿದಿರು ಕಂಡ್ಯ ತಾಳು ಮನವೇ – ಕನಕದಾಸರು ೩. ತತ್ವಪದಗಳು: ಸಾವಿರ ಕೊಡಗಳ ಸುಟ್ಟು – ಶಿಶುನಾಳ ಶರೀಫಕಾರಕ ರೂಪಗಳು ಮತ್ತು ವಿಭಕ್ತಿ ಪ್ರತ್ಯಯಗಳು – ಸಪ್ತಮಿ ವಿಭಕ್ತಿ ಪ್ರತ್ಯಯ – (ಆ, ಅದು, ಅವು, ಅಲ್ಲಿ) Predictive Forms, Locative Case			

Module-3 ಆಧುನಿಕ ಕಾವ್ಯಭಾಗ	(03 hours of pedagogy)
೧. ಡಿವಿಜಿ ರವರ ಮಂಕುತಿಮ್ಮನ ಕಗ್ಗದಿಂದ ಆಯ್ದ ಕೆಲವು ಭಾಗಗಳು ೨. ಕುರುಡು ಕಾಂಚಾಣ: ದಾ.ರಾ. ಬೇಂದ್ರೆ ೩. ಹೊಸಬಾಳಿನ ಗೀತೆ: ಕುವೆಂಪು	
Module-4 ತಾಂತ್ರಿಕ ವ್ಯಕ್ತಿಗಳ ಪರಿಚಯ	(03 hours of pedagogy)
೧. ಡಾ. ಸರ್. ಎಂ. ವಿಶ್ವೇಶ್ವರಯ್ಯ: ವ್ಯಕ್ತಿ ಮತ್ತು ಐತಿಹ್ಯ - ಎ ಎನ್ ಮೂರ್ತಿರಾವ್ ೨. ಕರಕುಶಲ ಕಲೆಗಳು ಮತ್ತು ಪರಂಪರೆಯ ವಿಜ್ಞಾನ: ಕರೀಗೌಡ ಬೀಚನಹಳ್ಳಿ	
Module-5 ಸಾಂಸ್ಕೃತಿಕ, ಜನಪದ ಕಥೆ ಮತ್ತು ಪ್ರವಾಸ ಕಥನ	(03 hours of pedagogy)
೧. ಯುಗಾದಿ: ವಸುಧೇಂದ್ರ ೨. ಮೆಗಾನೆ ಎಂಬ ಗಿರಿಜನ ಪರ್ವತ: ಹಿ.ಚಿ. ಬೋರಲಿಂಗಯ್ಯ	
ಸಾಂಸ್ಕೃತಿಕ ಕನ್ನಡ ಕಲಿಕೆಯಿಂದ ವಿದ್ಯಾರ್ಥಿಗಳಿಗೆ ಆಗುವ ಪರಿಣಾಮಗಳು (Course Outcomes) CO1: ಕನ್ನಡ ಭಾಷೆ, ಸಾಹಿತ್ಯ ಮತ್ತು ಕನ್ನಡದ ಸಂಸ್ಕೃತಿಯ ಕುರಿತು ಅರಿವು ಮೂಡಿರುತ್ತದೆ. CO2: ಕನ್ನಡ ಸಾಹಿತ್ಯದ ಆಧುನಿಕ ಪೂರ್ವ ಮತ್ತು ಆಧುನಿಕ ಕಾವ್ಯಗಳು ಸಾಂಕೇತಿಕವಾಗಿ ಕಲಿತು ಹೆಚ್ಚಿನ ಓದಿಗೆ ಮತ್ತು ಜ್ಞಾನಕ್ಕೆ ಸ್ಪೂರ್ತಿ ಮೂಡುತ್ತದೆ. CO3: ವಿದ್ಯಾರ್ಥಿಗಳಲ್ಲಿ ಸಾಹಿತ್ಯ ಮತ್ತು ಸಂಸ್ಕೃತಿಯ ಬಗ್ಗೆ ಅರಿವು ಹಾಗೂ ಆಸಕ್ತಿಯು ಹೆಚ್ಚಾಗುತ್ತದೆ. CO4: ತಾಂತ್ರಿಕ ವ್ಯಕ್ತಿಗಳ ಪರಿಚಯ ಹಾಗೂ ಅವರುಗಳ ಸಾಧಿಸಿದ ವಿಷಯಗಳನ್ನು ತಿಳಿದುಕೊಂಡು ನಾಡಿನ ಇನ್ನಿತರ ವ್ಯಕ್ತಿಗಳ ಬಗ್ಗೆ ತಿಳಿದುಕೊಳ್ಳಲು ಕೌತುಕ ಹೆಚ್ಚಾಗುತ್ತದೆ. CO4: ಸಾಂಸ್ಕೃತಿಕ, ಜನಪದ ಹಾಗೂ ಪ್ರವಾಸ ಕಥನಗಳ ಪರಿಚಯ ಮಾಡಿಕೊಡುವುದು.	
