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. ***Tentative Credit Distribution and*** **Second Year to Final Year curriculum structure for the completion of B.Tech. in Information Technology degree with one Minor/Honors/Research:**

Structure of B. Tech.in Information Technology with multidisciplinary minor:

Course Types/ Semester	I	II	III	IV	V	VI	VII	VIII	Total
Basic Science Course	8	8		--	--	--	--	--	16
Engineering Science Course	7	7		--	--	--	--	--	14
Programme Core Course (PCC)	--	2	15	11	11	11	--	--	50
Programme Elective Course (PEC)	--	--	--	--	7	10	3	-	20
Multidisciplinary Minor (MD M)		-	4	3	4	3			14
Open Elective (OE) Other than a particular program	--	--	3	3	2	--	--		8
Vocational and Skill Enhancement Course (VSEC)	2	2		2		2	--	--	8
Ability Enhancement Course (AEC -01, AEC-02)		2	--	2	--	--	--	--	4
Entrepreneurship/Economics/ Management Courses	--		2	2				--	4
Indian Knowledge System (IKS)	2			--	--	--	--	--	2
Value Education Course (VEC)	--	--	2	2	--	--	--	--	4
Research Methodology	--	--	--	--	--	--		4	4
Comm. Engg. Project (CEP)/Field Project (FP)	--	--	2	--	--	--		--	2
Project	--	--	--	--	--	--	4	--	4
Internship/ OJT	--	---			--	--	6	6	12
Co-curricular Courses (CC)	2	2		--	--	--	--	-	4
Total Credits / Semester with MDM	**21**	**23**	**28**	**25**	**24**	**26**	**13**	**10**	**170**
Total Credits / Semester with Double MDM	**21**	**23**	**32**	**28**	**28**	**29**	**13**	**10**	**184**
Honors Credits/ Semester						4	8	6	18
Total Credits / Semester with MDM +Honors	**21**	**23**	**28**	**25**	**24**	**26**	**21**	**16**	**188**
Research Credits/ Semester							**9**	**9**	**18**
Total Credits / Semester with MDM+Research	**21**	**23**	**28**	**25**	**24**	**26**	**22**	**19**	**188**

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 170Credits**
2. **B.Tech with one Multidisciplinary Minor and Honor in A.I.M.L. =Total 188 Credits**
3. **B. Tech with one Multidisciplinary Minor and Honor by Research=Total 188 Credits**
4. **B.Tech with two Multidisciplinary Minors=Total 184 Credits**

Approved in XXV IIIth Academic Council
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Government College of Engineering, Aurangabad

(An Autonomous Institute)

Teaching and Evaluation Scheme from year 2023-2024

B. **Tech. Program in Information Technology with Multidisciplinary Minor- Semester I and II**

SEMESTER- I

Sr.No	Category	Course Code	Course Title	Hours per week			Credits	Continuous Evaluation in terms of Marks				Total
				L	T	P		ISE I	ISEI I	ISEII I	ESE	
1	BSC	MABSC1001	Mathematics-I	3	1	0	4	15	15	10	60	100
2	BSC	CHBSC1001	Electrochemistry, Battery Science and Engineering Materials	3	0	0	3	15	15	10	60	100
3	BSC	CHBSC1003	Lab Chemistry	0	0	2	1	-	-	25	-	25
4	ESC	ITESC1001	Programming in C	3	0	0	3	15	15	10	60	100
5	ESC	ITESC1002	Lab Programming in C	0	0	2	1	-	-	25	-	25
6	ESC	EEESC1011/ AMESC1002/ CEESC1001	Basics of Electrical Engineering/ Engineering Mechanics / Basics of Civil Engineering	2	0	0	2	10	10	-	30	50
7	ESC	EEESC1012/ AMESC1004/ CEESC1002	Lab Basics of Electrical Engineering Lab Engineering Mechanics Lab Basics of Civil Engineering	0	0	2	1	-	-	25	-	25
8	VSEC-1	ITVSE1001	Computer Workshop	0	0	4	2	-	-	50	-	50
9	IKS	ETIKS1001	Indian Knowledge Systems	2	0	0	2	10	10	-	30	50
10	CC	INCCC1001	Yoga	0	0	4	2	-	-	50	-	50
Total				**13**	**1**	**14**	**21**	**65**	**65**	**205**	**240**	**575**

SEMESTER- II

Sr.No	Category	Course Code	Course Title	Hours per week			Credits	Continuous Evaluation in terms of Marks				Total
				L	T	P		ISE I	ISEI I	ISEII I	ESE	
1	BSC	MABSC1003	Mathematics-II	3	1	0	4	15	15	10	60	100
2	BSC	PHBSC1002	Optics, Semiconductors and Quantum Mechanics	3	0	0	3	15	15	10	60	100
3	BSC	PHBSC1004	Lab Physics	0	0	2	1	-	-	25	-	25
4	ESC	ETESC1003	Basics of Electronics Engineering	3	0	0	3	15	15	10	60	100
5	ESC	ETESC1004	Lab Basics of Electronics Engineering	0	0	2	1	-	-	25	-	25
6	ESC	MEESC1001 MEESC1006	Engineering Graphics/ Basics of Mechanical Engineering	2	0	0	2	10	10	-	30	50
7	ESC	MEESC1005 MEESC1007	Lab Engineering Graphics/ Lab Basics of Mechanical Engineering	0	0	2	1	-	-	25	-	25
8	PCC	ITPCC1001	Computer Organization	2	0	0	2	10	10	-	30	50
9	VSEC-2	ETVSE1002	Engineering Exploration	0	0	4	2	-	-	50	-	50
10	AEC-01	INAEC1001	Communication Skills	2	0	0	2	10	10	-	30	50
11	CC	INCCC1002 INCCC1003 INCCC1004	N.S.S/ Sports/ Club Activities	0	0	4	2	-	-	50		50
Total				**15**	**1**	**14**	**23**	**75**	**75**	**205**	**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	EEMC	--			Research			

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B. **Tech. Program in Information Technology with Semester– III and IV**

