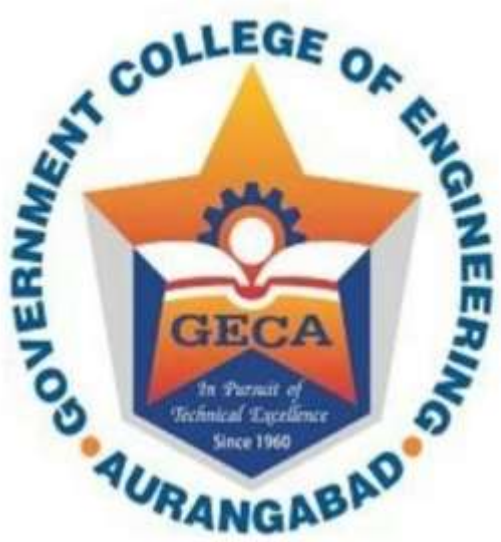

GOVERNMENT COLLEGE OF ENGINEERING
AURANGABAD
(An Autonomous Institute of Govt. of Maharashtra)
Station Road, Osmanpura, Aurangabad- 431005 (M.S.)
(0240) 2366101, 2366111, Fax: (0240) 2332835

NEP

Compliant Curriculum

w.e.f.2023-24

Electronics & Telecommunication

GENERAL COURSE STRUCTURE & THEME

A. Definition of Credit:

1 Hr. Lecture (L) per week	1 Credit
1 Hr. Tutorial (T) per week	1 Credit
1 Hr. Practical (P) per week	0.5 Credit
2 Hours Practical (P) per week	1 Credit

B. Total Credits for the completion of B.Tech. in Electronics & Telecommunication Engineering:

The total number of credits proposed for the four-year B.Tech Electronics and Telecommunication Engineering (E&TC) with 1 Multidisciplinary minor (Compulsory) degree is **176** as per the structure given below**:**

Structure of B. Tech.in Electronics and Telecommunication Engineering (E&TC) with multidisciplinary minor:

Semester		**I**	**II**	**III**	**IV**	**V**	**VI**	**VII**	**VIII**	**Total Credits**
Basic Science Course	BSC	08	08		--	--	--	--	--	16
Engineering Science Course	ESC	07	07		--	--	--	--	--	14
Programme Core Course (PCC)	Program Courses	--	02	12	11	15	12	08		56
Programme Elective Course (PEC)	Program Elective	--	--	--	--	04	08	08	-	20
Multidisciplinary Minor (MDM)	Multidisciplinary Courses		-	04	03	04	03			14
Open Elective (OE) Other than a particular program	OE	--	--	03	03	02	--	--	--	08
Vocational and Skill Enhancement Course (VSEC)	Skill Courses	02	02	--	02	--	02	--	--	08
Ability Enhancement Course (AEC -01, AEC-02)	Humanities Social Science and Management (HSSM)		02	--	02	--	--	--	--	04
Entrepreneurship/Economics/ Management Courses		--		02	02	--	--	--	--	04
Indian Knowledge System (IKS)		02			--	--	--	--	--	02
Value Education Course (VEC)		--	--	02	02	--	--	--	--	04
Research Methodology	Experiential Learning Courses	--	--	--	--	--	--		04	04
Comm. Engg. Project (CEP)/Field Project (FP)		--	--	02	--	--	--	-	-	02
Project		--	--	--	--	--	--	02	02	04
Internship/ OJT		--	---			--	--		12	12
Co-curricular Courses (CC)	Liberal Learning Courses	02	02		--	--	--	--	-	04
Total Credits (Major)		**21**	**23**	**25**	**25**	**25**	**25**	18	18	**176**

Students can opt for any of the following as per the rules and regulations given by institute:

1. **B. Tech with one Multidisciplinary Minor = Total 176 Credits**
2. **B. Tech with one Multidisciplinary Minor and Honor in A.I.M.L. = Total 194 Credits**
3. **B. Tech with one Multidisciplinary Minor and Honor by Research = Total 194 Credits**
4. **B. Tech with two Multidisciplinary Minors = Total 190 Credits**

Head of the Electronics and Telecommunication Engineering Department

Dean Academics

Approved in XXVIIth Academic Council
Dated: 27th April 2023

Government College of Engineering, Aurangabad

(An Autonomous Institute)

Teaching and Evaluation Scheme from year 2023-2024

B. Tech. Program in Electronics & Telecommunication Engineering with Multidisciplinary Minor

Semester I

Course				Teaching Scheme			Continuous Evaluation in terms of Marks					
Sr No	**Category**	**Course Code**	**Course Name**	**TH**	**T**	**PR**	**Credits**	**ISE I**	**ISEII**	**ISEIII**	**ESE**	**Total (100)**
1	BSC-01	MABSC1002	Mathematics I (EE and E &TC)	3	1	-	4	15	15	10	60	100
2	BSC-02	CHBSC1001	Electrochemistry, Battery Science & Engineering Materials	3	-	0	3	15	15	10	60	100
3	BSC-03	CHBSC1003	Lab-Chemistry	-	-	2	1	-	-	25	-	25
4	ESC-01	EEESC1011	Basics of Electrical Engineering	2	0	-	2	10	10	-	30	50
5	ESC-02	EEESC1012	Lab- Basics of Electrical Engineering	-	-	2	1	-	-	25	-	25
6	ESC-03	CSESC1001	Programming for Problem Solving	3	-	-	3	15	15	10	60	100
7	ESC-04	CSESC1002	Lab-Programming for problem solving	-	-	2	1	-	-	25	-	25
8	VSEC-01	ETVSE1001	Electronics Workshop I	-	-	4	2	-	25	25	-	50
9	IKS	ETIKS1001	Indian Knowledge Systems	2	0	0	2	10	10	-	30	50
10	CC-01	INCCC1001	Yoga	0	0	4	2	-	-	50	-	50
	Total for B. Tech with one minor			13	1	14	**21**	**65**	**90**	**180**	**240**	**575**

Semester II

Sr No	**Category**	**Course Code**	**Course Name**	**TH**	**T**	**PR**	**Credits**	**ISE I**	**ISEII**	**ISEIII**	**ESE**	**Total**
1	BSC-06	MABSC1004	Engineering Mathematics II (EEP & ETX)	3	1	-	4	15	15	10	60	100
2	BSC-04	PHBSC1002	Optics, Semiconductors & Quantum Mechanics	3	-	0	3	15	15	10	60	100
3	BSC-05	PHBSC1003	Lab- Physics	-	-	2	1	-	-	25	-	25
4	ESC-04	ETESC1001	Electronic Devices and Circuits	3	-	-	3	15	15	10	60	100
5	ESC-05	ETESC1002	Lab Electronic Devices and Circuits	-	-	2	1	-	--	25	-	25
6	Esc-06	MEESC1001	Engineering Graphics	2	-	-	2	10	10	-	30	50
	ESC-07	MEESC1005	Lab Engineering Graphics Skills	-	-	2	1	-	-	25	-	25
7	VSEC-02	ETVSE1002	Engineering Exploration	-	-	4	2	-	25	25	-	50
8	AEC-01	INAEC1001	Communication Skills	2	-	-	2	10	10	-	30	50
9	CC-02	INCCC1002/ INCCC1003/ INCCC1004	NSS/ Sports / Club Activities	-	-	4	2	-	25	25	-	50
10	PCC	ETPCC1001	Sensors and Instruments	2	-	-	2	10	10	-	30	50
	Total for B. Tech with one minor			15	1	14	**23**	**75**	**125**	**155**	**270**	**625**

BSC	**16**	**IKS**	**02**	**PCC**	**02**	**OE**	**--**	**MDM-1**	**--**
ESC	**14**	**VEC**	**--**	**PEC**	**--**				
CC	**04**	**AEC**	**02**	**E.L.**	**--**	**Honors**	**--**	**MDM-II**	**--**
VSEC	**04**	**HSSM**	**--**						

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B. Tech. Program in Electronics & Telecommunication Engineering with Multidisciplinary Minor

Semester – III

Course				Teaching Scheme			Continuous Evaluation in terms of Marks					
Sr No	**Category**	**Course Code**	**Course Name**	**TH**	**T**	**PR**	**Credits**	**ISE I**	**ISEII**	**ISEIII**	**ESE**	**Total (100)**
1	PCC		Digital Electronics	3	-	-	3	15	15	10	60	100
2	PCC		Signals & Systems	3	-	-	3	15	15	10	60	100
3	PCC		Network Theory	3	-	-	3	15	15	10	60	100
4	PCC		Lab Digital Electronics	-	-	2	1	-	-	25	25	50
5	PCC		Lab Signals & Systems	-	-	2	1	-	-	25	25	50
6	PCC		Lab Network Theory	-	-	2	1	-	-	25	25	50
7	MDM I / II		MDM-01	3	-	-	3	15	15	10	60	100
8	MDM I / II		Lab- MDM-01	-	-	2	1	-	-	25	-	25
9	OE		OE-01	3	-	-	3	15	15	10	60	100
10	HSSM		Any one from the group	2	-	-	2	10	10	-	30	50
11	VEC		Universal Human Values	2	-	-	2	10	10	-	30	50
12	Exp. Learning		Community Project	-	-	4	2	-	25	25	-	50
	Total for B. Tech with one minor			19		12	**25**	**95**	**120**	**175**	**435**	**825**

Semester IV

Sr No	**Category**	**Course Code**	**Course Name**	**TH**	**T**	**PR**	**Credits**	**ISE I**	**ISEII**	**ISEIII**	**ESE**	**Total**
1	PCC		Engineering Mathematics III	3	-	-	3	15	15	10	60	100
2	PCC		Analog & Digital Communication	3	-	-	3	15	15	10	60	100
3	PCC		Lab-Analog & Digital Communication	-	-	2	1	-	-	25	25	50
4	PCC		Linear Integrated Circuits	3	-	-	3	15	15	10	60	100
5	PCC		Lab-Linear Integrated Circuits	-	-	2	1	-	-	25	25	50
6	MDM I / II		MDM-02	3	-	-	3	15	15	10	60	100
7	OE		OE-II	3	-	-	3	15	15	10	60	100
8	VSEC-03		Electronics Workshop - II	-	-	4	2	-	25	25	-	50
9	AEC		Sanskrit	2	-	-	2	10	10	-	30	50
10	HSSM		Entrepreneurship/Economics/ Management Courses	2	-	-	2	10	10	-	30	50
11	VEC		Environmental Science	2	-	-	2	10	10	-	30	50
	Total for B. Tech with one minor			21		08	**25**	**105**	**130**	**125**	**440**	**800**

BSC	**(16)**	**IKS**	**02**	**PCC**	**23 (25)**	**OE**	**06**	**MDM-1**	**07**
ESC	**(14)**	**VEC**	**4**	**PEC**	**--**				
CC	**(04)**	**AEC**	**02 (4)**	**E.L.**	**02**	**Honors**	**--**	**MDM-II**	**07**
VSEC	**2 (6)**	**HSSM**	**04**						

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B. Tech. Program in Electronics & Telecommunication Engineering with Multidisciplinary Minor

Semester – V

Course				Teaching Scheme			Continuous Evaluation in terms of Marks					
Sr No	**Category**	**Course Code**	**Course Name**	**TH**	**T**	**PR**	**Credits**	**ISE I**	**ISEII**	**ISEIII**	**ESE**	**Total (100)**
1	PCC		Microprocessor & Microcontroller	3	-	-	3	15	15	10	60	100
2	PCC		Lab- Microprocessor & Microcontroller	-	-	2	1	-	-	25	25	50
3	PCC		Digital Signal Processing	3	-		3	15	15	10	60	100
4	PCC		Lab-Digital Processing		-	2	1	-	-	25	25	50
5	PCC		Electromagnetic Engineering	3	-	-	3	15	15	10	60	100
6	PCC		Control Systems	3	-	-	3	15	15	10	60	100
7	PCC		Lab-Control Systems	-	-	2	1	-	-	25	25	50
8	PEC		PEC-I	3	-	-	3	15	15	10	60	100
9	PEC		Lab-PEC I	-	-	2	1	-	-	25	25	50
10	MDM I / II		MDM 03	3	-	-	3	15	15	10	60	100
11	MDM I / II		Lab MDM 03	-	-	2	1	-	-	25	25	50
12	OE		OE III	2	-	-	2	10	10	-	30	50
	Total for B. Tech with one minor			20		10	**25**	**100**	**100**	**185**	**515**	**900**
Semester VI												
Sr No	**Category**	**Course Code**	**Course Name**	**TH**	**T**	**PR**	**Credits**	**ISE I**	**ISEII**	**ISEIII**	**ESE**	**Total**
1	PCC		Computer Network	3	-	-	3	15	15	10	60	100
2	PCC		Lab-Computer Networks	-	-	2	1	-	-	25	25	50
3	PCC		Embedded Systems	3	-	-	3	15	15	10	60	100
4	PCC		Lab-Embedded Systems	-	-	2	1	-	-	25	25	50
5	PCC		VLSI Design	3	-	-	3	15	15	10	60	100
6	PCC		Lab-VLSI	-	-	2	1	-	-	25	25	50
7	PEC		PEC II	3	-	-	3	15	15	10	60	100
8	PEC		Lab PEC II	-	-	2	1	-	-	25	25	50
9	PEC		PEC III	3	-	-	3	15	15	10	60	100
10	PEC		Lab-PEC III	-	-	2	1	-	-	25	25	50
11	MDM I / II		MDM 04	3	-	-	3	15	15	10	60	100
12	VSEC04		E-Skill Project	-	-	4	2	-	-	25	25	50
	Total for B. Tech with one minor			18		14	**25**	**90**	**90**	**210**	**510**	**900**

BSC	**(16)**	**IKS**	**(2)**	**PCC**	**27 (52)**	**OE**	**02 (08)**	**MDM-1**	**07 (14)**
ESC	**(14)**	**VEC**	**(4)**	**PEC**	**12**				
CC	**(04)**	**AEC**	**(4)**	**E.L.**	**02**	**Honors**	**08**	**MDM-II**	**07 (14)**
VSEC	**2 (8)**	**HSSM**	**04**						

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B. Tech. Program in Electronics & Telecommunication Engineering with Multidisciplinary Minor