Assessment Details (both CIE and SEE) methods of CIE – MCQ, Quizzes, Open book test, Seminar or micro project) The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The student has to obtain a minimum of 40% marks individually both in CIE and 35% marks in SEE to pass. Theory Semester End Exam (SEE) is conducted for 50 marks (01 hour duration). Based on this grading will be awarded.	
Continuous Internal Evaluation: Two Tests each of 40 Marks (duration 01 hour) Two assignments each of 10 Marks	
CIE methods / question paper is designed to attain the different levels of Blomm's taxonomy as per the outcome defined for the course. ಸೆಮಿಸ್ಟರ್ ಅಂತ್ಯದ ಪರೀಕ್ಷೆಯು ಈ ಕೆಳಗಿನಂತಿರುತ್ತದೆ – Semester end Exam SEE will be conducted as per the scheduled timetable, with common question papers for the subject, 1. The question paper will have 25 questions. Each question is set for 02 marks. 2. SEE Pattern will be in MCQ Model for 50 marks. Duration of the exam is 01 hour.	
ಪಠ್ಯ ಪುಸ್ತಕ: University Prescribed Textbook ಸಾಂಸ್ಕೃತಿಕ ಕನ್ನಡ ಡಾ. ಹಿ.ಚಿ. ಬೋರಲಿಂಗಯ್ಯ ಮತ್ತು ಎಲ್. ತಿಮ್ಮೇಶ, ಪ್ರಸಾರಾಂಗ, ವಿಶ್ವೇಶ್ವರಯ್ಯ ತಾಂತ್ರಿಕ ವಿಶ್ವವಿದ್ಯಾಲಯ, ಬೆಳಗಾವಿ	