SEMESTER- III

Sr.No	Category	Course Code	Course Title	Hours per week			Credits	Continuous Evaluation in terms of Marks				Total
				L	T	P		ISEI	ISEII	ISE III	ESE	
1	PCC	ITPCC2001	Discrete Mathematical Structures	3	0	0	3	15	15	10	60	100
2	PCC	ITPCC2002	Data Structures	3	0	0	3	15	15	10	60	100
3	PCC	ITPCC2003	Object Oriented Programming	3	0	0	3	15	15	10	60	100
4	PCC	ITPCC2004	Computer Networks	3	0	0	3	15	15	10	60	100
5	PCC	ITPCC2005	Lab Data Structures	0	0	2	1	-	-	25	25	50
6	PCC	ITPCC2006	Lab Object Oriented Programming	0	0	2	1	-	-	25	25	50
7	PCC	ITPCC2007	Lab Computer Networks	0	0	2	1	-	-	25	25	50
8	MDM	ITMDM5001/ ITMDM6001	Data Structures and Algorithm	3	0	0	3	15	15	10	60	100
9	MDM	ITMDM5002/ ITMDM6002	Lab Data Structures and Algorithm	0	0	2	1	-	-	25	-	25
10	OE	ITOEC0010	Data Structures and Algorithm	3	0	0	3	15	15	10	60	100
11	VEC	INVEC0010	Universal Human Values II	2	0	0	2	10	10	0	30	50
12	HSSM	ITEEM0010	Professional Ethics and Cyber Laws	2	0	0	2	10	10	0	30	50
13	EXL	ITEXL2001	Community based Project	0	0	4	2	-	-	50	-	50
Total				**22**	**0**	**12**	**28**	**110**	**110**	**210**	**495**	**925**

SEMESTER- IV

Sr.No	Category	Course Code	Course Title	Hours per week			Credits	Continuous Evaluation in terms of Marks				Total
				L	T	P		ISEI	ISEII	ISEIII	ESE	
1	PCC	ITPCC2010	Statistics, random variables and Linear Algebra	3	0	0	3	15	15	10	60	100
2	PCC	ITPCC2011	Database Management System	3	0	0	3	15	15	10	60	100
3	PCC	ITPCC2012	Operating Systems	3	0	0	3	15	15	10	60	100
4	PCC	ITPCC2013	Lab Database Management System	0	0	2	1	-	-	25	25	50
5	PCC	ITPCC2014	Lab Operating Systems	0	0	2	1	-	-	25	25	50
6	MDM	ITMDM5003 ITMDM6003	Introduction to Database Management Systems	3	0	0	3	15	15	10	60	100
7	OE	ITOEC1020	Introduction to Database Management Systems	3	0	0	3	15	15	10	60	100
8	VSEC-3	ITVSE2001	Lab Computer Programming I(Python Programming)	0	0	2	1	-	-	25	-	25
9	VSEC-3	ITVSE2002	Lab Computer Programming II (FSD -I)	0	0	2	1	-	-	25	-	25
9	AEC02	INAEC2002	Technical Communication	2	0	0	2	10	10	0	30	50
10	HSSM	ITEEM1010	Business Intelligence	2	0	0	2	10	10	0	30	50
11	VEC	INVEC1020	Environmental Science	2	0	0	2	10	10	0	30	50
				21	**0**	**8**	**25**	**105**	**105**	**150**	**440**	**800**

BSC	16	IKS	02	PCC	26	OE	06	MDM-I	07
ESC	14	VEC	04	PEC	--				
CC	04	AEC	04	E.L.	02	Honors	--	MDM-II	07
VSEC	06	EEMC	04			Research			

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SEMESTER- V

Sr.No	Category	Course Code	Course Title	Hours per week			Credits	Continuous Evaluation in terms of Marks				Total
				L	T	P		ISEI	ISEII	ISEIII	ESE	
1	PCC	ITPCC3001	Artificial Intelligence	3	0	0	3	15	15	10	60	100
2	PCC	ITPCC3002	Design and Analysis of Algorithm	3	0	0	3	15	15	10	60	100
3	PCC	ITPCC3003	Cloud Computing	3	0	0	3	15	15	10	60	100
4	PCC	ITPCC3004	Lab Design and Analysis of Algorithm	0	0	2	1	25			25	50
5	PCC	ITPCC3005	Lab Cloud Computing	0	0	2	1	25			25	50
6	PEC	ITPEC30XX	Professional Elective I	3	0	0	3	15	15	10	60	100
7	PEC	ITPEC30XX	Lab Professional Elective I	0	0	2	1	50			-	50
8	PEC	ITPEC30XX	Professional Elective II	3	0	0	3	15	15	10	60	100
9	MDM	ITMDM5004 ITMDM6004	Java Programming Artificial Intelligence	3	0	0	3	15	15	10	60	100
10	MDM	ITMDM5005 ITMDM6005	Lab Java Programming Lab Python Programming	0	0	2	1	25			-	25
11	OEC	ITOEC0030	Introduction to Machine Learning	2	0	0	2	10	10	0	30	50
				20	**0**	**8**	**24**	**225**	**100**	**60**	**440**	**825**

SEMESTER- VI

Sr.No	Category	Course Code	Course Title	Hours per week			Credits	Continuous Evaluation in terms of Marks				Total
				L	T	P		ISEI	ISEII	ISE III	ESE	
1	PCC	ITPCC3010	Theory of Computation	3	0	1	4	15	15	10	60	100
2	PCC	ITPCC3011	Machine Learning	3	0	0	3	15	15	10	60	100
3	PCC	ITPCC3012	Software Engineering	3	0	0	3	15	15	10	60	100
4	PCC	ITPCC3013	Lab Machine Learning	0	0	2	1	-	-	25	25	50
5	PEC	ITPEC30XX	Professional Elective III	3	0	0	3	15	15	10	60	100
6	PEC	ITPEC30XX	Lab Professional Elective III	0	0	2	1	-	-	25	-	25
7	PEC	ITPEC30XX	Professional Elective IV	3	0	0	3	15	15	10	60	100
8	PEC	ITPEC30XX	Professional Elective V	3	0	0	3	15	15	10	60	100
9	MDM	ITMDM5006 ITMDM6006	Python Programming Machine Learning	3	0	0	3	15	15	10	60	100
10	VSEC-3	ITVSE2001	Lab Computer Programming III	0	0	2	1	25			-	25
11	VSEC-3	ITVSE2002	Lab Computer Programming IV	0	0	2	1	25			-	25
Total Credits with MDM				**21**	**0**	**9**	**26**	**155**	**105**	**120**	**445**	**825**
12	Honors		Honors1	3	0	0	3	15	15	10	60	100
13	Honors		Lab Honors I	0	0	2	1	-	-	25	-	25
Total Credits with MDM + Honors				**24**	**0**	**9**	**29**	**145**	**120**	**155**	**505**	**925**