Semester – VII

Course				Teaching Scheme			Continuous Evaluation in terms of Marks					
Sr No	**Category**	**Course Code**	**Course Name**	**TH**	**T**	**PR**	**Credits**	**ISE I**	**ISEII**	**ISEIII**	**ESE**	**Total (100)**
1	PCC		AI & ML	3	-	-	3	15	15	10	60	100
2	PCC		Lab-AI & ML	-	-	2	1	-	-	25	25	50
3	PEC		PEC IV	3	-	-	3	15	15	10	60	100
4	PEC		Lab PEC IV	-	-	2	1	-	-	25	25	50
5	PEC		PEC V	3	-	-	3	15	15	10	60	100
6	PEC		Lab-PEC V	-	-	2	1	-	-	25	25	50
7	Exp learning		Research Methodology	4	-	-	4	15	15	10	60	100
8	Exp learning		Project Phase I	-	-	4	2	-	-	50	50	100
	Total for B. Tech with one minor			13	-	10	**18**	**60**	**60**	**165**	**365**	**650**

Semester VIII

Sr No	**Category**	**Course Code**	**Course Name**	**TH**	**T**	**PR**	**Credits**	**ISE I**	**ISEII**	**ISEIII**	**ESE**	**Total**
1	Experiential Learning Courses		Project Phase II	-	-	4	2	-	-	50	50	100
2	Experiential Learning Courses		Internship	-	-	24	12	50	50	50	100	250
	Total for B. Tech with one minor					28	**14**	**65**	**65**	**110**	**210**	**450**

BSC	**(16)**	**IKS**	**(2)**	**PCC**	**04 (56)**	**OE**	**02 (08)**	**MDM-1**	**07 (14)**
ESC	**(14)**	**VEC**	**(4)**	**PEC**	**08 (20)**				
CC	**(04)**	**AEC**	**(4)**	**E.L.**	**20 (22)**	**Honors**	**10 (18)**	**MDM-II**	**07 (14)**
VSEC	**2 (8)**	**HSSM**	**04**			**Dissertation**	**18**		

Head of the Electronics and Telecommunication Engineering Department

Dean Academics

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Teaching and Evaluation Scheme from year 2023-2024

B. Tech. Program in Electronics & Telecommunication Engineering with Multidisciplinary Minor & Honors

Semester I – Same as above mentioned

Semester II – Same as above mentioned

Semester III – Same as above mentioned

Semester IV – Same as above mentioned

Semester V onwards is as mentioned here.

Head of the Electronics and Telecommunication Engineering Department

Dean Academics

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B. Tech. Program in Electronics & Telecommunication Engineering with Multidisciplinary Minor & Honors

Semester – V

Course				Teaching Scheme			Continuous Evaluation in terms of Marks					
Sr No	**Category**	**Course Code**	**Course Name**	**TH**	**T**	**PR**	**Credits**	**ISE I**	**ISEII**	**ISEIII**	**ESE**	**Total (100)**
1	PCC		Microprocessor & Microcontroller	3	-	-	3	15	15	10	60	100
2	PCC		Lab- Microprocessor & Microcontroller	-	-	2	1	-	-	25	25	50
3	PCC		Digital Signal Processing	3	-		3	15	15	10	60	100
4	PCC		Lab-Digital Processing		-	2	1	-	-	25	25	50
5	PCC		Electromagnetic Engineering	3	-	-	3	15	15	10	60	100
6	PCC		Control Systems	3	-	-	3	15	15	10	60	100
7	PCC		Lab-Control Systems	-	-	2	1	-	-	25	25	50
8	PEC		PEC-I	3	-	-	3	15	15	10	60	100
9	PEC		Lab-PEC I	-	-	2	1	-	-	25	25	50
10	MDM I / II		MDM 03	3	-	-	3	15	15	10	60	100
11	MDM I / II		Lab MDM 03	-	-	2	1	-	-	25	25	50
12	OE		OE III	2	-	-	2	10	10	-	30	50
13	**Honors in AIML**		AI Search methods for problem solving	3	-	-	3	15	15	10	60	100
14			Lab AI Search methods for problem solving	-	-	2	1	-	-	25	25	50
	Total for B. Tech with Honors in AIML						**29**					

Semester VI

Sr No	**Category**	**Course Code**	**Course Name**	**TH**	**T**	**PR**	**Credits**	**ISE I**	**ISEII**	**ISEIII**	**ESE**	**Total**
1	PCC		Computer Network	3	-	-	3	15	15	10	60	100
2	PCC		Lab-Computer Networks	-	-	2	1	-	-	25	25	50
3	PCC		Embedded Systems	3	-	-	3	15	15	10	60	100
4	PCC		Lab-Embedded Systems	-	-	2	1	-	-	25	25	50
5	PCC		VLSI Design	3	-	-	3	15	15	10	60	100
6	PCC		Lab-VLSI	-	-	2	1	-	-	25	25	50
7	PEC		PEC II	3	-	-	3	15	15	10	60	100
8	PEC		Lab PEC II	-	-	2	1	-	-	25	25	50
9	PEC		PEC III	3	-	-	3	15	15	10	60	100
10	PEC		Lab-PEC III	-	-	2	1	-	-	25	25	50
11	MDM I / II		MDM 04	3	-	-	3	15	15	10	60	100
12	VSEC04		E-Skill Project	-	-	4	2	-	-	25	25	50
13	**Honors in AIML**		Deep Learning	3	-	-	3	15	15	10	60	100
14			Lab Deep Learning	-	-	2	1	-	-	25	25	50
	Total for B. Tech with Honors in AIML						**29**					

BSC	**(16)**	**IKS**	**(2)**	**PCC**	**27 (52)**	**OE**	**02 (08)**	**MDM-1**	**07 (14)**
ESC	**(14)**	**VEC**	**(4)**	**PEC**	**12**				
CC	**(04)**	**AEC**	**(4)**	**E.L.**	**02**	**Honors**	**08**	**MDM-II**	**07 (14)**
VSEC	**2 (8)**	**HSSM**	**04**						

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(An Autonomous Institute)

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B. Tech. Program in Electronics & Telecommunication Engineering with Multidisciplinary Minor & honors

Semester – VII

Course				Teaching Scheme			Continuous Evaluation in terms of Marks					
Sr No	**Category**	**Course Code**	**Course Name**	**TH**	**T**	**PR**	**Credits**	**ISE I**	**ISEII**	**ISEIII**	**ESE**	**Total (100)**
1	PCC		AI & ML	3	-	-	3	15	15	10	60	100
2	PCC		Lab-AI & ML	-	-	2	1	-	-	25	25	50
3	PEC		PEC IV	3	-	-	3	15	15	10	60	100
4	PEC		Lab PEC IV	-	-	2	1	-	-	25	25	50
5	PEC		PEC V	3	-	-	3	15	15	10	60	100
6	PEC		Lab-PEC V	-	-	2	1	-	-	25	25	50
7	Exp learning		Research Methodology	4	-	-	4	15	15	10	60	100
8	Exp learning		Project Phase I	-	-	4	2	-	-	50	50	100
9	**Honors in AIML**		Introduction to M.L.	3	-	-	3	15	15	10	60	100
10			Lab of I to M.L.	-	-	2	1	-	-	25	25	50
11			Reinforcement Learning	3	-	-	3	15	15	10	60	100
12			Lab of R.L.	-	-	2	1	-	-	25	25	50
	Total for B. Tech with Honors in AIML						**26**					

Semester VIII

Sr No	**Category**	**Course Code**	**Course Name**	**TH**	**T**	**PR**	**Credits**	**ISE I**	**ISEII**	**ISEIII**	**ESE**	**Total**
1	Experiential Learning Courses		Project Phase II	-	-	4	2	-	-	50	50	100
2	Experiential Learning Courses		Internship	-	-	-	12	50	50	50	100	250
4	**Honors in AIML**		Mini Project			04	02			25	25	50
	Total for B. Tech with Honors in AIML						**16**					

BSC	**(16)**	**IKS**	**(2)**	**PCC**	**04 (56)**	**OE**	**02 (08)**	**MDM-1**	**07 (14)**
ESC	**(14)**	**VEC**	**(4)**	**PEC**	**08 (20)**				
CC	**(04)**	**AEC**	**(4)**	**E.L.**	**20 (22)**	**Honors**	**10 (18)**	**MDM-II**	**07 (14)**
VSEC	**2 (8)**	**HSSM**	**04**			**Dissertation**	**18**		

Head of the Electronics and Telecommunication Engineering Department

Dean Academics

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B. Tech. Program in Electronics & Telecommunication Engineering with Multidisciplinary Minor & Honors in Research

Semester I – Same as above mentioned

Semester II – Same as above mentioned

Semester III – Same as above mentioned

Semester IV – Same as above mentioned

Semester V – Same as above mentioned

Semester VI – Same as above mentioned

Semester VII and VIII are as mentioned below:

Head of the Electronics and Telecommunication Engineering Department

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B. Tech. Program in Electronics & Telecommunication Engineering with Multidisciplinary Minor by Research

Semester – VII

Course				Teaching Scheme			Continuous Evaluation in terms of Marks					
Sr No	**Category**	**Course Code**	**Course Name**	**TH**	**T**	**PR**	**Credits**	**ISE I**	**ISEII**	**ISEIII**	**ESE**	**Total (100)**
1	PCC		AI & ML	3	-	-	3	15	15	10	60	100
2	PCC		Lab-AI & ML	-	-	2	1	-	-	25	25	50
3	PEC		PEC IV	3	-	-	3	15	15	10	60	100
4	PEC		Lab PEC IV	-	-	2	1	-	-	25	25	50
5	PEC		PEC V	3	-	-	3	15	15	10	60	100
6	PEC		Lab-PEC V	-	-	2	1	-	-	25	25	50
7	Exp learning		Research Methodology	4	-	-	4	15	15	10	60	100
8	Exp learning		Project Phase I	-	-	4	2	-	-	50	50	100
9	**BTech by Honors in Research**		Dissertation - I			18	9			100	100	200
	Total for B. Tech by Honors in Research						**27**					

Semester VIII

Sr No	Category	Course Code	Course Name	TH	T	PR	Credits	ISE I	ISEII	ISEIII	ESE	Total
1	Experiential Learning Courses		Project Phase II	-	-	4	2	-	-	50	50	100
2	Experiential Learning Courses		Internship	-	-	-	12	50	50	50	100	250
3	**BTech by Honors in Research**		Dissertation - II			18	9			100	100	200
	Total for B. Tech by Honors in Research						**23**					

BSC	**(16)**	**IKS**	**(2)**	**PCC**	**04 (56)**	**OE**	**02 (08)**	**MDM-1**	**07 (14)**
ESC	**(14)**	**VEC**	**(4)**	**PEC**	**08 (20)**				
CC	**(04)**	**AEC**	**(4)**	**E.L.**	**20 (22)**	**Honors**	**10 (18)**	**MDM-II**	**07 (14)**
VSEC	**2 (8)**	**HSSM**	**04**			**Dissertation**	**18**		

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Bridge Courses for exit:

After First Year:	**The candidate should complete the internship of two months for 8 credits** **OR** **The candidate should pass the following Two courses of 8 credits to get the certificate** 1.Consumer Electronic/Radio Engineering /Digital Electronics **(Any one course)** 2. Electronics Servicing and Maintenance
After Second Year:	**The candidate should complete the internship of two months for 8 credits** **OR** **The candidate should pass the following Two courses of 8 credits to qualify the Diploma.** 1. Data Communication and Networking 2. Electronics Servicing and Maintenance
After Third Year:	**The candidate should complete the internship of two months for 8 credits** **OR** **The candidate should pass the following Two courses of 8 credits to qualify B.Voc. Degree.** 1. Advanced Mobile Communication 2. Cyber Security

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Multidisciplinary Minor

This will be offered to students other than Electronics & Telecommunication Engineering

For Example Mechanical Engineering students offers for this minor degree will be

B.Tech.(Mech. Engg.) with Minor in Internet of Things

Theme: **Internet of Things**

Total Credits: 14

Number of courses: 04

Sr.No.	Subject	Title of the course	Total credits	Offered in semester
01	MDM I – 01	Microcontrollers	3 + 0 + 0 = 03	III
	MDM I – 02	Lab Microcontrollers	0 + 0 + 1 = 01	III
02	MDM I - 03	Internet of Things	3 + 0 + 0 = 03	IV
03	MDM I – 04	Embedded Systems & RTOS	3 + 0 + 1 = 03	V
	MDM I – 05	Lab - Embedded Systems & RTOS	0 + 0 + 1 = 01	V
04	MDM I - 06	Applications of IoT	3 + 0 + 0 = 03	VI

Theme: **Automation**

Total Credits: 14

Number of courses: 04

Sr.No.		Title of the course	Total credits	Offered in semester
01	MDM II – 01	Sensors & Instruments	3 + 0 + 0 = 03	III
	MDM II – 02	Lab – Sensors & Instruments	0 + 0 + 1 = 01	III
02	MDM II - 03	Industrial Automation	3 + 0 + 0 = 03	IV
03	MDM II – 04	Mechatronics	3 + 0 + 0 = 03	V
	MDM II – 05	Lab – Mechatronics	0 + 0 + 1 = 01	V
04	MDM II - 06	Robotics	3 + 0 + 0 = 03	VI

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Honors

Degree offered will be B. Tech.(E & TC)Honors with Minor in —-----

Theme: **A.I.M.L**

Total Credits: 18

Number of courses: 04

Sr. No.	Title of the course	Total credits	Offered in semester
01	AI Search Methods for Problem Solving	3 + 0 + 0 = 03	V
	Lab - AI Search Methods for Problem Solving	0 + 0 + 1 = 01	V
02	Deep Learning	3 + 0 + 0 = 03	VI
	Lab - Deep Learning	0 + 0 + 1 = 01	VI
03	Introduction to Machine Learning	3 + 0 + 0 = 03	VII
	Lab - Introduction to Machine Learning	0 + 0 + 1 = 01	VII
04	Reinforcement Learning	3 + 0 + 0 = 03	VII
	Lab - Reinforcement Learning	0 + 0 + 1 = 01	VII
05	Mini Project	0 + 0 + 2 = 02	VIII

List of HSSM courses offered by the department:

Each of the following course is of 2 credits (2 + 0 + 0 =2)

Sr.No.	Course
1	Economics
2	Industrial Management
3	Entrepreneurship Development
4	Innovation Ambassador

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List of Open Electives offered by the department

	Theme	Course	Credits
01	Foreign Language	German - I	3 + 0 + 0 =3
		German - II	3 + 0 + 0 =3
		German - III	2 + 0 + 0 =2
02	Generic	Operation Research	3 + 0 + 0 =3
		Law for Engineers	3 + 0 + 0 =3
		Psychology	2 + 0 + 0 =2
03	Forensic	Introduction to Forensic	3 + 0 + 0 =3
		Digital Forensic	3 + 0 + 0 =3
		Forensic Case Studies	2 + 0 + 0 =2

Following courses may be offered as Generic Open Elective (8 Credits) or Multidisciplinary Minor (14 Credits):

List of Multidisciplinary Minor Courses from other faculties: Total 14 Credits as per GR

Two courses of 4 credits and two courses of 3 credits.
Open electives of 8 credits can be offered from these other faculties.
Two courses of 3 credits and 01 course of 01 credit.