ಬಳಕೆ ಕನ್ನಡ - Balake Kannada (Kannada for Usage)**ಕನ್ನಡ ಕಲಿಕೆಗಾಗಿ ನಿಗದಿಪಡಿಸಿದ ಪಠ್ಯಪುಸ್ತಕ (Prescribed Textbook to Learn Kannada)**

Course Title:	ಬಳಕೆ ಕನ್ನಡ		
Course Code:	P24KBK109/209	CIE Marks	50
Course Type (Theory/Practical /Integrated)	Theory	SEE Marks	50
		Total Marks	100
Teaching Hours/Week (L:T:P:S)	0:2:0:0	Exam Hours	01 Theory
Total Hours of Pedagogy	15 hours	Credits	00

Course objectives: ಬಳಕೆ ಕನ್ನಡ ಪಠ್ಯ ಕಲಿಕೆಯ ಉದ್ದೇಶಗಳು

The course (P24KBK107/207) will enable the students,

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

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

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

೧. ಬಳಕೆ ಕನ್ನಡವನ್ನು ತರಗತಿಯಲ್ಲಿ ಶಿಕ್ಷಕರು ಬೋಧಿಸಲು ವಿಟಿಯು ಸೂಚಿಸಿರುವ ಪಠ್ಯಪುಸ್ತಕವನ್ನು ಉಪಯೋಗಿಸಬೇಕು.
೨. ಪ್ರಮುಖ ಅಂಶಗಳ ಚಾರ್ಟ್‌ಗಳನ್ನು ತಯಾರಿಸಲು ವಿದ್ಯಾರ್ಥಿಗಳನ್ನು ಉತ್ತೇಜಿಸುವುದು ಮತ್ತು ತರಗತಿಯಲ್ಲಿ ಅವುಗಳನ್ನು ಚರ್ಚಿಸಲು ಅವಕಾಶ ಮಾಡಿಕೊಡುವುದು.
೩. ಪ್ರತಿ ವಿದ್ಯಾರ್ಥಿ ಪುಸ್ತಕವನ್ನು ತರಗತಿಯಲ್ಲಿ ಬಳಸುವಂತೆ ನೋಡಿಕೊಳ್ಳುವುದು ಮತ್ತು ಪ್ರತಿ ಪಾಠ ಮತ್ತು ಪ್ರವಚನಗಳ ಮೂಲ ಅಂಶಗಳಿಗೆ ಸಂಬಂಧಪಟ್ಟಂತೆ ಪೂರಕ ಚಟುವಟಿಕೆಗಳಿಗೆ ತೊಡಗಿಸತಕ್ಕದ್ದು.
೪. ಡಿಜಿಟಲ್ ತಂತ್ರಜ್ಞಾನದ ಮುಖಾಂತರ ಇತ್ತೀಚೆಗೆ ಡಿಜಿಟಲೀಕರಣಗೊಂಡಿರುವ ಭಾಷೆ ಕಲಿಕೆಯ ವಿಧಾನಗಳನ್ನು ಪಿಪಿಟಿ ಮತ್ತು ದೃಶ್ಯ ಮಾಧ್ಯಮದ ಮುಖಾಂತರ ಚರ್ಚಿಸಲು ಕ್ರಮಕೈಗೊಳ್ಳುವುದು. ಇದರಿಂದ ವಿದ್ಯಾರ್ಥಿಗಳನ್ನು ತರಗತಿಯಲ್ಲಿ ಹೆಚ್ಚು ವಿಕಾಗ್ರತೆಯಿಂದ ಪಾಠ ಕೇಳಲು ಮತ್ತು ಅಧ್ಯಯನದಲ್ಲಿ ತೊಡಗಲು ಅನುಕೂಲವಾಗುತ್ತದೆ.
೫. ಭಾಷಾಕಲಿಕೆಯ ಪ್ರಯೋಗಾಲಯದ ಮುಖಾಂತರ ಬಹುಬೇಗ ಕನ್ನಡ ಭಾಷೆಯನ್ನು ಕಲಿಯಲು ಅನುಕೂಲವಾಗುವಂತೆ ಕಾರ್ಯಚಟುವಟಿಕೆಗಳನ್ನು ಮತ್ತು ಕ್ರಿಯಾ ಯೋಜನೆಗಳನ್ನು ರೂಪಿಸುವುದು.

Module-1**(03 hours of pedagogy)**

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

Module-2**(03 hours of pedagogy)**

೧. ನಾಮಪದಗಳ ಸಂಬಂಧಾರ್ಥಕ ರೂಪಗಳು, ಸಂದೇಹಾಸ್ಪದ ಪ್ರಶ್ನೆಗಳು ಮತ್ತು ಸಂಬಂಧವಾಚಕ ನಾಮಪದಗಳು – Possessive forms of nouns, dubitive question and Relative nouns
೨. ಗುಣ, ಪರಿಮಾಣ ಮತ್ತು ವರ್ಣಬಣ್ಣ ವಿಶೇಷಣಗಳು, ಸಂಖ್ಯಾವಾಚಕಗಳು Qualitative and Colour Adjectives, Numerals