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SEMESTER- VII

Sr. No	Category	Course Code	Course Title	Hours per week			Credits	Continuous Evaluation in terms of Marks				Total
				L	T	P		ISEI	ISEII	ISEIII	ESE	
1	PEC	ITPEC40XX	Professional Elective VI	3	0	0	3	15	15	10	60	100
2	ELC		Project	0	0	8	4	50			50	100
3	ELC		Internship / On Job Training	0	0	12	6	100			50	150
Total Credits with MDM				**3**	**0**	**20**	**13**	**165**	**15**	**10**	**160**	**350**
4	Honors		Honors 2	3	0	0	3	15	15	10	60	100
5	Honors		Lab Honors 2	0	0	2	1	-	-	25	-	25
6	Honors		Honors 3	3	0	0	3	15	15	10	60	100
7	Honors		Lab Honors 3	0	0	2	1	-	-	25	-	25
Total Credits with MDM + Honors				**9**	**0**	**24**	**21**	**195**	**45**	**80**	**280**	**600**
9	Research		Research Project -I	0	0	18	9	-	-	50	50	100
Total Credits with MDM + Research				**3**	**0**	**38**	**22**	**165**	**15**	**60**	**210**	**450**

SEMESTER- VIII

Sr.No	Category	Course Code	Course Title	Hours per week			Credits	Continuous Evaluation in terms of Marks				Total
				L	T	P		ISEI	ISEII	ISEIII	ESE	
1	ELC		Research Methodology	4	0	0	4	15	15	10	60	100
2	ELC		Internship/OJT	0	0	12	6	25	25	50	100	200
Total Credits with MDM				**4**	**0**	**12**	**10**	**40**	**40**	**60**	**160**	**300**
3	Honors		Honors 4	3	0	0	3	15	15	10	60	100
4	Honors		Lab Honors 4	0	0	2	1	-	-	25	-	25
5	Honors		Project	0	0	4	2	-	-	25	25	50
Total Credits with MDM + Honors				**7**	**0**	**18**	**16**	**55**	**55**	**120**	**245**	**475**
6	Research		Research Project -II	0	0	18	9	-	-	50	50	100
Total Credits with MDM + Research				**4**	**0**	**30**	**19**	**40**	**40**	**110**	**210**	**400**

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Bridge Courses for exit:

The candidate should complete the internship of two months for 8 credits. OR

The candidate should pass the following Two courses of 8 credits.

After First Year:	**The candidate should complete the internship of two months for 8 credits along** **OR** **The candidate should pass the following Two courses of 8 credits to qualify for Diploma.** 1. Data Structures and Algorithms 2. Python Programming
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 for Diploma.** 1. Software Engineering 2. Cloud Computing
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.** Any two from the list of electives, except registered earlier

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Multidisciplinary Minor (IT Department)

This will be offered to students other than Information Technology

Theme: 1) **Computer Applications**

Total Credits: 14

Number of courses: 04

Sr.No.	Subject	Title of the course	Total credits	Offered in semester
01	ITMDM5001	Data Structures and Algorithms	3 + 0 + 0 = 03	III
	ITMDM5002	Lab Data Structures and Algorithms	0 + 0 + 1 = 01	III
02	ITMDM5003	Introduction to Database Management System	3 + 0 + 0 = 03	IV
03	ITMDM5004	Java Programming	3 + 0 + 1 = 03	V
	ITMDM5005	Lab Java Programming	0 + 0 + 1 = 01	V
04	ITMDM5006	Python Programming	3 + 0 + 0 = 03	VI

Multidisciplinary Minor (IT Department)

Theme: Artificial Intelligence and Machine Learning

Total Credits: 18

Number of courses: 04

Sr.No.		Title of the course	Total credits	Offered in semester
01	ITMDM6001	Data Structures and Algorithms	3 + 0 + 0 = 03	III
	ITMDM6002	Lab Data Structures and Algorithms	0 + 0 + 1 = 01	III
02	ITMDM6003	Introduction to Database Management System	3 + 0 + 0 = 03	IV
03	ITMDM6004	Artificial Intelligence	3 + 0 + 1 = 03	V
	ITMDM6005	Lab Python Programming	0 + 0 + 1 = 01	V
04	ITMDM6006	Machine Learning	3 + 0 + 0 = 03	VI

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Honors Degree offered will be B.Tech.(IT) Honors with Minor in

Theme: Artificial Intelligence and Machine Learning

Total Credits: 18 Number of courses: 04

Sr.No	Semester	Course Code	Course Title	Hours per week			Credits
				L	T	P	
1	6	HIT01XX01	Advanced Artificial Intelligence	3	0	1	4
2	7	HIT01XX02	Advanced Machine Learning	3	0	1	4
3	7	HIT01XX03	Advanced Speech and Natural Language Processing	3	0	1	4
4	8	HIT01XX04	Advanced Deep Learning	3	0	1	4
5	8	HIT01XX05	Project I	0	0	4	2
							18

List of *Entrepreneurship/Economics/ Management* Courses offered by the department:

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

Sr. No.	Course
1	Professional Ethics and Cyber Laws
2	Business Intelligence

Tentative List of Professional Electives

Professional Electives (I and III) (3+0+1)	Professional Electives(II,IV,V,VI) (3+0+0)
ITPE3001 Mobile Computing ITPE3002 Lab Mobile Computing	ITPE3031 Speech and Natural Language Processing
ITPE3003 Cryptography & Network Security ITPE3004 Lab Cryptography & Network Security	ITPE3032 Deep Learning
ITPE3005 Advanced DBMS ITPE3006 Lab Advanced DBMS	ITPE3033 Compiler Constructions
ITPE3007 Data Mining ITPE3008 Lab Data Mining	ITPE3034 Advanced Computer Architecture
ITPE3009 Data Mining ITPE3010 Lab Internet of Things	ITPE3035 High Performance Computing
	List of NPTEL/ MOOCS will be provided