Specialization	Dramatics	Film Making	Fine Art	Music	Management & Finance	Law	Social Science	Journalism
Multi-disciplinary Minor - 01	Dramatic Theory, Literature	Videography + Cinematography	Applied Art (Digital Art)	Theory of Indian Music	Microeconomics	Constitutional Law	Indian Economics	Principles of Communication
Multi-disciplinary Minor – 02	Acting	Video Editing and Lighting	Painting (Generative Art)	Ancient and Modern Poetry	Corporate Social Responsibility	Human Rights & International Law	Introduction to Sociology	Fundamentals of Journalism
Multi-disciplinary Minor – 03	Directing	Story telling Story Boarding	Sculpture (3D-Space)	The Evolution of music	Principles of Accounting	Environmental Law	Geo-Informatics	Cyber Journalism
Multi-disciplinary Minor – 04	Playwriting	UI/UX and Animation	Visual Communication (Evolutionary Art)	Music and Film	Business Intelligence	Civil Procedure Code (CPC)	Introduction to Political Sciences	Basics of Design & Graphics
Multi-disciplinary Minor – 05	Applied Interactive Theatre	Art of Visual Communication	Graphics Art (Print & Printing Art)	Introduction to Electronic and Computer Music	Marketing Research	Land Laws including ceiling and other local laws	Corporate sociology	Mass Communication: Concepts and Processes
Multi-disciplinary Minor - 06	Technical Theatre	Film & TV Directing	Art Culture	Analysis of Tonal Music	Corporate Governance and Business Ethics	Cyber Law	Modern India-Political ,Economic & Social Ethos	IT and Online Journalism

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Following courses will be offered as Professional Electives:

Following are the Professional Elective courses through MOOCs

Sr. No.	Course Name
1.	Artificial Intelligence Search Methods For Problem Solving
2.	Data Science for Engineers
3.	Introduction to Machine Learning (IITM)
4.	Introduction to Cyber Security
5.	Switching Circuits and Logic Design
6.	Electrical Distribution System Analysis
7.	Neural Networks for Signal Processing - I
8.	Introduction to Internet of Things
9.	Artificial Intelligence (AI)
10.	Machine Learning
Any other MOOC course with the permission of BoS chairman	

Following is the list of Professional Elective courses offered by the department

List of Professional Elective Courses

(Each of the following course is of 3 + 0 + 1 = 4 Credits)

Sr. No.	**Course Title**	**Sr. No.**	**Course Title**
1	Satellite Communication & lab	12	Computer Architecture & lab
2	Radar Communication & lab	13	Operating System Fundamentals & lab
3	Optical Wireless Communication beyond 5G network & lab	14	Quantum Computing & lab
4	Digital VLSI & lab	15	Information Theory and Coding & lab
5	Cyber Security & lab	16	Optical Fiber Communication & lab
6	Robotics & lab	17	Microwave Engineering & lab
7	Automotive Electronics & lab	18	Digital Image Processing & lab
8	Object Oriented Programming & lab	19	Power Electronics & lab
9	Big Data & lab	20	Digital System Design & lab
10	Cloud Computing & lab	21	Industrial Automation & lab
11	Mobile Communication & lab		

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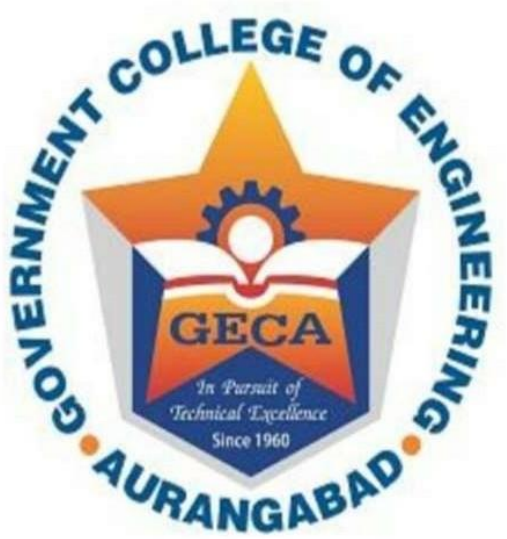

GOVERNMENT COLLEGE OF ENGINEERING AURANGABAD

(An Autonomous Institute of Govt. of Maharashtra)
Station Road, Osmanpura, Aurangabad- 431005 (M.S.)
(0240) 2366101, 2366111, Fax: (0240) 2332835

First Year BTECH Curriculum Structure & Detailed Syllabus (UG Program)

(For Electronics and Telecommunication)

(Effective from: A.Y. 2023-24)

Vision

In pursuit of global competitiveness, the institute is committed to excel in engineering education and research with concern for environment and society.

Mission

- Provide conducive environment for academic excellence in engineering education.
- Enhance research and development along with promotion to sponsored projects and industrial consultancy.
- Foster development of students by creating awareness for needs of society, sustainable development and human values.

PROGRAM OUTCOMES

Engineering Graduates will be able to:

1. **Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

2. **Problem analysis:** Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

3. **Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

4. **Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

5. **Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

6. **The engineer and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

7. **Environment and sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

8. **Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

9. **Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

10. **Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

11. **Project management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

12. **Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

GENERAL COURSE STRUCTURE & THEME

A. Definition of Credit:

1 Hr. Lecture (L) per week	1 Credit
1 Hr. Tutorial (T) per week	1 Credit
1 Hr. Practical (P) per week	0.5 Credit
2 Hours Practical (P) per week	1 Credit

B. Total Credits for the completion of B.Tech. in Electronics & Telecommunication Engineering:

The total number of credits proposed for the four-year B.Tech Electronics and Telecommunication Engineering (E&TC) with 1 Multidisciplinary minor (Compulsory) degree is **176** as per the structure given below**:**

Structure of B. Tech.in Electronics and Telecommunication Engineering (E&TC) with multidisciplinary minor:

Semester		**I**	**II**	**III**	**IV**	**V**	**VI**	**VII**	**VIII**	**Total Credits**
Basic Science Course	BSC	08	08		--	--	--	--	--	16
Engineering Science Course	ESC	07	07		--	--	--	--	--	14
Programme Core Course (PCC)	Program Courses	--	02	12	11	15	12	08		56
Programme Elective Course (PEC)	Program Elective	--	--	--	--	04	08	08	-	20
Multidisciplinary Minor (MD M)	Multidisciplinary Courses		-	04	03	04	03			14
Open Elective (OE) Other than a particular program	OE	--	--	03	03	02	--	--	--	08
Vocational and Skill Enhancement Course (VSEC)	Skill Courses	02	02	--	02	--	02	--	--	08
Ability Enhancement Course (AEC -01, AEC-02)	Humanities Social Science and Management (HSSM)		02	--	02	--	--	--	--	04
Entrepreneurship/Economics/ Management Courses		--		02	02	--	--	--	--	04
Indian Knowledge System (IKS)		02			--	--	--	--	--	02
Value Education Course (VEC)		--	--	02	02	--	--	--	--	04
Research Methodology	Experiential Learning Courses	--	--	--	--	--	--		04	04
Comm. Engg. Project (CEP)/Field Project (FP)		--	--	02	--	--	--	-	-	02
Project		--	--	--	--	--	--	02	02	04
Internship/ OJT		--	---			--	--		12	12
Co-curricular Courses (CC)	Liberal Learning Courses	02	02		--	--	--	--	-	04
Total Credits (Major)		**21**	**23**	**25**	**25**	**25**	**25**	18	18	**176**

Students can opt for any of the following as per the rules and regulations given by institute:

1. **B. Tech with one Multidisciplinary Minor = Total 176 Credits**
2. **B. Tech with one Multidisciplinary Minor and Honor in A.I.M.L. = Total 194 Credits**
3. **B. Tech with one Multidisciplinary Minor and Honor by Research = Total 194 Credits**
4. **B. Tech with two Multidisciplinary Minors = Total 190 Credits**

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Government College of Engineering, Aurangabad
(An Autonomous Institute)
Teaching and Evaluation Scheme from year 2023-2024
B. Tech. Program in Electronics & Telecommunication Engineering with Multidisciplinary Minor
Semester I

Course				Teaching Scheme			Continuous Evaluation in terms of Marks					
Sr No	**Category**	**Course Code**	**Course Name**	**TH**	**T**	**PR**	**Credits**	**ISE I**	**ISEII**	**ISEIII**	**ESE**	**Total (100)**
1	BSC-01	MABSC1002	Mathematics I (EE and E &TC)	3	1	-	4	15	15	10	60	100
2	BSC-02	CHBSC1001	Electrochemistry, Battery Science & Engineering Materials	3	-	0	3	15	15	10	60	100
3	BSC-03	CHBSC1003	Lab-Chemistry	-	-	2	1	-	-	25	-	25
4	ESC-01	EEESC1011	Basics of Electrical Engineering	2	0	-	2	10	10	-	30	50
5	ESC-02	EEESC1012	Lab- Basics of Electrical Engineering	-	-	2	1	-	-	25	-	25
6	ESC-03	CSESC1001	Programming for Problem Solving	3	-	-	3	15	15	10	60	100
7	ESC-04	CSESC1002	Lab-Programming for problem solving	-	-	2	1	-	-	25	-	25
8	VSEC-01	ETVSE1001	Electronics Workshop I	-	-	4	2	-	25	25	-	50
9	IKS	ETIKS1001	Indian Knowledge Systems	2	0	0	2	10	10	-	30	50
10	CC-01	INCCC1001	Yoga	0	0	4	2	-	-	50	-	50
	Total for B. Tech with one minor			13	1	14	**21**	**65**	**90**	**180**	**240**	**575**
Semester II												
Sr No	**Category**	**Course Code**	**Course Name**	**TH**	**T**	**PR**	**Credits**	**ISE I**	**ISEII**	**ISEIII**	**ESE**	**Total**
1	BSC-06	MABSC1004	Engineering Mathematics II (EEP & ETX)	3	1	-	4	15	15	10	60	100
2	BSC-04	PHBSC1002	Optics, Semiconductors & Quantum Mechanics	3	-	0	3	15	15	10	60	100
3	BSC-05	PHBSC1003	Lab- Physics	-	-	2	1	-	-	25	-	25
4	ESC-04	ETESC1001	Electronic Devices and Circuits	3	-	-	3	15	15	10	60	100
5	ESC-05	ETESC1002	Lab Electronic Devices and Circuits	-	-	2	1	-	--	25	-	25
6	Esc-06	MEESC1001	Engineering Graphics	2	-	-	2	10	10	-	30	50
	ESC-07	MEESC1005	Lab Engineering Graphics Skills	-	-	2	1	-	-	25	-	25
7	VSEC-02	ETVSE1002	Engineering Exploration	-	-	4	2	-	25	25	-	50
8	AEC-01	INAEC1001	Communication Skills	2	-	-	2	10	10	-	30	50
9	CC-02	INCCC1002/ INCCC1003/ INCCC1004	NSS/ Sports / Club Activities	-	-	4	2	-	25	25	-	50
10	PCC	ETPCC1001	Sensors and Instruments	2	-	-	2	10	10	-	30	50
	Total for B. Tech with one minor			15	1	14	**23**	**75**	**125**	**155**	**270**	**625**

BSC	**16**	**IKS**	**02**	**PCC**	**02**	**OE**	**--**	**MDM-1**	**--**
ESC	**14**	**VEC**	**--**	**PEC**	**--**				
CC	**04**	**AEC**	**02**	**E.L.**	**--**	**Honors**	**--**	**MDM-II**	**--**
VSEC	**04**	**HSSM**	**--**						

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MABSC1002: MATHEMATICS I [For EE and E&TC]		
Teaching Scheme	**Examination Scheme**	
Lectures: 03 hrs/ week	**ISE I**	**15 Marks**
Tutorial: 01 hrs/ week	**ISE II**	**15 Marks**
Credits: 04	**ISE III**	**10 Marks**
	End Semester Examination	**60 Marks**

Course Description:

MABSC1002: MATHEMATICS I is a compulsory course for first year B. Tech. Electrical engineering and Electronics & Telecommunications engineering students.