೩. ಕಾರಕ ರೂಪಗಳು ಮತ್ತು ವಿಭಕ್ತಿ ಪ್ರತ್ಯಯಗಳು – ಸಪ್ತಮಿ ವಿಭಕ್ತಿ ಪ್ರತ್ಯಯ – (ಅ, ಅದು, ಅವು, ಅಲ್ಲಿ) Predictive Forms, Locative Case
Module-3 (03 hours of pedagogy)
೧. ಚತುರ್ಥಿ ವಿಭಕ್ತಿ ಪ್ರತ್ಯಯದ ಬಳಕೆ ಮತ್ತು ಸಂಖ್ಯಾವಾಚಕಗಳು – Dative Cases, and Numerals ೨. ಸಂಖ್ಯಾಗುಣವಾಚಕಗಳು ಮತ್ತು ಬಹುವಚನ ನಾಮರೂಪಗಳು – Ordinal numerals and Plural markers ೩. ನ್ಯೂನ / ನಿಷೇಧಾರ್ಥಕ ಕ್ರಿಯಾಪದಗಳು ಮತ್ತು ವರ್ಣ ಗುಣವಾಚಕಗಳು – Defective / Negative Verbs and Colour Adjectives
Module-4 (03 hours of pedagogy)
೧. ಅಪ್ಪಣೆ / ಒಪ್ಪಿಗೆ, ನಿರ್ದೇಶನ, ಪ್ರೋತ್ಸಾಹ ಮತ್ತು ಒತ್ತಾಯ ಅರ್ಥರೂಪ ಪದಗಳು ಮತ್ತು ವಾಕ್ಯಗಳು Permission, Commands, encouraging and Urging words (Imperative words and sentences) ೨. ಸಾಮಾನ್ಯ ಸಂಭಾಷಣೆಗಳಲ್ಲಿ ದ್ವಿತೀಯ ವಿಭಕ್ತಿ ಪ್ರತ್ಯಯಗಳು ಮತ್ತು ಸಂಭವನೀಯ ಪ್ರಕಾರಗಳು Accusative Cases and Potential Forms used in General Communication ೩. “ಇರು ಮತ್ತು ಇರಲ್ಲ” ಸಹಾಯಕ ಕ್ರಿಯಾಪದಗಳು, ಸಂಭಾವ್ಯಸೂಚಕ ಮತ್ತು ನಿಷೇಧಾರ್ಥಕ ಕ್ರಿಯಾ ಪದಗಳು – Helping Verbs “iru and iralla”, Corresponding Future and Negation Verbs ೪. ಹೋಲಿಕೆ (ತರತಮ), ಸಂಬಂಧ ಸೂಚಕ ಮತ್ತು ವಸ್ತು ಸೂಚಕ ಪ್ರತ್ಯಯಗಳು ಮತ್ತು ನಿಷೇಧಾರ್ಥಕ ಪದಗಳ ಬಳಕೆ – Comparative, Relationship, Identification and Negation Words
Module-5 (03 hours of pedagogy)
೧. ಕಾಲ ಮತ್ತು ಸಮಯದ ಹಾಗೂ ಕ್ರಿಯಾಪದಗಳ ವಿವಿಧ ಪ್ರಕಾರಗಳು –Different types of forms of Tense, Time and Verbs ೨. ದ್, -ತ್, -ತು, -ಇತು, -ಆಗಿ, -ಅಲ್ಲ, -ಗ್, -ಕ್, ಇದೆ, ಕ್ರಿಯಾ ಪ್ರತ್ಯಯಗಳೊಂದಿ ಭೂತ, ಭವಿಷ್ಯತ್ ಮತ್ತು ವರ್ತಮಾನ ಕಾಲ ವಾಕ್ಯ ರಚನೆ – Formation of past, Future and Present Tense Sentences with Verb Forms ೩. Kannada Vocabulary List : ಸಂಭಾಷಣೆಯಲ್ಲಿ ದಿನೋಪಯೋಗಿ ಕನ್ನಡ ಪದಗಳು – Kannada Words in Conversation
Course Outcomes (Course Skill Set): ಬಳಕೆ ಕನ್ನಡ ಪಠ್ಯದ ಕಲಿಕೆಯಿಂದ ವಿದ್ಯಾರ್ಥಿಗಳಿಗೆ ಆಗುವ ಅನುಕೂಲಗಳು ಮತ್ತು ಫಲಿತಾಂಶಗಳು : At the end of the Couse, The Students will be able CO1: To understand the necessity of learning of local language for comfortable life. CO2: To Listen and understand the Kannada language properly. CO3: To speak, read and write Kannada language as per requirement. CO4: To communicate (converse) in Kannada language in their daily life with kannada speakers. CO5: To speak in polite conservation.
(Assessment Details – both CIE and SEE) The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks). A student shall be deemed to have satisfied the academic requirements and aearned the credits allotted to each subject / course if the student secures not less than 35% (18 Marks out of 50) in the semester – end examination (SEE), and a minimum of 40% (40 maeks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together Continuous Internal Evaluation: Two Tests each of 40 Marks (duration 01 hour) Two assignments each of 10 Marks

CIE methods / question paper is designed to attain the different levels of Blomm's taxonomy as per the outcome defined for the course.

ಸೆಮಿಸ್ಟರ್ ಅಂತ್ಯದ ಪರೀಕ್ಷೆಯು ಈ ಕೆಳಗಿನಂತಿರುತ್ತದೆ – Semester end Exam (SEE)

SEE will be conducted as per the scheduled timetable, with common question papers for the subject,

1. The question paper will have 25 questions. Each question is set for 02 marks.
2. SEE Pattern will be in MCQ Model for 50 marks. Duration of the exam is 01 hour.