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MABSC1001: MATHEMATICS I [For all branches except EEP 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**
	ESE	**60 Marks**

Course Description:
MABSC1001: MATHEMATICS I is compulsory course for first year B. Tech. Civil Engineering, Mechanical Engineering., Computer Science & Engineering and Information Technology 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, asymptotes of given curves.	K1	1,2,3,4,5
CO2	Summaries the Complex Numbers; Explain the Rank of Matrix, successive differentiation, Special functions (Beta and Gamma functions)	K2	1,2,3,4,5
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 sketch the approximate shape of the curves .	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 nulity 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 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	**Curve Tracing and its applications** Tracing of cartesian curves, polar curves and parametric equations, rectification of plane curves: cartesian and polar .

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

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

Course outcome	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	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

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

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

1. Surprise Test
2. Assignment using Mathematical tools like Mathematica / MatLab or similar.
3. Quize
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				

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CHBSC1001: Electrochemistry, Battery Science and Engineering Materials				
Teaching Scheme			**Examination Scheme**	
Lectures	3 Hrs/Week		**ISE I**	15 Marks
Total 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 & 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
Unit 2	**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
Unit 3	**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

Unit 4	**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
Unit 5	**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

	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

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

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13	Determination of Cloud & Pour point of lubricant oil.	S3/K2	CO3, CO2
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**	**PO 4**	**PO 5**	**PO6**	**PO 7**	**PO 8**	**PO9**	**PO10**	**PO1 1**	**PO1 2**
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

ITESC1001 : Programming in C		
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 Outcomes Students will be able to:

CO1	Understand fundamentals and structure of c programming language
CO2	Develop the basic programming skills for problem solving
CO3	Impart program writing skills using conditional statements branching, looping and functions
CO4	Apply the concept of pointers, arrays , structures and file handling
CO5	Develop a fundamental understanding of programming for problem solving ,so that they can switch over to any other language

Detailed Syllabus:

Unit 1	**Introduction to programming:** 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.
Unit 2	**Introduction to C Language fundamentals:** The C character set, variables and constants, data types, keywords, expressions, statements, precedence, operators- arithmetic operators, sizeof() and ternary operators, relational & logical operators, conditional operators, type conversions , type casting.
Unit 3	**Decision making. 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 and Strings:** Array's definition (1-D, 2-D), accessing, searching and sorting array elements. Passing array to the function, String Operation-String copy, String length, String concatenation, String compare,
Unit 5	**Structure and Pointers and File handling** 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. Introduction to datafilesandfilehandlinginC

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.

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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.

Mapping of Course outcome with Program Outcomes and Program Specific Outcomes

Course outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	1	1	1	1											
CO2	2	3	2	1									2	2	2
CO3	3	3	3	1	1								2	2	2
CO4	3	3	2	1	1								3	2	3
CO5	3	2	2	1	1								3	2	2

Assessment:
ISE I: Class Test-I of Maximum Marks-15
ISE II: Class Test-II of Maximum Marks-15
ISE III: Teacher's Assessment of Maximum Marks-10
Teachers Assessment of 10 marks is based on one of the / or combination of few of following
1) Quiz
2) Question & answer
3) Power point presentation
4)Any other activity suggested by course coordinator
ESE: End Semester Examination of Maximum Marks-60

Assessment Pattern:

Assessment Pattern Level	Knowledge Level	ISE I (Class Test-1)	ISE II (Class Test-2)	ISE III (TA + Surprise Test)	End Semester Examination
K1	Remember	05	00	00	12
K2	Understand	10	05	00	12
K3	Apply	00	10	00	12
K4	Analyze	00	00	05	12
K5	Evaluate	00	00	05	12
K6	Create	00	00	00	00
Total Marks 100		15	15	15	10

Assessment table:

Assessment Tool	**K1**	**K2**	**K3, K4**
	CO1, CO2	CO1, CO2,CO3	CO3,CO4 ,CO5
ISE I (15 Marks)	10	05	
ISE II (15Marks)	05	05	05
ISEIII(10)	00	05	05
ESE Assessment (60 Marks)	20	25	15
Total Marks 100	35	40	25

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ITESC1002 : Lab Programming in C		
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:	
CO1	Understand the development environment and structure of a C program.
CO2	Develop logic using basic syntaxes and simple codes
CO3	Apply concepts like decision making, looping, array, structures and pointers
CO4	Develop a fundamental understanding of programming for problem solving ,so that they can switch over to any other language

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

Sr. No.	Title of the Experiments	Skill / Knowledge Level	CO
1	Write C programs for getting familiar with syntax and structure of C-programming: Suggestive examples 1. Write a C program to display "Name of the student". 2. Write a C program using scanf() and printf() display data of different data types 3. Write a program to display the size of every data type using "sizeof" operator.	S2	CO1
2	Write C programs for getting familiar with basic operators and data types of C-programming: Suggestive examples 1. Write a C program to display Addition/ Subtraction/ Multiplication/ Division of two numbers 2. Write a program to illustrate the use of unary prefix and post fix increment and decrement operators. 3. Write a C program to calculate area and circumference of a circle	S2	CO1
3	Write C programs for getting familiar with Decision Statements (if,if-else, if-else-if ladder) of C-programming: Suggestive examples (Any one) 1. Write a program to find the largest and smallest among three entered numbers 2. Write a program to check number is Armstrong or not. 3. Write a program to compute grade of students using **if else ladder**.	S3	CO3,CO4, CO5
4	Write C programs for getting familiar with switch case : Suggestive examples (Any one) 1. Write a program to print grade of students. 2. Write a program to print day name of a week 3. Write a program to implement simple calculator	S3	CO3