Course Outcomes:

After completing the course, students will be able to:

	Course Outcomes	Bloom's Taxonomy Level	Unit
CO1	Define Beta, Gamma and error functions and find the roots of Complex Numbers, Rank of Matrix, limit of function, series expansion and maxima – minima of functions, understand the basic concepts of probability and find the probabilities of events	K1	1,2,3,4, 5
CO2	Summarise the Complex Numbers; Explain the Rank of Matrix, successive differentiation, Special functions (Beta and Gamma functions)	K2	1,2,3,4
CO3	Identify the real and imaginary part of logarithm of complex numbers, eigen values and eigen vectors.	K2	1,2
CO4	Solve the system of linear equations using Gauss elimination and Gauss Jordan Method, Leibnitz's theorem, definite integrals using Beta and Gamma functions and definite integrals using rule of Differentiation under integral sign.	K2	2,3,4
CO5	Apply De Moivre's theorem, Cayley Hamilton theorem, knowledge of integral calculus and Apply the basic rules and theorems in probability including Bayes's theorem	K3	1,2,4,5

Detailed Syllabus:

Unit 1	**Complex Numbers** Definition of complex numbers, Argand Diagram, De-Moivre's theorem and its application to find roots of algebraic equations, expansions of trigonometric functions, Circular and Hyperbolic functions inverse Hyperbolic functions, Logarithm of complex numbers, separation into real and imaginary parts.
Unit 2	**Matrices** Rank of matrix, echelon form of matrix, normal form of matrix, algebraic system of m linear equations in n unknowns, Gauss elimination and Gauss Jordan elimination method, linear dependence and independence of vectors, orthogonal matrix, linear transformations, matrix of linear transformation, rank nullity theorem, Eigen values and Eigen vectors, Cayley Hamilton theorem and its applications.
Unit 3	**Differential Calculus** nth order ordinary derivatives of elementary functions, Leibnitz's theorem, expansion of

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	function in power series, Taylor's series, Maclaurin's series indeterminate forms and L'hospital rule, maxima and minima, converge of sequence and series, range of convergence of power series, test of convergence – ratio test and comparison test.
Unit 4	**Integral Calculus** Beta function, Gamma function, rules of Differentiation Under Integral Sign, error function, application of definite integrals to evaluate surface area and volume of revolutions.
Unit 5	**Elementary Probability Theory** Introduction to probability, addition and multiplication law of probability, independent events, total probability, Conditional probability, Bayes' theorem, permutation and combinations.

Text Books

1. Erwin Kreyszing, Advanced Engineering Mathematics,10th Edition, Mumbai: Willey Eastern Ltd. 2015.
2. B. S. Grewal, Higher Engineering Mathematics, 44th Edition, New Delhi: Khanna publication, 2017.
3. Ramana B.V.Higher Engineering Mathematics, 11 th Reprint, New Delhi: Tata McGraw Hill, 2010.
4. David Poole, Linear Algebra: A Modern Introduction, 3rd Edition, USA: BROOKS/COLE CENGAGE Learning, 2011.
5. Ravish R. Singh, Mukul Bhatt, Engineering Mathematics- A tutorial approach, 4th Edition, New Delhi: Tata McGraw Hill Education Pvt. Ltd.2018.

Reference Books

1. Dass H.K.Advanced Engineering Mathematics, 22nd Edition, New Delhi: S. Chand publications, 2018.
2. P. N. Wartikar and J. N. Wartikar, A text book of Engineering Mathematics (Vol. 1 & 2), Reprint, Pune :Pune Vidhyarthi Griha prakashan, 2013.

Mapping of Course outcome with Program Outcomes:

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

Values in the mapping tables: 3 – HIGH 2 - MEDIUM 1 – LOW)

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Assessment: ISEI, II, III (Class Test-1, Class Test-2, TA)& ESE
TA: Students will perform one or more of the following activities

1. Surprise Test
2. Assignment using Mathematical tools like Mathematical / MatLab or similar.
3. Quiz
4. Any other activity suggested by course coordinator

Assessment Pattern:

Assessment Pattern Level No.	Knowledge Level	ISE I (Class Test-1)	ISE II (Class Test-2)	ISE III (TA + Surprise Test)	End Semester Examination
K1	Remember	5	5		
K2	Understand	10	10		60
K3	Apply			10	
K4	Analyze				
K5	Evaluate				
K6	Create				
Total Marks 100		15	15	10	60

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CHBSC1001:ELECTROCHEMISTRY, BATTERY SCIENCE AND ENGINEERING MATERIALS		
Teaching Scheme	**Examination Scheme**	
Lectures: 03 hrs/ week	**ISE I**	**15 Marks**
Credits: 03	**ISE II**	**15 Marks**
	ISE III	**10 Marks**
	End Semester Examination	**60 Marks**

Prerequisites: Nil

Course description: The course is mandatory course for first year B. Tech. Electronics & Telecommunications Engineering, Computer Science & Engineering and Information Technology programs in first semester. The course objective is to teach fundamental principles in Chemistry and relate the understanding to applications.

	Course Outcomes	Bloom's Taxonomy Level
CO1	To understand fundamental of Chemistry relevant to Engineering field.	K1
CO2	To differentiate between primary and secondary battery as well as battery and fuel cell.	K2
CO3	To equipped with basic knowledge of polymer reinforced composites, applications of semiconductor conducting polymers in energy harnessing.	K2
CO4	To understand Basic Principals of Green chemistry for minimizing waste.	K1
CO5	To understand the principles in synthesis of nano materials.	K1

	Course Contents	CO
Unit 1	**Electrochemistry:** Specific conductance, equivalent conductance. Variation of equivalent conductance with dilution, migration of ions nernst equation and application, determination of emf of cell, applications of emf measurements - potentiometric titrations instrumental methods of analysis: introduction, theory, instrumentation and applications flame photometry. **Energy sciences:** Fuels: classification, characteristics of good fuel, comparison between solid, liquid, gaseous fuel, calorific value, low and high calorific value, units of calorific value, determination of calorific value by Bomb calorimeter and numerical. fuel cells, solar cell and polymer cell	CO1 CO2
Unit2	**Battery Science** Introduction - classification of batteries primary and secondary batteries, reserve batteries with examples, battery components and their role, characteristics of battery, batteries and their importance, basic requirements for commercial batteries, construction, working and applications of ni-cd and lithium ion battery, fuel cells- differences between battery and a fuel cell, classification of fuel cells - based on type of fuel, construction, working and applications of solid oxide fuel cell, hydrogen – oxygen fuel cell electrical vehicle battery construction, working advantages and disadvantages of EV car.	CO1 CO2

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Unit3	**Advanced Engineering Materials** Advanced polymers: conducting polymers, liquid crystal polymers, definition-classification- intrinsic and extrinsic, mechanism of conduction in doped poly acetylene -applications synthesis & mechanism of conduction in poly acetylene. biodegradable polymers: introduction and their requirements, synthesis and properties of poly lactic acid. applications of biodegradable polymers in medical	CO1 CO3
Unit4	**Environmental & Green Chemistry:** **Green Chemistry:** introduction- definition of green chemistry, need of green chemistry, basic principles of green basic 12 principles of green chemistry. various green chemical approaches– microwave synthesis, bio catalyzed reactions **Microwave and ultrasound assisted green synthesis**: advantages and applications microwave assisted reactions in organic solvents apparatus required, examples of MAOS advantages and disadvantages of MAOS.	CO1 CO4
Unit5	**Nano materials**: Introduction, Fullerenes, Carbon nano tubes, Nano wires, Electronic and mechanical properties, Synthesis of nano materials, Applications of nano materials- Catalysis, Electronics Telecommunication, Medicines, Energy sciences	CO1 CO5

Text Books	
1.	F. W. Billmeyer, Text Book of Polymer Science, John Wiley & Sons, 15th Edition, 2020.
2.	B. K. Sharma- A text book of Industrial Chemistry. 15th Edition, 2020. G.A. Ozin & A.C. Arsenault, “Nanotechnology A Chemical Approach to Nanomaterials”. RSC Publishing, 5th Edition, 2020.
Reference Books	
1.	Uppal M.M, Jain and Jain. Engineering Chemistry, Khanna Publishers, 45th Edition, 2020.
2.	P.C. Jain and Monica Jain, A test Book of Engineering Chemistry, Dhanpat Rai Publications, New Delhi, 20th Edition, 2020.
3.	S SDara -A Text book of Engineering Chemistry, S Chand & Company Ltd., 15th Edition, 2020.

Mapping of Course Outcome with Program Outcomes:

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**
CO 1	3	2	2	2		1	1					1
CO 2	3	1	1	1								1
CO 3	3	2	2	2		1	1					1
CO 4	3	2	2	2	2	1	1					1
CO 5	3	2	2	2		1	1					1

1 – Low, 2 – Medium, 3 – High

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CHBSC1003: Lab Chemistry		
Teaching Scheme	**Examination Scheme**	
Practical: 02 Hrs/Week	**ISE III**	**25 Marks**
Credits : 1		

Course Outcomes:

After completion of this course students will be able to:

	Course Outcomes
CO1	Perform qualitative and quantitative determination of physical and chemical properties of lubricants, polymers and water used for domestic and industrial application.
CO2	Explain the objectives of experiments, perform the experiments, appropriately record the data and analyze the results with accuracy and precision.
CO3	Demonstrate laboratory skills by use of relevant instrument or modern analytical methods for analysis of chemical compounds.
CO4	Work effectively and safely in a laboratory environment in teams as well as independently.
CO5	Recognize the issues of safety regulations, ethical, societal, economical and environmental issues in the use of chemicals in their laboratory work.

List of the Experiments – Any eight from the following

Sr. No.	Title of the Experiments	Skill / Knowledge Level	CO
1	Determination of hardness of water by EDTA method.	S3/K2	CO3, CO4, CO2
2	Determination of BOD and COD of water sample	S3/K2	CO3, CO5, CO2
3	Determination of Cell Constant.	S3/K2	CO3, CO2
4	Determination of Acid Value of lubricant.	S1/K1	CO1, CO5, CO2
5	Determination of chloride content of water by Mohr's method	S1/K1	CO1, CO5, CO2
6	Determination of Viscosity of lubricating oils by Redwood Viscometer.	S3/K2	CO3, CO4, CO2
7	Determination of Flash & Fire point of lubricant oil.	S3/K2	CO3, CO4, CO2
8	To Determination P^H value of solutions by indicator, Paper and by P^H meter	S1/K1	CO3, CO5, CO2
9	Preparation of Phenol Formaldehyde Resin (Bakelite) /Urea formaldehyde resin.	S2/K2	CO2, CO4, CO5
10	Determination of Iron by colorimetric method.	S3/K2	CO3, CO2
11	Separation of chemicals by thin layer chromatography.	S2/K2	CO3, CO2
12	Dermination of strength of acids by Potentiometric titrations	S2/K2	CO1, CO4, CO5, CO2
13	Determination of Cloud & Pour point of lubricant oil.	S3/K2	CO3, CO2

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14	To verify Lambert Beer's Law calorimetrically.	S3/K2	CO3, CO2
15	To determine Rf value and identify phenyl alanine & Glycine mixture by ascending paper chromatography.	S3/K2	CO3, CO2
16	Demonstration Of TLC/Paper chromatography	S2/K2	CO3, CO2
17	To determine conduct metrically, the strength of given HCl solution by titrating with standard NaOH solution.	S3/K2	CO3, CO2
18	To determine the empirical formula of ferric-5 sulpho salicylate complex by Jobs method.	S3/K2	CO3, CO2

CO-PO MAPPING

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

1-Low, 2-Medium, 3-High

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EEESC 1011 BASICS OF ELECTRICAL ENGINEERING		
Teaching Scheme	**Examination Scheme**	
Lectures: 02hrs/ week	**ISE I**	**10 Marks**
Credits: 02	**ISE II**	**10 Marks**
	End Semester Examination	**30 Marks**

Course description: On completion of this course, students will have knowledge of fundamentals of electrical Engineering. It includes Kirchhoff's voltage law, current law, source transformation, network analysis methods and AC circuits.

Course Objectives:

- To offer basic understanding for solving circuits using KCL, KVL and network theorems.
- To explain DC circuits, magnetic circuits and AC circuits.

Course Outcomes:

After completing the course, students will be able to:

CO1	K1	Define the terms related to network theorems, magnetic induction and AC circuits.
CO2	K2	Understand DC, AC and magnetic circuits.
CO3	K3	Apply concepts of DC, AC circuits for network analysis.

Detailed Syllabus:

Unit 1	**DC Circuits:** Kirchhoff's laws, Source conversion, series and parallel circuit, current and voltage division rule, Delta-star and star-delta conversion, Node voltage and Mesh current methods, Superposition theorem, Thevenin's and Norton's theorems, Maximum power transfer theorem. Charging and discharging of capacitor, Time constant for RC circuit
Unit 2	**Electromagnetic Induction**: Faraday's laws, statically and dynamically induced emf, self and mutual inductance, coefficients of coupling, dot convention, inductance in series and parallel, principle of operation, constructional details, types and applications of single phase Transformer, Induction motors, DC motors.
Unit 3	**Single phase AC Circuits**: Concept of single phase supply, Terms related with A.C. quantities, pure resistive, inductive and capacitive circuits, Complex and phasor representation of AC quantities, series and parallel circuits, introduction to resonance

TEXT AND REFERENCE BOOKS

1. Leonard Bobrow "Fundamentals of Electrical Engineering" ,Oxford University press.
2. Vincent Del Toro, "Principles of Electrical Engineering ", Prentice Hall.
3. D.P. Kothari, I.J Nagrath , "Basic Electrical Engineering" Tata McGraw Hill.
4. M.S.Naidu, S.Kamakshaiah,"Introduction to Electrical Engineering" Tata McGraw Hill.
5. J.P.Tiwari, "Basic Electrical Engineering" New Age Publication.
6. Joseph Administer, "Schaum's outline of Electric circuits", Tata McGraw Hill.