ಪಠ್ಯ ಪುಸ್ತಕ (Text book) :

ಬಳಕೆ ಕನ್ನಡ

ಡಾ. ಎಲ್. ತಿಮ್ಮೇಶ,

ಪ್ರಕಟಣೆ: ಪ್ರಸಾರಾಂಗ,

ವಿಶ್ವೇಶ್ವರಯ್ಯ ತಾಂತ್ರಿಕ ವಿಶ್ವವಿದ್ಯಾಲಯ, ಬೆಳಗಾವಿ

Indian Constitution

Course Title:	Indian Constitution		
Course Code:	P24ICO109/209	CIE Marks	50
Course Type (Theory/Practical /Integrated)	Theory	SEE Marks	50
		Total Marks	100
Teaching Hours/Week (L:T:P:S)	0:2:0:0	Exam Hours	01 Theory
Total Hours of Pedagogy	15 hours	Credits	00
Course objectives:			
The course INDIAN CONSTITUTION (P24ICO107/207) will enable the students,			
1. To know about the basic structure of Indian Constitution. 2. To know the Fundamental Rights (FR’s), DPSP’s and Fundamental Duties (FD’s) of our constitution. 3. To know about our Union Government, political structure & codes, procedures. 4. To know the State Executive & Elections system of India. 5. To learn the Amendments and Emergency Provisions, other important provisions given by the constitution.			
Teaching-Learning Process			
These are sample Strategies, which teacher can use to accelerate the attainment of the various course outcomes and make Teaching –Learning more effective: Teachers shall adopt suitable pedagogy for effective teaching – learning process. The pedagogy shall involve the combination of different methodologies which suit modern technological tools.			
I. Direct instructional method (Low/Old Technology), (ii) Flipped classrooms (High/advanced Technological tools), (iii) Blended learning (Combination of both), (iv) Enquiry and evaluation based learning, (v) Personalized learning, (vi) Problems based learning through discussion. II. Apart from conventional lecture methods, various types of innovative teaching techniques through videos, animation films may be adapted so that the delivered lesson can progress the students in theoretical applied and practical skills.			
Module-1		(03 hours of pedagogy)	
Indian Constitution: Necessity of the Constitution, Societies before and after the Constitution adoption. Introduction to the Indian constitution, Making of the Constitution, Role of the Constituent Assembly.			
Module-2		(03 hours of pedagogy)	
Salient features of India Constitution. Preamble of Indian Constitution & Key concepts of the Preamble. Fundamental Rights (FR’s) and its Restriction and limitations in different Complex Situations. Building.			
Module-3		(03 hours of pedagogy)	
Directive Principles of State Policy (DPSP’s) and its present relevance in Indian society. Fundamental Duties and its Scope and significance in Nation, Union Executive: Parliamentary System, Union Executive – President, Prime Minister, Union Cabinet.			
Module-4		(03 hours of pedagogy)	
Parliament - LS and RS, Parliamentary Committees, Important Parliamentary Terminologies. Judicial System of India, Supreme Court of India and other Courts, Judicial Reviews and Judicial Activism.			

Module-5	(03 hours of pedagogy)
State Executive and Governor, CM, State Cabinet, Legislature - VS & VP, Election Commission, Elections & Electoral Process. Amendment to Constitution, and Important Constitutional Amendments till today. Emergency Provisions.	
Course outcome (Course Skill Set) At the end of the course P24ICO107/207 the student will be able to: CO1 Analyse the basic structure of Indian Constitution. CO2 Remember their Fundamental Rights, DPSP's and Fundamental Duties (FD's) of our constitution. CO3 know about our Union Government, political structure & codes, procedures. CO4 Understand our State Executive & Elections system of India. CO5 Remember the Amendments and Emergency Provisions, other important provisions given by the constitution.	
Assessment Details (both CIE and SEE) The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks that is 20 marks. A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/course if the student secures not less than 35% (18 Marks out of 50) in the semester-end examination(SEE), and a minimum of 40% (40 marks out of 100) in the sum total of the CIE and SEE taken together Continuous Internal Evaluation: Two Tests each of 40 Marks (duration 01 hour) Two assignments each of 10 Marks The average of two tests, two assignments, and quiz/seminar/group discussion will be out of 50 marks CIE methods /question paper is designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course. Semester End Examination: SEE will be conducted by University as per the scheduled timetable, with common question papers for the subject. 1. The question paper will have 25 questions. Each question is set for 02 marks. 2. SEE Pattern will be in MCQ Model (Multiple Choice Questions) for 50 marks. Duration of the examination is 01 Hour.	
Suggested Learning Resources: Textbook: 1. "Constitution of India" (for Competitive Exams) - Published by Naidhruva Edutech Learning Solutions, Bengaluru. – 2022.	