5	Write C programs for getting familiar with Loops: Suggestive examples (Any two) 1. Write a program to print positive integers from1to10 using For, Do-while and While) 2. Write a program to find the factorial of a number. 3. Write a program to reverse a given integer 4. Write a program to print given pattern	S3	CO3,CO4,
6	Write C programs for getting familiar with different dimensions of Array 1. Write a program to declare an array and print elements of the array 2. Write a program to insert 5 elements into an array and print the elements of the array. 3. Write a program to perform addition of all elements in Array	S3	CO3,CO4,
7	Write C programs for getting familiar with use of functions, its types and function-call.(any one) 1. Write a program to calculate factorial of a number using recursion. 2. Write a program to find power of any number using recursion	S3	CO3,CO4,
8	Write C programs for getting familiar with Pointer, String and Function call by reference. 1. Write a program for the implementation of pointer arithmetic (Increment/Decrement of a Pointer, Addition of integer to a pointer) 2. Write a program to swap value of two variables using pointer. 3. Write a program to perform string operations	S3	CO3,CO4,
9	Write C programs for getting familiar with structures in C 1. Write a program to create, declare and initialize structure. 2. Write a program to store name, enrollment number and CET score of5studentsinstructureanddisplay	S3	CO3
10	Study of C programs for getting familiar with File Handling 1. Write a program to illustrate how a file stored on the disk is read	S2	CO4

Mapping of Course outcome with Program Outcomes and Program Specific 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	PSO 1	PSO 2	PSO 3
CO1	2	1	1	1											
CO2	2	3	2	1									2	2	2
CO3	3	3	3	1	1								2	2	2
CO4	3	3	2	1	1								3	2	3

3-High , 2-Medium , 1-Low

Assessment Table

Assessment Tool	S1	S2	S3
	CO1, CO2	CO2, CO3	CO2, CO3,CO4
Term Work (25 Marks)	05	10	10

Recommended Assessment pattern

Assessment Pattern Level No.	Skill Level	Term Work

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S1	Imitation	05
S2	Manipulation	10
S3	Precision	10
S4	Articulation	00
S5	Naturalization	00
Total		25

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

EEESC1011: Basics of Electrical Engineering	
Teaching Scheme **Lectures: 2 Hrs/Week** **Credits: 02**	**Examination Scheme** **ISE I : 10 Marks** **ISE II : 10 Marks** **End Semester Exam : 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:** Kirchoff'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)

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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

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

EEESC1012 : Lab Elements of Electrical Engineering		
Teaching Scheme	**Examination Scheme**	
Practical: 2Hrs/Week	**ISE III**	**25 Marks**
Credit:1		

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
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

AMESC1002 Engineering Mechanics		
Teaching Scheme	**Examination Scheme**	
Lectures: 03 hrs/ week	**ISE I***	**10 Marks**
Credits: 02	**ISE II***	**10 Marks**
	End Semester Examination	**30 Marks**

Prerequisites: Knowledge of vectors and scalars and preliminary knowledge of motion.

Course description: Engineering Mechanics is one of the basic subjects for the students of engineering, irrespective of their branches, since it help them to develop the logical thinking, analytical ability and enhance the imagination power. It introduces the students to various types of forces, their resultant, equilibrium of forces, analysis of various force system and the effect of forces on the state of motion of the body. Students will be exposed to C.G. and M.I. of the area and mass M.I of the bodies. They will also be exposed to dynamics of particle and rigid body.

Course Outcomes:

After completing the course, students will be able to:

	Course Outcomes
CO1	State and explain the relevant laws of statics and dynamics.
CO2	Determine resultant, identify the force system acting on bodies and perform static analysis of a given system.
CO3	Determine the centroid and compute moment of inertia of area and centroid of line.
CO4	Establish relations between kinematic parameters for different types of motion and compute the motion characteristics.
CO5	Apply the principles of kinetics to compute the motion parameters or related forces of a given system.

Detailed Syllabus:

Unit 1	Fundamental Concepts and Principles, Types of Force systems, Composition and Resolution of Forces, Moment of force, Couple, Resultant of Planar forces, Analytical and Graphical methods.
Unit 2	Free body diagrams, Equations of Equilibrium, Types of Supports and support reactions, Equilibrium of Co-planer force systems, Applications to beams, Theory and Laws of Friction, angle of friction, angle of repose, Cone of friction, application to plane friction.
Unit 3	Centroid of Plane figures and lines, Moment of Inertia of plane sections, Transformation theorems, Radius of gyration.
Unit 4	Kinematics of particles : Rectilinear Motion, Equations of Motion, Curvilinear motion in Cartesian and normal and tangential components, Motion of projectile.
Unit 5	Kinetics of particles: Newton's laws of Motion, D'Alembert's Principle, Equations of motion of particle motion of connected bodies. Principle of work and Energy, Principle of Impulse and Momentum and their applications to particles, Direct central impact.

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Text Books

1. Beer and Johnston, Mechanics for Engineers (Statics and Dynamics), McGraw Hill Co.Ltd.
2. A.K.Tayal, Engineering Mechanics, Umesh publications.
3. V.S. Mokashi, Engineering Mechanics Vol. I and II, Tata McGraw Hill Publishing Co. ltd., New Delhi.
4. S.S.Bhavikutti and K.G. Rajashekarappa, Engineering Mechanics, New Age International (P) Limited Publishers, New Delhi.

Reference Books:

1. F.L. Singer, Engineering Mechanics, Harper and Row Publishers, USA
2. Timoshenko and Young, Engineering Mechanics, McGraw Hill Co.Ltd.
3. R.C. Hibbeler, Engineering Mechanics (Statics and Dynamics), McMillan publications
4. Engineering Mechanics by McLean and Nelson, Schaum's Outline Series, McGraw Hill Co.Ltd. New Delhi

Mapping of Course outcome with Program Outcomes and Program Specific Outcomes

BE-Computer Science

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	2										1				
CO2	2										1				
CO3	1										1				
CO4	2										1				

1 : Low 2:Medium 3: High

BE-Information Technology

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	2								1						
CO2	2								1						
CO3	1								1						
CO4	2								1						

1 : Low 2:Medium 3: High

Assessment: 1) For assessment under ISE-I and ISE-II, two test of 10 marks each, Test-I and Test-II, will be conducted on prescribed syllabus (around first 1.5 to 2 Units for Test-I and 3rd and some portion of 4th Unit for Test-II).