Mapping of Course outcome with Program Outcomes (PO) and Program Specific Outcomes (PSO):

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	PSO 1	PSO 2	PSO 3
CO1	1	1	-	-	-	-	-	-	1	1	-	1	1	2	3
CO2	2	2	-	-	-	-	-	-	1	1	-	1	2	2	2
CO3	3	2	1	-	-	-	-	-	1	1	-	1	2	2	2

3 – High, 2 – Medium , 1 – Low

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Teacher's Assessment: Teachers Assessment of 10 marks is based on one of the / or combination of few of following

1) Simulation
2) Prototype development
3) Power point presentation of case studies
4) Question and answer / Numerical solution

Assessment Pattern:

Assessment Pattern Level No.	Knowledge Level	Test 1	Teachers Assessment/ Assignment	End Semester Examination
K1	Remember	04	00	06
K2	Understand	06	05	18
K3	Apply	00	05	06
K4	Analyze	00	00	00
K5	Evaluate	00	00	00
K6	Create	00	00	00
Total Marks 50		**10**	**10**	**30**

Assessment Table:

Assessment Tool	K1	K2	K3
	CO1	CO2	CO3
Class Test (10 Marks)	04	06	00
Teachers Assessment (10 Marks)	00	05	05
ESE Assessment (30 Marks)	06	18	06

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EEESC1012 : Lab Basics of Electrical Engineering		
Teaching Scheme	**Examination Scheme**	
Practical: 2Hrs/Week	**ISE III**	**25 Marks**
Credit:01		

Laboratory Course Outcomes:

As an outcome of completing the Laboratory course, students will able to:

Course Outcomes:

After completion of this course students will be able to:

	Course Outcomes
CO1	Apply electrical safety measures in the laboratory
CO2	Verify various electric laws and theorem to determine the electric circuit and electromagnetic circuit parameters
CO3	Determine the relationship of various electric circuit parameters
CO4	Demonstrate the basic concepts of electromagnetic induction and ac circuits
CO5	Demonstrate the fundamental and working of electrical machines

List of the Experiments:

The student shall perform minimum EIGHT experiments from the following list

Sr. No.	Title of the Experiments	Skill / Knowledge Level	CO	Marks for ISE
1	Introduction of tools, electrical materials, safety procedure, symbols and abbreviations	K1,K2,K3	CO1, CO2, CO3,	3
2	Perform an experiment for the verification current and voltage in series and parallel circuit	K2	CO1, CO2, CO3,	3
3	To Perform an experiment for the demonstration of electromagnetic induction phenomenon OR Describe one experiment to demonstrate the phenomenon of electromagnetic induction.	K2	CO1, CO2, CO3, CO4	4
4	Perform an experiment for Verification ofThevenin's theorem and Norton's theorem	K2	CO1, CO2, CO3	3
5	Perform an experiment for Verification of Superposition theorem,		CO1, CO2, CO3	
6	Perform an experiment for Verification of Maximum power transfer theorem		CO1, CO2, CO3	
7	To Perform an experiment to plot hysteresis loop/B-H curve of magnetic material	K2	CO1, CO2, CO3, CO4	3
8	To perform experiment for Measurement of current, voltage and power in R-L-C series exited by single phase AC supply	K3	CO1, CO2, CO3, CO4	4

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9	To Study the R-L-C series resonance circuit	K2	CO1, CO2, CO3, CO4	3
10	To demonstrate the construction D.C. Shunt motor.	K2	CO1, CO2, CO3, CO5	3
11	To perform the load test on 1 phase transformer	K3	CO1, CO2, CO3, CO5	4

NOTE: The students will be required to perform the 8 experiments from the above list and any other relative experiments designed on the basis course

Assessment Pattern:

Assessment Pattern Level No.	**Knowledge Level**	**ISE I**	**ISE II**
K1	Remember	5	5
K2	Understand	10	10
K3	Apply	10	10
K4	Analyze		
K5	Evaluate		
K6	Create		
Total Marks		**25**	**25**

Assessment Pattern Level No.	**Knowledge Level**	**ISE I**	**ISE II**
S1	Imitation	5	5
S2	Manipulation	10	10
S3	Precision	10	10
S4	Articulation		
S5	Naturalization		
Total Marks		25	25

Mapping of Course outcome with Program Outcomes and Program Specific Outcomes:

Course outcome	PO 1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12
CO1	2				1	3	2	2	3	2	1	2
CO2	3	1		1	1	2	2	2	3	2	1	2
CO3	3	1		1	1	2	2	2	3	2	1	2
CO4	3	1		1	1	2	2	2	3	2	1	2
CO5	2	1		1	1	2	2	2	3	2	1	2

3 - High 2 – Medium 1 – Low

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CSESC1001 : Programming for Problem Solving		
Teaching Scheme	**Examination Scheme**	
Lectures: 03hrs/ week	**ISE I**	**15Marks**
Credits: 03	**ISE II**	**15 Marks**
	ISE III	**10 Marks**
	End Semester Examination	**60 Marks**

Prerequisites: Nil

Course Objectives

- To understand the fundamentals of computer systems and programming.
- To understand the basic programming paradigms.
- To learn the conditional branching, iteration and recursion.
- To learn methodology which are essential for developing C programs.

Course Outcomes

Students will be able to:

CO1	Understand fundamentals of computer systems and programming.
CO2	Implement the basic programming paradigms
CO3	Able to develop C programs
CO4	Able to define data types and use them in simple data processing applications also he/she must be able to use the concept of pointers, array of structures
CO5	Develop confidence and ability for life-long learning needed for Computer language.

Detailed Syllabus:

Unit 1	**Introduction to programming:** Components of a computer system: Memory, processor, I/O Devices, storage, operating system, Concept of assembler, compiler, interpreter, loader and linker. Idea of Algorithm: Representation of Algorithm, Flowchart, Pseudo code with examples, From algorithms to programs, source code. Programming Basics: Structure of C program, writing and executing the first C program, Syntax and logical errors in compilation, object and executable code. Components of C language. Standard I/O in C, and memory locations, Storage classes.
Unit 2	**Introduction to C Language fundamentals:** The C character set, variables and constants, data types, keywords, expressions, statements, precedence, operators- arithmetic operators, size of() and ternary operators, relational & logical operators, conditional operators, type conversions , type casting.
Unit 3	**Conditional Branching, Loops and Function:** if, nested if, it else, nested if else switch, goto statement, Loop execution – For loop, while loop, Do while loop, break, and continue statements. Functions - Defining a function, passing arguments to functions, call by value, idea of call by reference, returning values from function, command line arguments, Local & Global, Formal variables concept, Recursion.
Unit 4	**Arrays:** Array's definition (1-D, 2-D), passing array to the function, String Operation-String copy, String length, String concatenation, String compare, Basic Sorting Algorithms (Bubble, Insertion and Selection).
Unit 5	**Structure and Pointers:** Introduction to structure and union. Array of structure, Passing structure as an object to function. Structure as a return type of function. Pointers- pointer as a variable, pointer to array, pointer as argument to function, notion of linked list.

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Text and Reference Books :

1. E. Balagurusamy; Programming in C, 3rd ed, Tata McGraw Hill.
2. K. R. Venugopal and S R Prasad, Mastering C, 3rd ed, Tata McGrath Hill.
3. Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, 2nd ed, Prentice Hall of India.
4. Problem Solving and Program Design in C, by Jeri R. Hanly, Elliot B. Koffman, Pearson Addison-Wesley, 2006.
5. Let Us C By Yashwant P. Kanetkar.

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CSESC1002: LAB PROGRAMMING FOR PROBLEM SOLVING		
Teaching Scheme	**Examination Scheme**	
Practical: 02 Hrs/Week	**ISE III**	**25 Marks**
Credits: 01		

Course Outcomes:

After completion of this course students will be able to:

	Course Outcomes
CO1	Understand the development environment for compiling, debugging, linking and executing a C program.
CO2	Analyzing the complexity of problems, Modularize the problems into small modules and then convert them into programs
CO3	Apply the in-built functions and customized functions for solving the problems.
CO4	Document and present the algorithms, flowcharts, and programs in the form of user-manuals.
CO5	Demonstrate using of various technologies and tools for developing web sites.

List of the Experiments:

The student shall perform minimum ten experiments of the following using TURBO C&C++/ CodeBlocks

Sr. No.	Title of the Experiments	Skill / Knowledge Level	CO
1	Developing Flowchart and algorithm.	K2	CO5
2	Creating Pseudo code for C program.	K3	CO5
3	Simple program using scanf() and printf()	K3	CO1
4	Program using Control Statements	K3	CO2
5	Program using Loops	K3	CO2
6	Program to generate Fibonacci series and/or factorial of a number using recursive function	K3	CO3, CO4
7	Creating Web site using free web hosting	K3	CO5
8	Using arrays for sorting numbers -Write a C program to input elements in array and sort array elements in ascending or descending order.	K3	CO4
9	Program which shows use of call by value and call by reference	K3	CO3
10	Program to accept and display student information using structure.	K3	CO2, CO4
11	Program to pass structure/array as a parameter to a function	K3	CO3
12	Program to prepare monthly telephone bill	K3	CO2
13	Menu driven program for matrix addition and subtraction	K3	CO3
14	Program for matrix multiplication	K3	CO3

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ETVSE 1001 ELECTRONICS WORKSHOP I		
Teaching Scheme	**Examination Scheme**	
Practical: 04 Hrs/Week	**ISE II**	**25 Marks**
Credits: 02	**ISE III**	**25 Marks**

Laboratory Course Outcomes:

As an outcome of completing the Laboratory course, students will be able to:

CO1	Familiarize students with various electrical and electronics components.
CO2	Gain practical knowledge of testing and measuring components with hands-on experience.
CO3	Explore the usage and importance of electrical & electronics equipment
CO4	Understand the design and implementation of basic circuits on bread board and PCB.

List of Experiments:

Sr. No.	Details
1	Identification and information related to different types of Electrical and Electronics components. Resistor ,Capacitor ,Inductor, Transformer Diode, Transistor, LED
2	Study of lab equipment: CRO, Function generator, Power supply, Multimeter, Breadboard.
3	Testing of component using Multimeter & LCR- Q meter (Resistor, Capacitor, Diode, transistor LED etc.)
4	Information & applications of wires, cables, connector, fuses, switches, relays, display, cutter, wire stripper etc.
5	Implement and test the simple circuit on bread board with safety precaution. (Simple RL, RC, RLC, Rectifiers, clipper & clamper)
6	Printed Circuit Board (PCB) lab: Installation and basic information of Proteus software.
7	Draw the simple circuit and their layout using Proteus software.(Simple RL, RC, RLC, Rectifiers, clipper & clamper)
8	Comparative analysis of circuit implemented using bread board and Proteus software (simulation). (Simple RL, RC, RLC, Rectifiers, clipper& clamper)
9	Perform drilling, masking, etching, soldering, de-soldering etc, operations to prepare Printed Circuit Board (PCB)
10	Design and fabrication of single sided Printed Circuit Board (PCB) for A simple circuit with manual etching (Ferric chloride) and drilling.
11	Mini-project: Design the regulated power supply to generate 5V & 12V supply.

Mapping of Course outcome with Program Outcomes:

Course Outcome	PO1	PO2	PO3	PO4	PO 5	PO6	PO7	PO8	PO9	PO1 0	PO 11	PO 12	PS O1	PS O2	PS O3
CO1	3	-	1	-	-	2	-	-	-	-	-	1	2	2	1
CO2	2	2	1	-	2	1	-	-	-	-	-	-	1	1	1
CO3	2	2	1	1	2	1	1	-	-	-	-	-	1	1	1
CO4	2	2	2	1	2	1	1	-	-	-	-	-	1	2	1

3 – High 2 – Medium 1 – Low

Assessment:

ISE: Shall be based on the assessment of submission work and interaction with students till the end of the term.

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Assessment Pattern:

Assessment Pattern Level No.	Knowledge Level	ISE II	ISE III
S1	Remember	10	10
S2	Understand	10	10
S3	Apply	05	05
S4	Analyze	-	-
S5	Evaluate	-	-
	Create	25	25

Assessment table:

Assessment Tool	S1	S2	S2	S3
	CO1	CO2	CO3	CO4
ISE II	05	05	10	05
ISE III	05	05	10	05

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ETIKS1001: INDIAN KNOWLEDGE SYSTEMS		
Teaching Scheme	**Examination Scheme**	
Lectures: 02hrs/ week	**ISE I**	**10Marks**
Credits: 02	**ISE II**	**10 Marks**
	End Semester Examination	**30 Marks**

Course description:

Indian Knowledge Systems (IKS) will introduce the students to the breadth and depth of India's intellectual, scientific, and artistic knowledge traditions. The course is designed to give exposure about our ancient culture and heritage. Ancient Indians were very much civilized and had proper systems in every aspect of life. Every branch of knowledge was well developed e.g., Mathematics, Geometry, Astronomy, Science, Medicine etc. The course deals with exposure to such aspects of Ancient Indian culture to budding technocrats.

Course Objectives:

The course has the following objectives:

- To introduce Indian culture
- To give exposure to Indian heritage
- To build confidence and self-respect

Course Outcomes:

After completing the course, students will be able to:

CO1	Explain the golden era of Ancient India
CO2	Understand Engineering aspects of Ancient India
CO3	Preserve and disseminate IKS

Detailed Syllabus:

Unit 1	**Indian Knowledge Systems** – An Introduction, Number Systems and Units of Measurement: 1. Number systems in India - Historical evidence 2. Salient aspects of Indian Mathematics 3. Bhūta-Saṃkhyā system 4. Kaṭapayādi system 5. Measurements for time, distance, and weight 6. Piṅgala and the Binary system
Unit 2	**Mathematics:** 1. Introduction to Indian Mathematics 2. Unique aspects of Indian Mathematics 3. Indian Mathematicians and their Contributions 4. Algebra 5. Geometry 6. Trigonometry 7. Binary mathematics and combinatorial problems in ChandaḥŚāstra 8. Magic squares in India
Unit 3	**Engineering and Technology: Metals and Metalworking**: 1. Wootz Steel: The rise and fall of a great Indian technology 2. The Indian S & T heritage 3. Mining and ore extraction 4. Metals and metalworking technology 5. Iron and steel in India 6. Lost wax casting of idols and artifacts 7. Apparatuses used for extraction of metallic components
Unit 4	**Engineering and Technology**: Other applications: 1. Irrigation systems and practices in South India 2. Literary sources for science and technology 3. Physical structures in India 4. Irrigation and water management 5. Dyes and painting technology 6. The art of making perfumes 7. Surgical techniques 8. Shipbuilding 9. Sixty-four art forms (64 Kalās) 10. Status of Indigenous S & T

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Text and Reference Books:

1. Mahadevan, B., Bhat Vinayak Rajat, Nagendra Pavana R.N. (2022), "Introduction to Indian Knowledge System: Concepts and Applications", PHI Learning Private Ltd. Delhi. Pride of India: A Glimpse into India's Scientific Heritage, Samskrita Bharati, New Delhi.
2. Sampad and Vijay (2011). "The Wonder that is Sanskrit", Sri Aurobindo Society, Puducherry.
3. Bag, A.K. (1979). Mathematics in Ancient and Medieval India, Chaukhamba Orientalia, New Delhi.
4. Datta, B. and Singh, A.N. (1962). History of Hindu Mathematics: Parts I and II, Asia Publishing House, Mumbai.
5. Kak, S.C. (1987). "On Astronomy in Ancient India", Indian Journal of History of Science, 22(3), pp. 205–221.
6. Subbarayappa, B.V. and Sarma, K.V. (1985). Indian Astronomy: A Source Book, Nehru Centre, Mumbai.
7. Bag, A.K. (1997). History of Technology in India, Vol. I, Indian National Science Academy, New Delhi.
8. Acarya, P.K. (1996). Indian Architecture, MunshiramManoharlal Publishers, New Delhi.
9. Banerjea, P. (1916). Public Administration in Ancient India, Macmillan, London.
10. Kapoor Kapil, Singh Avadhesh (2021). "Indian Knowledge Systems Vol – I & II", Indian Institute of Advanced Study, Shimla, H.P.

Mapping of Course outcome with Program Outcomes:

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1								1	2	3		2			
CO2								1	2	3		2			
CO3								1	2	3		2			

3 – High 2 – Medium 1 – Low

Assessment:

ISE I: Shall be based on Class Tests/ Assignments/ Quizzes/ Field visits/Presentations/ Course Projects

ISE II: Shall be based on class test.

Assessment Pattern:

Assessment Pattern Level No.	Knowledge Level	ISE I	ISE II	End Semester Examination
K1	Remember	5	5	10
K2	Understand	5	5	20
K3	Apply			
Total Marks		**10**	**10**	**30**

Assessment table:

Assessment Tool	K1	K2	K2
	CO1	CO2	CO3
ISE I (10 Marks)	5	5	--
ISE II (10 Marks)	5	5	--
ESE Assessment (30 Marks)	10	10	10

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INCCC1001: YOGA (Co Curricular Course (Liberal Learning Course)		
Teaching Scheme	**Examination Scheme**	
Practical: 04 Hrs/Week	**ISE III**	**50Marks**
Credits: 02		

Course Description: Yoga - In today's stressful life, there is much more need to experience relaxation and remain focused. The inner connect is very much needed to retain stability. Beyond physical exercise there is much more to do in the field of Yoga. The content of this course includes Yoga, Pranayama, Meditation, Relaxation, rejuvenation and connection with our own self. The introduction of such an experiential course helps to boost self confidence and with regulation of mind through meditation improves concentration. Meditation is basically training of mind and helps to regulate it. Along with experiential learning, the students are also exposed to learnings contained in the supported literature.

Course Outcomes:

After completing the course, students will be able to:

CO1	Understand and perform Yoga Asanas
CO2	Gain knowledge about Pranayama and perform it.
CO3	Apply the concept of Mediation in everyday life and studies

Syllabus:

(1) Perfection in at least 3 types of Yoga-asana(Trikonasan, Konasan and Ushtrasan)

(2) Perfection in at least 3 types of Pranayama (Anulom-Vilom, Bhramari and Kapalbhati)

(3) Regular practice of Yoga-asanas, Pranayam and Meditation for 10 minutes during the allotted periods as per the time table and daily at home.

Text Books:

1) The Heartfulness way", Heartfulness Kamlesh Patel and Joshua Pollock
2) The Yoga Sutras of Patanjali — Sri Swami Satchidananda
3) The Yamas and Niyamas — Deborah Adele
4) Yoga Practices for Anxiety and Depression --- H. R. Nagendra & R. Nagarathana

Assessment:

The evaluation is based on participating and performing Yoga, Pranayama and meditation regularly and perfectly under the guidance by Yoga Teachers in class as per schedule. Meditation trainers will observe intrinsic goodness, right attitude and happy and joyous way of doing things.

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MABSC1004: MATHEMATICS II [For EE and E&TC]		
Teaching Scheme	**Examination Scheme**	
Lectures: 03 hrs/ week	**ISE I**	**15 Marks**
Tutorial: 01 hrs/ week	**ISE II**	**15 Marks**
Credits:04	**ISE III**	**10 Marks**
	End Semester Examination	**60 Marks**

Course description:

MABSC1004: MATHEMATICS II is compulsory course for Electrical engineering and Electronics & Telecommunications students.

Course Outcomes:

After completing the course, students will be able to:

	Course Outcomes	Bloom's Taxonomy Level	Unit
CO1	Define first order first degree ordinary differential equations, orthogonal trajectories; partial derivatives, Jacobian, Multiple integrals; Fourier Series, basic concepts of probability distributions.	K1	1,2,3,4,5
CO2	Summaries the First order First degree Linear Differential Equations; Partial, Total Derivatives; methods of solving Multiple Integrals; Fourier Series and Half Range Fourier series Expansion. Explain probability distribution.	K2	1,2,3,4,5
CO3	Identify Order of Differential Equation and exactness; Homogeneous function; Even and odd functions, Euler's coefficients for the Fourier Series.	K2	1,2,4,
CO4	Solve the First order Linear Differential Equations, Jacobians, Maxima and Minima of functions of two variables; Double and Triple Integrations;	K2	1,2,3
CO5	Apply knowledge of Differential equation to different Engineering Problems, Partial derivative; Multiple Integrals to find area and volume of solids, Fourier Series to Harmonic Analysis.	K3	1,2,3,4.

Detailed Syllabus:

Unit 1	**First order ordinary differential equations and its applications** Exact, linear and Bernoulli's equations, application of first order ordinary differential equations: orthogonal trajectories, simple electrical circuit, D'Alembert's principle, one dimensional conduction of heat.
Unit 2	**Multivariate Calculus [Differentiation]** Limit, continuity, partial derivatives, Euler's theorem on homogeneous functions, implicit functions, composite functions, total derivatives, Jacobians and their applications, error and approximations, maxima and minima of functions of two variables, saddle points, Lagrange's method of undermined multipliers.
Unit 3	**Multiple integrals and its applications** Double and triple integrals (Cartesian and polar), change of order of integration in double integrals, change of variables (Cartesian to polar), applications: to find area and volume.
Unit 4	**Fourier Series** Fourier Series (Dirichlet's conditions), Periodic functions, convergence of the Fourier series, Euler's formula, Fourier series expansion with period 2π, 2L,Fourier series of even and odd functions, Half range sine and cosine series, applications to harmonic analysis.
Unit 5	**Probability Distribution** Discrete probability distributions - Binomial distribution, Poisson distribution, Continuous Distribution - Normal distribution, Uniform distribution, Exponential distribution.

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Text Books

6. Erwin Kreyszing, Advanced Engineering Mathematics, 10thEdition, Mumbai: Willey Eastern Ltd. 2015.
7. B. S. Grewal, Higher Engineering Mathematics, 44th Edition, New Delhi: Khanna publication, 2017.
8. Ramana B.V.Higher Engineering Mathematics,11 th Reprint, New Delhi: Tata McGraw Hill, 2010.
9. David Poole, Linear Algebra: A Modern Introduction, 3rd Edition, USA: BROOKS/COLE CENGAGE Learning, 2011.
10. Ravish R. Singh, Mukul Bhatt, Engineering Mathematics- A tutorial approach, 4th Edition, New Delhi: Tata McGraw Hill Education Pvt. Ltd.2018.

Reference Books

3. Dass H.K.Advanced Engineering Mathematics, 22nd Edition, New Delhi: S. Chand publications, 2018.
4. P. N. Wartikar and J. N. Wartikar, A text book of Engineering Mathematics (Vol. 1 & 2), Reprint, Pune :Pune Vidhyarthi Griha prakashan, 2013.

Mapping of Course outcome with program outcomes:

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

(Values in the mapping tables: 3 –HIGH, 2 – MEDIUM, 1 – LOW)

Assessment: ISEI, II, III (Class Test-1, Class Test-2, TA) & ESE

TA: Students will perform one or more of the following activities

1. Surprise Test
2. Assignment using Mathematical tools like Mathematical/ MatLab or similar.
3. Quiz
4. Any other activity suggested by course coordinator

Assessment Pattern:

Assessment Pattern Level No.	Knowledge Level	ISE I (Class Test-1)	ISE II (Class Test-2)	ISE III (TA + Surprise Test)	End Semester Examination
K1	Remember	5	5		10
K2	Understand	10	10	2	38
K3	Apply			8	12
K4	Analyze				
K5	Evaluate				
K6	Create				
Total Marks 100		15	15	10	60

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PHBSC1002: OPTICS, SEMICONDUCTORS AND QUANTUM MECHANICS		
Teaching Scheme	**Examination Scheme**	
Lectures: 3 hrs/week	**ISE I**	**15 Marks**
Credits: 3	**ISE II**	**15 Marks**
	ISE III	**10 Marks**
	ESE	**60 Marks**

Course description: The course is mandatory course for first year B. Tech. Electronics and Telecommunication, Computer Science & Engineering and Information Technology programs for second semester. The course objective is to learn fundamental principles in Physics and to relate it real life situations.

	Course Outcomes	**Bloom's Taxonomy level**
CO1	Define thin film interference, Fraunhofer diffraction, resolving power, double refraction, spontaneous and stimulated emission, numerical aperture, acceptance angle of optical fibre, electric and magnetic fields, polarization, types of energy bands, group and phase velocity	K1
CO2	Explain the concepts interference, diffraction, polarization, optical resonator, propagation of light, semiconductors, uncertainty principle, Schrodinger wave equations	K2
CO3	Illustrate the engineering applications of interference, diffraction, polarization, lasers in industrial and medical applications, fibre optic sensors, semiconductors, uncertainty principle	K3
CO4	Identify, formulate and solve physical problems related to engineering	K4
CO5	Apply the fundamental principles of interference, diffraction, polarization, laser, optical fibre, semiconductors, quantum mechanics in engineering context	K5

Detailed Syllabus:

Unit 1	**Optics** Interference- interference due to thin film of uniform thickness, wedge shaped film, newton's rings formation and theory, anti-reflection coating. Diffraction- fraunhofer diffraction at single slit (geometrical method), conditions for maxima and minima, double slit diffraction, plane diffraction grating, rayleigh's criterion of resolution, resolving power of grating. Polarization- polarization by reflection, polarization by double refraction, phase difference and path difference, quarter wave plate, half wave plate, superposition of e-ray and o-ray, production of circularly and elliptically polarized light, Polaroid sheets.
Unit 2	**Laser and Fibre optics-** Laser- absorption, spontaneous and stimulated emission of radiation, meta-stable state, population inversion, pumping schemes, lasing action, optical resonator, construction and working of He-Ne gas laser, CO_2 laser, industrial and medical applications. Fibre optics- principle and propagation of light in optical fibre, numerical aperture and acceptance angle, types of optical fibres (material, refractive index, mode), fibre optical communication system (block diagram), fibre optic sensor
Unit 3	**Semiconductors-** band theory of solids, classification of solids on the basis of energy band theory, Fermi Dirac statistics, concept of Fermi level and its variation with temperature, density of states, position of fermi level in intrinsic semiconductor (with derivation) and in extrinsic semiconductor, conductivity of semiconductor, working of P-N junction from energy band diagram- forward and reverse biased, Hall effect in semiconductor.

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Unit 4	**Quantum Mechanics-** de-Broglie's hypothesis of matter waves, properties of matter waves, wave packet, phase velocity and group velocity, wave function, physical interpretation of wave function, Heisenberg's uncertainty principle, nonexistence of electron in nucleus, Schrodinger time dependent and time independent wave equations, particle in an one dimension and three dimension potential well.
Unit 5	**Electromagnetic waves-** The wave equation, plane electromagnetic waves in vacuum, their transverse nature and polarization, relation between electric and magnetic fields of an electromagnetic wave, energy carried by electromagnetic waves.

Text and Rereference books:

1. M. N. Avadhanulu, and P. G. Kshirsagar. *A Textbook Of Engineering Physics*, 5th ed. New Delhi: Scand and company Ltd., 2014
2. R. K. Gaur, S. L. Gupta. *Engineering Physics*, 14th ed. New Delhi: Dhanpat Rai and Sons Publications, 2012
3. M. R. Srinivasan, *Physics For Engineers*, 2nd ed. New Delhi: New Age International Publishers, 2009.
4. D. Halliday, and R. Resnic. *Fundamentals of Physics*, 9th ed. Noida: John–Wiley and Sons, 2010
5. Arthur Beiser, *Perspectives of modern Physics*, Mc-Graw Hill, US, 1969

Mapping of Course outcome with Program Outcomes and Program Specific Outcomes:

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2									2		
CO2	2											
CO3	2											
CO4	2											
CO5	2											

1- Low, 2- Medium, 3- High

Assessment: ISE I-Class Test-I of Maximum Marks-15

ISE II-Class Test-II of Maximum Marks-15

ISE III- Teacher's Assessment: Teachers Assessment of 10 marks is based on one of the / or combination of surprise test, assignment, quiz, any other activity suggested by course coordinator

ESE-End Semester Examination of Maximum Marks-60

Assessment Pattern:

Assessment Pattern Level	Knowledge Level	ISE I	ISE II	ISE III	End Semester Examination
K1	Remember	5	5	2	12
K2	Understand	5	5	6	18
K3	Apply	5	5	2	12
K4	Analyze				12
K5	Evaluate				6
K6	Create				
Total Marks 100		15	15	10	60

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Assessment table:

Course Outcome	CO1	CO2	CO3	CO4	CO5
Assessment Tool	K1	K2	K3	K4	K5
ISE I Class Test-I (15 Marks)	5	5	5		
ISE II Class Test-II (15 Marks)	5	5	5		
ISE III TA (10 Marks)	2	6	2		
ESE Assessment (60 Marks)	12	18	12	12	6
Total Marks 100	24	34	24	12	6

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PHBSC1003: LAB PHYSICS		
Teaching Scheme	**Examination Scheme**	
Practical:2Hrs/Week	**ISE III**	**25 Marks**
Credits:01		

Course Outcomes:

After completion of this course students will be able to:

	Course Outcomes
CO1	Demonstrate basic laws of Physics with experimental process
CO2	Conduct experiments to understand the relationship between variables in physical problems
CO3	Interpret experimental data to examine the physical laws
CO4	Illustrate the relevance between theoretical knowledge and means to imply it in a practical manner by performing various experiments
CO5	Work in teams and understand the effective team dynamics.