Assessment Pattern:

Assessment Pattern Level No.	**Knowledge Level**	**ISE I**	**ISE II**	**End Semester Examination**
K1	Remember	02	-	03
K2	Understand	02	02	03
K3	Apply	06	08	24
K4	Analyze			
K5	Evaluate			
K6	Create			
Total Marks 100		10	10	30

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Assessment table:

Assessment Tool	K1 , K2	K3	K2, K3	K3	K3
	CO1	CO2	CO2,CO3	CO4	CO5
ISE I (10 Marks)	04	06	-	-	-
ISE II (10Marks)	02		06	02	
ESE Assessment (30 Marks)	06	06	06	06	06
Total Marks (50 Marks)	12	12	12	08	06

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AMESC1004 : Lab Engineering Mechanics		
Teaching Scheme	**Examination Scheme**	
Practical: 2Hrs/Week	**ISE I***	**25 Marks**
Credits:01	**ISE II***	**25 Marks**
	End Semester Evaluation	**-**

Course Outcomes:

After completion of this course students will be able to:

	Course Outcomes
CO1	Apply graphical method to solve problems of statics.
CO2	Demonstrate the principles of Engineering Mechanics experimentally and interpret the experimental results.
CO3	Solve numerical examples in statics and dynamics.

List of the Experiments/ Term Work

The student shall use graphical method to solve the problems of engineering mechanics (Sr. No. 1) and perform the experiments given below. They should also complete the tutorial problems of the subject Engineering Mechanics given by the teacher as a part of laboratory work.

Sr. No.	Title of the Experiments/Term Work	Skill / Knowledge Level	CO	Marks for ISE
1	Graphical solutions for the following problems a. Resultant of Coplanar Non Concurrent force system: i) At least one problem with resultant as a force ii) At least one problem with resultant as a couple b. Equilibrium of Coplanar Non Concurrent force system: At least one Problem c. Friction: At least one Problem	K2, K3	CO1	15
2	Following experiments shall be conducted. a. Polygon law of forces b. Law of moments c. Jib crane d. Beam reaction e. Friction f. Screw jack g. Fly wheel	K1, K2, K3	CO2	30

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3	Tutorial Problems a. At least three problem on each unit of the theory course of Engineering Mechanics. b. The tutorial problem needs to be solved by the student during the practical hours only.	K1,K2, K3	CO3	05

Assessment: **ISE-I:** Assessment will be based on understanding of theory/experiment, the performance of practical, completion of term work, completion of tutorial problems, participation in group activity etc. for half term and
ISE-II: Assessment will be done at the end of the term in similar manner as in ISE-I, however will be based on remaining half term.

Assessment Pattern:

Assessment Pattern Level No.	**Knowledge Level**	**ISE I**	**End Semester Examination**
K1	Remember	05	-
K2	Understand	15	-
K3	Apply	30	-
K4	Analyze	-	-
K5	Evaluate	-	-
K6	Create	-	-
Total Marks			-

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

BE-Civil Engineering

Course Outcome	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O 1	PS O 2
CO1	3	2	1	1	1								-	2
CO2	3	1	1	3	2								1	3
CO3	3	2	2	1	1								1	3

1 : Low 2:Medium 3: High

BE-Mechanical Engineering

Course Outcome	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O 1	PS O 2	PS O 3
CO1	3	1	1												
CO2	3	2	2	1	1										
CO3	3	2	2												

1 : Low 2:Medium 3: High

BE- Computer Science & Engineering

Course Outcome	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O 1	PS O 2	PS O 3
CO1	1	1									1				
CO2	2	3									1				
CO3	2	1									1				

1 : Low 2:Medium 3: High

BE-Information Technology

Course Outcome	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O 1	PS O 2	PS O 3
CO1	1			1					1						
CO2	2			3					1						
CO3	2			1					1						

1 : Low 2:Medium 3: High

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CEESC1001 Basics of Civil Engineering (For other than Civil Engg. Branches)

Teaching Scheme		Evaluation Scheme	
Theory	02 hrs/week	ISE I	10 Marks
Tutorial	00	ISE II	10 Marks
Total Credits	02	ISE III	
		End Semester Examination	30 Marks
		Total	50 Marks

Pre-requisites – Nil

Course Description: Objective of this course is to provide an insight and inculcate the essentials of civil engineering discipline to the students of all branches of Engineering and to provide the students an illustration of the significance of the civil engineering profession in satisfying the societal needs. Civil engineers plan, design, build, supervise and maintain infrastructure projects such as public and private utility buildings, roads, bridges, water supply and sewage treatment schemes, irrigation projects, etc. This course will give an understanding to the students of the vast breadth and various areas of engagement available in overall field of civil engineering.

Course Outcomes:

After completing the course, students will able to:

	Course outcomes
CO1	Explain terms related with building construction
CO2	Illustrate various surveying techniques
CO3	Explain the uses of civil engineering materials and explain the types of roads
CO4	Demonstrate construction equipments and term related with earthquake
CO5	Sketch Environment and Irrigation works

Detailed syllabus:

Unit I	Building Construction Early constructions and developments over time, ancient monuments and modern marvels, development of various materials of constructions and methods of constructions Site selection, principles of planning, typical plan of residential building, plinth area, carpet area, floor space index, cost of building, building bye-laws. Loads coming on structure, types of construction a) load bearing structure b) framed structure. Function of foundation, column footing, combined footing and machine foundation. Superstructure and its components typical cross section through load bearing wall, brick and stone masonry used for construction, technical terms related with doors, windows and stairs.

Unit 2	Geographical Measurement Principles of survey, measurement of distance by chain and tape, laser distance meter base line and offset equipments for laying offsets, prismatic compass, measurement of bearing and calculation of inclined angles, study and use of dumpy level, leveling staff, bench mark, determination of reduced levels, modern surveying equipments, remote sensing and GIS, uses of toposheets and contours
Unit 3	Civil Engineering Materials, Road construction and Water Resources Engg Study of properties and uses of different engineering materials a) bricks b) stones c) aggregates d) sand e) cement f) concrete g) steel h) paving blocks i) autoclaved aerated concrete blocks j) paints Classification of roads, Rigid and flexible pavements, typical road sections in cutting and embankment, function of camber, super-elevation, intelligent transport systems and road safety, various types of bridges. Watershed management. Roof top rainwater harvesting. Classification of dams, Water treatment and sewage treatment units, solid waste management.