List of the Experiments

The student shall perform minimum eight experiments of the following:

S.N.	Title of the Experiments	Skill / Knowledge Level	CO
1	e/m by Thomson's method.	S1/K2	CO3
2	Determination of radius of curvature of Plano-convex lens by Newton's ring.	S1/K1	CO1
3	Determination of the wavelength of light of a given source using diffraction grating.	S1/K2	CO1
4	Resolving power of telescope.	S1/K2	CO3
5	Study of C.R.O (amplitude and frequency measurement).	S1/K1	CO5
6	Specific rotation of sugar solution by Laurent's half shade polarimeter.	S1/K2	CO4
7	Determination of band gap of a semiconductor.	S1/K2	CO3
8	To study temperature dependence of resistivity of a semiconductor using four probe method.	S1/K2	CO3 CO5
9	To determine the Hall coefficient of a semiconductor material and then evaluate carrier type and its density of charge carrier.	S1,S3/K2	CO1
10	Study of solar cell characteristics.	S1/K1	CO2 CO5
11	Determination of wavelength of Laser using grating.	S1,S2/K2	CO3
12	Determination of numerical aperture of an optical fiber.	S1,S3/K2	CO3
13	To plot the hysteresis loop of a given magnetic material (iron).	S1/K2	CO2
14	To study characteristics of photovoltaic cell.	S1/K2	CO3
15	Study of divergence of Laser beam.	S2,S3/K2	CO2 CO5

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16	To measure thickness of fine wire and grating element with the help of Laser source.	S1/K2	CO1
17	To draw V/I characteristics of forward & reverse biased P-N junction diode.	S1,S3/K2	CO3
18	Determination of velocity of sound through water using ultrasonic interferometer.	S1,S3/K2	CO3

Assessment: ISE I-Continuous Assessment of individual student in a batch during each experiment Maximum Marks-25

Assessment Pattern:

Assessment Pattern Level No.	**Knowledge Level**	**ISE I**
K1	Remember	10
K2	Understand	15
K3	Apply	
K4	Analyze	
K5	Evaluate	
K6	Create	
Total Marks		25

Assessment Pattern Level No.	**Knowledge Level**	**ISE I**
S1	Imitation	15
S2	Manipulation	05
S3	Precision	05
Total Marks		25

Mapping of Course outcome with Program Outcomes and Program Specific Outcomes

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3			2					3			
CO2	3			2								
CO3	3	3	2	2								
CO4	3	3	2	2								
CO5									2			

1-Low, 2-Medium, 3-High

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ETESC1001: Electronic Devices and Circuits		
Teaching Scheme	**Examination Scheme**	
Lectures: 03 hrs/ week	**ISE I**	**15 Marks**
Credits: 03	**ISE II**	**15 Marks**
	ISE III	**10 Marks**
	End Semester Examination	**60 Marks**

Course Description:

After the completion of this course, students will be able to understand working principles Of the semiconductor devices and their applications with frequency analysis response. This Will help students in learning dependent core courses.

Course Objectives:

- To acquaint the students with construction, theory and characteristics of various Semiconductor devices
- To lay a strong fundamental base of electronics
- To develop capacity to interpret and analyze different electronics circuits

Course Outcomes:

After completing the course, students will be able to:

CO1	Know the basics principles and construction of the semiconductor devices.
CO2	Understand the working of semiconductor devices and their characteristics
CO3	Describe various applications of semiconductor devices
CO4	Explain the working of amplifiers
CO5	Explore the feedback amplifiers
CO6	Illustrate the types of oscillators

Detailed Syllabus:

Unit 1	**Semiconductor and Diode Applications** Energy Band Diagram, mobility, types of semiconductors, drift and diffusion mechanism, current density, drift current density, diffusion current density, direct and indirect bandgap semiconductors Review of the device construction, operation, characteristics, voltage and current equations for PN junction diode, Zener diode, Laser diode. Half Wave, Full Wave and Bridge Rectifiers, Clippers and Clampers, Over-voltage protection circuits
Unit 2	**BJT (Bipolar Junction Transistor)** Device structure and symbol, basic operation, Input and Output Characteristics, Transistor configurations, BJT biasing, Stability factor, h-parameters, transistor amplifier, Hybrid – π parameter.
Unit 3	**FET (Field Effect Transistor)** Structure, symbol, basic operation, drain and transfer characteristics, biasing arrangements for JFET and MOSFET. Review of device construction, operation, characteristics, voltage & current equations and applications for MOSFET and JFET, CMOS.
Unit 4	**Feedback Amplifiers and Oscillators** Introduction, The Basic concepts of Feedback, Effect of Negative Feedback, Types of Negative Feedback Connections, Method of Identifying Feedback Topology and Feedback Factor, Stability of Feedback Amplifier. Single stage and multistage and differential amplifiers Barkhausen criteria of stability, Types of oscillators -Wien bridge, Hartley, Colpitts and Crystal oscillators

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Unit 5	**Power Amplifiers** Non-switching Amplifiers- Class A, Class B, Class C, Class AB, Class B Push-pull, Cross-over distortion in Class B Push-pull. etc.

Text and Reference Books

1. Boylestad &Nashelsky, *Electronics Devices & Circuits*, 10th edition, Pearson Education 2009
2. Millman &Halkias, *Electronic Devices & Circuits*, 4th edition, McGraw Hill Education, 2015
3. D. A. Neamen, *Electronic circuit analysis and design*, 2nd edition, Irwin Professional Publishing, 1996
4. S.Salivahanan, N Sureshkumar, *"Electronic Devices and Circuits"*, 3rd edition, McGraw Hill Publication 2012
5. J.B. Gupta, *"Electronic Devices and Circuits"*, 6th Edition, Katson Education Series 2009

Mapping of Course outcome with Program Outcomes

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	2	1								2			2		
CO2	2	1								2			2	1	
CO3	2	2	2	1	2				1	2			2	1	
CO4	1	3	2	2	2	1	1	1		2			2	2	1
CO5	3									2			2	1	1
CO6	3	3	1		3					2			2	1	1

3 – High 2 – Medium 1 – Low

Assessment:

ISE I:	Shall be on the basis of Class Tests/ Assignments/ Quizzes/ Field visits/ Presentations/ Course Projects
ISE II:	Shall be based on class test
ISE III:	Shall be on the basis of Class Tests/ Assignments/ Quizzes/ Field visits/ Presentations/ Course Projects

Assessment Pattern:

Assessment Pattern Level No.	**Knowledge Level**	**ISE I**	**ISE II**	**ISE III**	**End Semester Examination**
K1	Remember	05	00	02	10
K2	Understand	10	05	03	30
K3	Apply	00	10	05	20
K4	Analyze	00	00	00	00
K5	Evaluate	00	00	00	00
K6	Create	00	00	00	00
Total Marks 100		**15**	**15**	**10**	**60**

Assessment Table:

Assessment Tool	**K1**	**K2**	**K2**	**K2**	**K3**	**K3**
	CO1	**CO2**	**CO3**	**CO4**	**CO5**	**CO6**
ISE I (15 Marks)	05	05	05	00	00	00
ISE II (15 Marks)	00	00	00	05	05	05
ISE III (10 Marks)	02	0	03	00	02	03
ESE Assessment (60 Marks)	10	10	10	10	10	10

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ETESC1002: LAB ELECTRONIC DEVICES AND CIRCUITS		
Teaching Scheme	**Examination Scheme**	
Practical: 02 Hrs/Week	**ISE III**	**25 Marks**
Credits: 01		

Laboratory Course Outcomes:

As an outcome of completing the Laboratory course, students will be able to:

CO1	Know the testing of components
CO2	Understand of electrical circuits in practical applications
CO3	To analyze and design amplifier circuits, oscillators and filter circuits employing BJT, FET devices
CO4	Implement a hardwired circuit to test performance and application for what it is being designed.

List of Experiments:

Sr. No.	Details
1	To Test various Electronics components and equipment.
2	To calculate Efficiency and Ripple Factor in case of Half Wave, Full Wave & Bridge Rectifier and to observe the effect of load and filters.
3	To study of Series Positive Clipper, Series Negative Clipper, Shunt Positive Clipper and Shunt Negative Clipper Circuits.
4	To analyze the Drain and Transfer Characteristics of N- channel MOSFET.
5	To evaluate Input resistance, Output resistance and Current gain of NPN and PNP Transistor in CB, CC and CE Configuration also plot their characteristics.
6	To evaluate DC Drain resistance, Transconductance, Amplification factor and plot the V-I characteristics of JFET.
7	To plot the Frequency response of RC–Coupled amplifier.
8	To plot the Frequency response of a FET amplifier.
9	To design and functioning of Hartley Oscillator ,Colpitt Oscillator and Wein Bridge Oscillator.
10	To design Class A, Class B and Class AB Push-pull Amplifier.
11	To Study of the working principle of class C Amplifier, Differential amplifier and its operation at tuned frequency.

Mapping of Course outcome with Program Outcomes:

Course Outcome	PO1	PO2	PO3	PO4	PO 5	PO6	PO7	PO8	PO9	PO1 0	PO 11	PO 12	PS O1	PS O2	PS O3
CO1	3	3		2	2	1	2	2	2	2		1			
CO2	2	3		2					2	2		1			
CO3	1	2	3	2	2					2	1	1	2	2	2
CO4			3	3	2	1							2	2	2

3 – High 2 – Medium 1 – Low

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Assessment: **ISE III:** Shall be based on the assessment of submission work and interaction With students till the end of the term.

Assessment Pattern:

Assessment Pattern Level No.	**Knowledge Level**	**ISE III**	**ESE**
S1	Imitation	05	05
S2	Manipulation	15	15
S3	Precision	05	05
S4	Articulation	00	00
S5	Naturalization	00	00
Total Marks		25	25

Assessment table:

Assessment Tool	S1	S2	S2	S3
	CO1	CO2	CO3	CO4
ISE III (25 Marks)	05	05	10	05

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MEESC1001 ENGINEERING GRAPHICS		
Teaching Scheme	**Examination Scheme**	
Lectures: 02Hrs/ Week	**ISE I**	**10 Marks**
Credits: 02	**ISE II**	**10 Marks**
	End Semester Examination	**30 Marks**

Prerequisites: Nil

Course Description: All engineering activities (design/ manufacturing/ operation/ servicing) for any product from any discipline involve a team of people who communicate graphically. Hence, every engineer must have exposure and some competence in presenting ideas as pictures, and be able to unambiguously interpret drawing from others. This course will help develop basic visualization competency as well as ability to representing ideas on both paper and computer.

Course Outcomes:

After completing the course students will able to

Course Outcomes	
CO1	Understand concept of projection of line application in design.
CO2	Apply the concept to draw the basic views related to projections of Planes
CO3	Gain knowledge about orthographic projections
CO4	Sketch the different concepts of isometric projections

Detailed Syllabus:

Unit 1	**Projections of Lines and Planes** Projections of Straight Lines: Introduction to point, Projections of points in four quadrants, projections of points in reference plane, Introduction and concept of line, cases: - line parallel to both the plane, line parallel to one plane and perpendicular to the other. Plane cases: surface parallel to one reference plane and perpendicular to other reference plane, plane surface inclined to one reference plane and perpendicular to other reference, projections of planes inclined to both reference planes
Unit 2	**Orthographic Projections:** Types of lines, methods of dimensioning and types of dimensioning, Principle of orthographic projections (First and third angle orthographic projection methods) Exercise shall be consist of orthographic projection of different machine parts problem by first angle orthographic projection methods, all types sectional orthographic projections (First angle orthographic projection methods). Sectional view problem shall be solving consist of various mechanical components and by First angle orthographic projection methods.
Unit 3	**Isometric view:** Isometric Views: Introduction to pictorial views, isometric scale, isometric projections and different machine parts isometric views problems on various mechanical components.

Text and Reference Books

1. Engineering Graphics with an introduction to computer aided drafting, vol. I & II, H. G. Phakatkar, Nirali Prakashan, Pune. Feb 2007 onwards.
2. A Text book of Engineering Drawing, P.J. Shah, S. Chand & company Ltd., New Delhi. 2009
3. Engineering Drawing, R. V. Mali & Chaudhari, Vrinda Publication, Jalgaon 1998 onwards.
4. Kulkarni, D. M., Rastogi, A. P. and Sarkar, A. K., Engineering Graphics with

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AutoCAD, PHI 2009
5. Engineering Drawing and Graphics + AutoCAD, K. Venugopal, New Age International Publishers, New Delhi,2007
6. Engineering Drawing, Bhatt N. D., Paschal V. M., Charotar Publishing House 2008 onwards
7. Engineering Graphics, Vol.-I and Vol.-II, Dhabhade M. L., Vision Publications 2003 onwards
8. Engineering drawing – P.S Gill, S. K. Kataria publication.2012 onwards.

Assessment:

ISE I: Shall be on the basis of Class Tests / Assignments / Quizzes / Field visits / Presentations / Course Projects on first unit.

ISEII: Shall be based on class test on Second unit.

Assessment Pattern:

Assessment Pattern Level No.	Knowledge Level	ISEI	ISEII	End Semester Examination
K1	Remember			
K2	Understand	5	5	9
K3	Apply	5	5	12
K4	Analyze			9
K5	Evaluate			
K6	Create			
TotalMarks50		10	10	30

Assessment table:

Assessment Tool	K2, K3	K2, K3	K2, K3	K4
	CO1	CO2	CO3	CO4
ISEI(10 Marks)	5	5		
ISEII (10Marks)			10	
	K2 to K4	**K2 to K4**	**K2 to K4**	**K2 to K4**
ESE Assessment(30Marks)	6	6	6	6
Total Marks 50	11	11	16	6

Mapping of Course outcomes with Program outcomes:

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

1 – Low, 2 – Medium, 3 – High

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MEESC1005: LAB ENGINEERING GRAPHICS SKILLS		
Teaching Scheme	**Examination Scheme**	
Practical: 02 Hrs/Week	**ISE III**	**25 Marks**
Credit: 01		

Course Outcomes:

After completing the course students will able to

Course Outcomes	
CO1	Understand the conventions and the methods of engineering drawing
CO2	Improve their visualization skills so that they can apply these skills in developing new Products.
CO3	Become proficient in drawing the projections of various machine components.

List of the Experiments:

The student shall perform following experiments:

Sr. No.	Title of the Experiments
1	Introduction to Computer Graphics (CAD) Demonstrating of the theory of CAD software, Standard Toolbars and Basic operations used like, Object Properties, Draw, Modify and Dimension, Select and erase objects etc. in CAD software package
2	Drawing two problems based on projections of lines on drawing sheet
3	Drawing two problems based on projections of planes on drawing sheet
4	Drawing two problems based on sectional orthographic projections on drawing sheet and 2 problems using CAD software tool.
5	Drawing two problems based on sectional Isometric projections on drawing sheet and 2 problems using CAD software tool.

Assessment Pattern:

Assessment Pattern Level No.	**Knowledge Level**	**ISEIII**	**ESE**
S1	Imitation	5	
S2	Manipulation	10	
S3	Precision	10	
S4	Articulation		
S5	Naturalization		
S6			
Total Marks 25		25	

Assessment table:

Assessment Tool	**S1 to S3**	**S1, S2**	**S1**
	CO1	CO2	CO3
ISEIII TW (25 Marks)	10	10	5
Total Marks 25	10	10	5

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Mapping of Course outcomes with Program outcomes:

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	2										
CO2			3							1		
CO3	1			2								

1 – Low, 2 – Medium, 3 – High

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ETVSE1002: Engineering Exploration		
Teaching Scheme	**Examination Scheme**	
Practical: 04 Hrs/Week	ISE II	25 Marks
Credits: 02	ISE III	25 Marks

Course Outcomes:

As an outcome of completing the course, students will be able to:

CO1	Explain the role of an Engineer as a problem solver
CO2	Identify multi-disciplinary approach required in solving an engineering problem
CO3	Build simple mechanisms using engineering design process
CO4	Interface different peripherals to Arduino
CO5	Apply basics of engineering project management skills
CO6	Analyze engineering solutions from ethical & sustainability perspectives

Engineering Exploration is a Project-based learning (PBL) based course wherein students will apply their technical knowledge, practical skills to develop a project in a team. A group of 5 students (max) normally will be permitted in a team. A set of need statements will be prepared by team members with the help of course coordinators. These need statements will be converted to Problem Statements. Students will follow Engineering Design process to develop conceptual design and detailed design.

Few of the activities which can be carried out are:

- Catapult design, weight bearing structure using newspapers, bridge making, activity with straws, colored paper, box of straws, football with papers, paper plane.
- How do you think Engineering design case studies for designing Panipuri/ tea/ coffee vending/pan making vending machines, grass cutter/mower machine, winding machines, chips making machine, home automationetc (block diagram and components in different blocks), Pugh chart examples.
- Building mechanisms using gears and other components, design mechanisms using linkages, auto inventor for model designing.
- Arduino based experimentation and programming.
- Preparation of timelines for project management.
- Presentation of case studies for ethics, sustainability, and carbon footprint.

Detailed Syllabus:

	Content
Module 1	**Introduction to Engineering and Engineering Study** **2 Hrs** Introduction to Engineering and Engineering Study: Difference between science and engineering, scientist and engineer needs and wants, various disciplines of engineering, some misconceptions of engineering, Expectation for the 21st century engineer and Graduate Attributes.
Module 2	**Engineering Design** **15 Hrs** Engineering Design Process, Multidisciplinary facet of design, Pair wise comparison chart, Introduction to mechatronics system, generation of multiple solution, Pugh Chart, Motor and battery sizing concepts, introduction to PCB design
Module 3	**Mechanisms 4 Hrs** Basic Components of a Mechanism, Degrees of Freedom or Mobility of a Mechanism,4 Bar Chain, Crank Rocker Mechanism, Slider Crank Mechanism.

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Module 4	**Platform Based Development** Introduction to various platform-based development (Arduino) programming and its essentials, Introduction to sensors, transducers and actuators and its interfacing with Arduino, Introduction to Data Acquisition and Analysis	**12 Hrs**
Module 5	**Project Management** Introduction to Agile practices, Significance of teamwork, Project management tools: Checklist, Timeline, Gantt Chart, Significance of documentation	**3 Hrs**
Module 6	**Sustainability and Ethics in Engineering** Introduction to sustainability, Sustainability leadership, carbon footprint Identifying Engineering as a Profession, Significance of Professional Ethics, Code of Conduct for Engineers, Identifying Ethical Dilemmas in different tasks of engineering, Plagiarism check for research papers	**4 Hrs**
Total Contact Hours		**40 Hrs**
Course Project Reviews Evaluation of group projects		**08 Hrs**

Mapping of Course outcome with Program Outcomes and Program Specific Outcomes

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	1				1					1	1			
CO2	2	2	2	1	1				3	1					
CO3	2	2	3	2	2	1	1		3	1	2		1	1	
CO4	2	2	2	2	2				1	1	2	1	3	1	1
CO5		2	2	2	2	1	1	1	3	1	3		1	1	1
CO6						1	3	3							

3 – High 2 – Medium 1 – Low

Evaluation Scheme			
Name of the Module	Hours	Marks	Evaluation
1.Introduction to Engineering & Engineering Study	02	3	ISE - II
2. Engineering Design	15	10	
3. Mechanisms	04	2	
4. Platform based development	12	10	
5. Project Management	03	5	ISE - III
6. Sustainability and ethics in Engineering	04	5	
7. Course Project Reviews	08	10	
8.Honor code	-	5	
TOTAL	48	50	

	CO1	**CO2**	**CO3**	**CO4**	**CO5**	**CO6**	**Total**
ISE II	03	10	02	10			25
ISE III		05		05	05	10	25

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INAEC1001: COMMUNICATION SKILLS		
Teaching Scheme	**Examination Scheme**	
Lectures:02hrs/week	**ISEI**	**10 Marks**
Credits:2	**ISEII**	**10 Marks**
	ESE	**30 Marks**

Course description:

Communication Skills (INAEC1001) is a one semester compulsory course for the first year students of all disciplines.

The course is aimed at introducing the basic of the communication skills. The goal of the course is to improve listening, speaking, reading and writing skills. Thus focus of syllabus is primarily on the development of communicative skills and fostering of ideas.

Course Outcomes:

After completing the course, students will be able to:

	Course Outcomes
CO1	Analyze the situation and overcome the barriers in speaking English and get the ability to communicate in professional as well as day to day life.
CO2	Develop personality through corporate etiquettes and take active participation in Discussion and other academic activities as well.
CO3	Apply proper words and structure in speaking English language and develop vocabulary and use of correct English.
CO4	Express them through oral as well as written communication and develop written Communication for professional and business purpose.
CO5	Use of E-Communication in day to day as well as professional life

Detailed Syllabus:

Unit1	**Communication Skills & Soft Skills** Basic concept, factor's, process and types of communication, principles of effective communication, barriers of communication, and how to overcome these barriers, basics of soft skills.
Unit2	**Non verbal Communication and Corporate Etiquettes** Body language and its different aspects, voice dynamics & voice modulation, professional appearance, clothing etiquettes and corporate dressing.
Unit3	**Remedial Grammar and Vocabulary Building** Parts of speech, types of tense, use of articles, synonyms and antonyms, Find out the grammatical errors in the given sentences.
Unit4	**Writing Skills and Business Correspondence** Letter writing, office documents like circulars, notices, minutes, agenda and memos report writings- technical report, academic report, accident report, resume writing
Unit5	**E-Communication** Introduction to multi-cultural, global cultural traits, email communication and email etiquettes

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Text and Reference Books

1. S .M .Rai and Urmila Rai, *Business Communication*, 1st ed, NewYork, USA, New royal book Company Publication, 2010
2. Leena Sen, *Communication skills*, 2nd Revised ed, Publisher- PHI Learning, 2007
3. William Sanborn, *Technical communication*, Delhi, Pearson publications, 2014
4. McGraw Hill briefcase books, *Presentation Skills for Managers*, United states, John A. Hill, 1888
5. Pravil S. R. Bhatia and S. Bhatia, *Professional Communication Skill*, 8th Revised ed, S Chand Publications, 2001
6. Daniel G. Riordan and Steven E. Pauley, *Technical Report Writing Today*, 10th ed, USA, Michael Rosenberg Publisher
7. B. N. Basu, *Technical Writing*,1st ed, NewDelhi, Prentice hall of India,2008
8. M.A Pink and S. E. Thomas., *English Grammar Composition & Effective Business Communication*, 12th ed, S Chand Publication, 1998
9. Sarah Freeman, *Written Communication in English*,1st ed, Orient Blackswan publication, 1996

Mapping of course outcome with Program outcomes and program specific outcomes:

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

1-Low,2-Medium, 3-High

INCCC1002: NSS/ INCCC1003: Sports/INCCC1004: Club Activities Co Curricular Course (Liberal Learning Course)		
Teaching Scheme	**Examination Scheme**	
Practical: 04 Hrs/Week	**ISE II**	**25Marks**
Credits: 02	**ISE III**	**25 Marks**

Course Description: Co-curricular activities are activities that take place outside of a course's curriculum but are related to academics in some way. Although involvement is not part of classroom instruction, it does supplement and enhance a student's academic experience.

NSS: Aim of NSS activities to Gain skills in mobilizing community participation; To acquire leadership qualities and democratic attitude; To develop the capacity to meet emergencies and national disasters; To practice national integration and social harmony. Types of Activities are not limited to Cleaning, Plantation
Blood Donation Camps, Awareness Rallies, Health Care Camps, Stage shows or a procession creating awareness of such issues as social problems, education and cleanliness but decided by Institute NSS Coordinator. Students will participate in NSS Activities throughout semester.

The evaluation is based on participation in regular NSS activities.NSS Coordinator along with departmental NSS coordinator will certify at the end of semester about participation. Program head will notify the exam section about awarding credits to the students.

Sports activity: Sporting Activities means performing or participating in the Sport in any capacity which includes, but is not limited to, participation in training, competitions, coaching or as an official.
Students will participate in Sports Activities throughout semester. Gymkhana vice president will coordinate along with sports coordinator of department. The coordinators will certify at the end of semester about participation. Program head will notify the examination section about awarding credits to the students. The evaluation is based on participation in regular sports activities.

Club activities: Government Engineering College Aurangabad has various clubs that focus on specific interests such as robotics, coding, literature, environment, etc. These clubs often organize events, workshops, and competitions that provide students with opportunities to learn new skills and showcase their talents. Students will participate in Club Activities throughout semester. Faculty coordinators will coordinate along with students bodies the activities of club.

The Faculty coordinators will certify at the end of semester about participation of students. Program head will notify the examination section about awarding credits to the students.

Dean Student's affairs and all program heads will formulate additional modalities for smooth conduction of co curricular activities as and when required.

ETPCC1001 SENSORS AND INSTRUMENTS		
Teaching Scheme	**Examination Scheme**	
Lectures: 02hrs/ week	**ISE I**	**10 Marks**
Credits: 02	**ISE II**	**10 Marks**
	End Semester Examination	**30 Marks**

Course description:

This course is electronics - based course dealing with Sensors and Instruments designed for students in Electronics Engineering. It is a theory course based on the use of electrical and electronics instruments for measurements. The course deals with topics such as Principle of measurements, Errors, Accuracy, Units of measurements and electrical standards, Q-meters, Digital Multimeters, recorders, principles of operation of transducers used for measurement.

Course Objectives:

- To understand the operation of different instruments
- To familiarize with various measurement methods & electronic measurement equipment's
- To analyze the signals using different analyzers
- To introduce transduction methods

Course Outcomes:

After completing the course, students will be able to:

CO1	Identify elements of setup for measurement of physical quantities and parameter.
CO2	Understand the various techniques for parameter measurement & study of signals.
CO3	Apply the complete knowledge of various electronics instruments / transducers to measure the Physical quantities in the field of science, engineering and technology.

Detailed Syllabus:

Unit 1	**Basics Instruments and bridge measurement**
	Introduction to measurements, Units and standards of measurement and their classification, Sensing and Transduction, Block diagram of Instrumentation system, Errors in measurements, Probability of errors, Static and Dynamic performance characteristics of Measuring Transducers Bridge measurement: Measurement of Voltage, Current, AC/DC Bridges such as Wheatstone, Kelvin, Maxwell, Hay, Schering, Wein bridge and their application.
Unit 2	**Transducer** Definition, classification, selection criterion, Resistive, Capacitive, Transducers, Hall Effect Transducer, piezoelectric, Thermocouple, strain gauge, Transducers for Measurement of Humidity, Pressure. Concept of smart sensor.
Unit 3	**Basic Parameter Measurement and analysis by Electronic Instrumentation** Block diagram of Digital Multimeter, Function generator, LCR Q-meter, Sound level meter, Recorders, CRO, DSO.

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Text and Reference Books:

1. W.D.Cooper,AD.Helfrick,ModernElectronicInstrumentationandMeasurements,
2. Edition,Prentice-Halloflndia,1985
3. H.S.Kalsi, Electronic Instrumentation and Measurements,4thEdition, TMH,2019
   B.Oliver,I.Cage, Electronic Measurements andInstrumentation,McGrawHill,2017
4. J.J.Carr,Elements of Electronics Instrumentation and Measurement Handbook, 3rd Edition, Pearson Education,2002
5. B.C. Nakra, K.K. Chaudhary, Instrumentation Measurement and Analysis, 2nd Edition, Tata McGraw Hill

Assessment:

ISEI:	Shall be based on Class Tests/ Assignments/Quizzes/Field visits/Presentations/ Course Projects
ISEII:	Shall be based on class test.

Mapping of Course outcome With Program Outcomes:

Course Outcome	PO I	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	POI 0	POI I	POI 2	PSO I	PSO 2	PSO 3
COI	2	2	-	-		-	-	-	-	-	-	-	I	-	I
CO2	2	2	-	-	2	-	-	-	-	-	-	-	2	-	1
CO3	3	2	-	-		1	1	-	-	-	-	-	2	-	I

Assessment Pattern:

Assessment Pattern Level No.	Knowledge Level	ISE1	ISEII	ESE
Kl	Remember	05	05	08
K2	Understand	05	05	12
K3	Apply	-	-	10
K4	Analyze	-	-	-
KS	Evaluate	-	-	-
K6	Create	-	-	-
Total Marks 50		**10**	**10**	**30**

Assessment table:

Assessment Tool	Kl	K2	K3
	COl	CO2	CO3
ISEI(10Marks)	05	05	-
ISEII(10Marks)	05	05	-
ESE(30Marks)	08	12	10

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