Text and Reference books

1. PC Verghese "Building construction" 2nd PHI learning pvt ltd
2. NN Bask "Surveying and leveling" 2nd McGraw hill education
3. Garg SK "Irrigation Engineering and Hydraulics structures" 36th Khanna Publishers Delhi
4. Jai Krishna, Brijesh Chandra "Elements of earthquake engineering" 2nd South asian publishers
5. Shah Kale and Patki "Building Design and Drawing" 5th Tata McGraw Hill

Mapping of course outcomes with program outcomes and program specific outcomes

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

1-low, 2-medium, 3-high

CEESC1002 : Lab Basics of Civil Engineering

Teaching Scheme		Evaluation Scheme	
Theory	2 Hrs/ Week	ISE I	25 Marks
Total Credit	1	ISE II	
		ISE III	
		Practical Examination	25 Marks
		Total	50 Marks

Pre-requisites – Nil

Course Description: Objective of this course is to provide an insight and inculcate the essentials of civil engineering discipline to the students of all branches of Engineering and to provide the students an illustration of the significance of the civil engineering profession in satisfying the societal needs. Civil engineers plan, design, build, supervise and maintain infrastructure projects such as public and private utility buildings, roads, bridges, water supply and sewage treatment schemes, irrigation projects, etc. In this course the students will have to write the information of different civil engineering structures along with sketches wherever necessary. While drawing the sketches, students are expected to see the structures, measure the dimensions and conduct the practical If necessary.

Course Outcomes:

After completing the course, students will able to:

	Course outcomes
CO1	Explain terms related with building construction
CO2	Demonstrate the uses of basic surveying equipments
CO3	Explain the properties of materials and types of roads
CO4	Demonstrate construction equipments and term related with earthquake
CO5	Summarize the water, wastewater treatment units and types of dams.

Detailed syllabus:

The term work shall consist of at least 10 exercises of following nature. Individual subject teacher shall have freedom of including additional exercises.

1	Identify 5 ancient monuments and 5 modern marvels and list the uniqueness of each
2	Draw line plans of residential building/flats
3	Draw the plan and sectional elevation of door and window
4	Draw the plan and sectional elevation of staircase
5	Draw different types of foundations
6	Measure the dimensions of Room/Hall and furniture and write it
7	Find the level different between two stations by using level
8	Find out the latitude, longitude and reduced level of different stations, bearing of line by using software apps
9	Draw typical road sections in cutting and embankment
10	Identify three top new materials and write their potential in construction
11	Visit concrete technology laboratory/ strength of materials laboratory/ Geotechnical engineering laboratory and enlist the equipment and their uses.

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12	Explain the terms related with earthquake along with sketch
14	Explain different types of construction equipments
15	Draw the flow chart of water sewage treatment plant
16	Draw the section of earthen and gravity dams
17	Identify three different irrigation projects and write their features
18	Draw different types of roof top rainwater harvesting works
19	Enlist the different types of software used in civil engineering and their uses.

Text and Reference books

1. PC Verghese "Building construction" 2nd PHI learning pvt ltd
2. NN Bask "Surveying and leveling" 2nd McGraw hill education
3. Garg SK "Irrigation Engineering and Hydraulics structures" 36th Khanna Publishers Delhi
4. Jai Krishna, Brijesh Chandra "Elements of earthquake engineering" 2nd South asian publishers
5. Shah Kale and Patki "Building Design and Drawing" 5th Tata McGraw Hill

Mapping of course outcomes with program outcomes and program specific outcomes

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

1-low, 2-medium, 3-high

ITVSE1001 : Computer Workshop	
Teaching Scheme: 04Hrs/Week **Total Credits: 2**	**Examination Scheme** **ISE III :50 Marks**

Content
Module1:Introduction to Computer Hardware devices: Introduction and working of basic components: Motherboard, Processor, Memory and SMPS. Introduction and working of peripheral devices Keyboard, Mouse, Monitor, DVD Drive and Hard Drive. Understand system configuration. Step by step assembling and de-assembling a desktop computer.
Module2: Booting and Installation: Understand BIOS setup and booting process. Installation of operating system and external devices using device drivers.
Module3:Computer maintenance and troubleshooting: **PC Maintenance** : Creating data backup drives, Understanding Hard Disk Drive Space, Running the Disk Cleanup Program, Running the Disk Defragmenter Program Audio, Video, Display (Monitor),Hard Disk Drive, Hardware Installation, Internet Access, Keyboard and Mouse, Power, Performance
Module4:Introduction to computer network components Introduction of network components and their functions: Types of transmission mediums, switches and routers, modems. Model network topologies, Understand Types of networks, IP Addressing.
Module 5 : LAN setup and Internet connectivity Prepare Ethernet cables for networking. Set up wired LAN and wireless LAN with and without Internet access.
Module 6. Fundamentals of visualization and analysis Introduction to spreadsheet applications and Excel interface. Perform Basic spreadsheet operations and functions. Construction of tables to organize data and introduction to charts. Constructing various Line, Bar and Pie charts. Understanding and constructing Histograms and Scatterplots. Introduction to ICT tools

Course Outcome	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	1														
CO2	1			1	1		1	2			1				
CO3	1	2	1	2	1				2			2			
CO4	1	3	1	3								2			
CO5	1	2	1		1					2		2			

3 – High 2 – Medium 1 – Low

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ETIKS1001: Indian Knowledge Systems	
Teaching Scheme **Lectures: 2 Hrs/Week** **Total Credits: 02**	**Examination Scheme** **ISE I : 10 Marks** **ISE II : 10Marks** **End Semester Exam : 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 artefacts 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 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: 04Hrs/Week **Total Credits: 2**	**Examination Scheme** **ISE III :50 Marks**

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, Pranayam, 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 Depresion --- H. R. Nagendra & R. Nagarathana

Assessment:

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

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MABSC1003 : Mathematics II [For all branches except 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:
MABSC1003: MATHEMATICS II is compulsory course for Civil Engineering, Mechanical Engineering, Computer Science & Engineering and Information Technology 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, Directional Derivative, Gradients, Curl and divergence; Multiple integrals; Fourier Series.	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.	K2	1,2,3,4
CO3	Identify Order of Differential Equation and exactness; Homogeneous function, Gradient, Divergence and Curl; Even and odd functions, Euler's coefficients for the Fourier Series.	K2	1,2,4,5
CO4	Solve the First order Linear Differential Equations, Jacobians, Maxima and Minima of functions of two variables; Double and Triple Integrations; vector integration	K2	1,2,3,5
CO5	Apply knowledge of Differential equation to different Engineering Problems, Partial derivative; Multiple Integrals to find area and volume of solids; surface integral and volume integral using Green's theorem and Stoke's theorem, Fourier Series to Harmonic Analysis.	K3	1,2,3,4, 5

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	**Vector Calculus** Directional Derivative, Gradients, Curl and divergence. Vector integration : Line integral, Surface integral and volume integral, Green's Theorem, Gauss Divergence Theorem and Stoke's Theorem.

Text Books

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

Reference Books

1. Dass H.K. Advanced Engineering Mathematics, 22 nd 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 VidhyarthiGrihaprakashan, 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							1
CO5	3	3	1		2							1

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

Assessment : ISE I, 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 Mathematica/ MATLAB or similar.
3. Quiz
4. Any other activity suggested by course coordinator.

Assessment Pattern:

Assessment Pattern Level	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

Designed by

Prof. S. P. Atipamulu
Prof. S. D. Gadhire

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

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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, CO2 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.
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. NewDelhi: S.Chand and company Ltd., 2014
2. **R. K. Gaur, S. L. Gupta. *Engineering Physics*, 14th ed. NewDelhi: Dhanpat Rai and Sons Publications, 2012**
3. M. R. Srinivasan, *Physics For Engineers*, 2nd ed. NewDelhi: 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

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		

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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

PHBSC1004: 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
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

ETESC1003: Basics of Electronics Engineering	
Teaching Scheme	**Examination Scheme**

Lectures: 3 Hrs/Week	**ISE I**	**15 Marks**
Credits: 03	**ISE II**	**15 Marks**
	ISE III	**10 Marks**
	End Semester Examination	**60 Marks**

Course description:
After completing this course, students will have a broad and fundamental understanding of basic electronics. Students will be able to discuss the basic concepts of various electronics devices and communication techniques with some basic applications.

Course Objectives:

- To impart knowledge of basic electronics devices and its applications
- To create awareness of electronics communication concept
- To introduce basic concepts of consumer electronics and instruments

Course Outcomes:
After completing the course, students will able to:

	Course Outcomes
CO1	Describe the working principle of electronic diodes and transistors
CO2	Explain transistor configurations, their comparison and FET devices
CO3	Understand working of transistor as an amplifier and transistor as switch
CO4	Explain number system and logic gates
CO5	Describe arithmetic operations using digital logic
CO6	Illustrate difference between combinational and sequential logic

Detailed Syllabus:

Unit 1	**Diodes**: -PN junction diode, diode characteristics, diode as rectifier, half wave and full wave rectifier, bridge rectifier, Zener diode Operation, zener regulator, LEDs and Photo Diode
Unit 2	**Transistors:** Bipolar junction transistors, NPN & PNP transistors, structure, working of NPN transistor. Transistor configurations: common base(CB), common emitter(CE), common collector(CC), comparison of three configurations, common emitter configuration as an amplifier, transistor biasing, dc load line, Q-point, Transistor as a switch, Introduction to JFET, characteristics of MOSFET, CMOS devices
Unit 3	**Digital Fundamentals:** Number systems and codes: Binary, Octal, Hexadecimal; BCD, Excess-3, Gray code, error detecting and correcting codes Alphanumeric code. Basic logic gates; NOT, AND, OR gates, Universal Logic gates: NAND, NOR gates; Ex-OR, Ex-NOR gates
Unit 4	**Adder/Subtractor Circuits** : binary addition and subtraction, one's and two's complement arithmetic, Half /Full Adder, Half/Full Subtractor, 4-bit Binary adder chip, BCD arithmetic, BCD Adder circuit
Unit 5	**Combinational and Sequential Logic:** Boolean algebraic theorems, minimization using algebraic manipulations, k-maps up to 4-variables, realization of combinational logic circuits, Flip-flops : S-R, J-K, J-K master-Slave, T & D Flipflop, sequential logic circuit as an Asynchronous counter**.**

Text and Reference Books

1. Thomas L. Floyd, "Electronic Devices", Pearson Education, 9e,2011
2. R. G. Gupta, "Audio-Video Engineering", TMG,2e.
3. R. S. Sedha, "A textbook of Applied Electronics", S. Chand Publication.2e.
4. David A Bell, Electronic Devices And Circuits, Oxford University Press
5. Albert Paul Malvino, Electronic Principles, Tata McGraw- Hill
6. R. P. Jain, Modern Digital Electronics, McGraw- Hill, 4e.

Mapping of Course outcome with Program Outcomesand Program Specific Outcomes

Course outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	O 10	PO 11	PO 12	PS O 1	PS O 2	PS O 3
CO1	2	1	2												
CO2	2	1	2												
CO3	1	2													
CO4	1	2													
CO5		2	2												
CO6		2	2												

1 – Low2 – Medium 3 - High

Assessment:

ISE1 shall be either a written examination or a quiz or an assignment presentations as declared by the course coordinator

ISE2 shall be Class Test

ISE3 shall be based on one of the following or a combination of a few of the following as declared by the course coordinator :

1) Software Simulation
2) Application development
3) Power point presentation of case studies
4) Question & answer / Numerical solution
5) Mini projects

ESE shall be a written examination based on the complete syllabus

Assessment Pattern:

Assessment Pattern Level No.	Knowledge Level	ISE I	ISE II	ISE III	End Semester Examination
K1	Remember	07	08	03	15
K2	Understand	04	04	03	30
K3	Apply	04	03	04	15
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**	**K1**	**K3**	**K2**
	CO1	CO2	CO3	CO4	CO5	CO6
ISE I (15 Marks)	06	04	05	00	00	00
ISE II (15 Marks)	00	00	00	04	07	04
ISE III (10 Marks)	03	00	00	03	02	02
ESE Assessment (60 Marks)	08	08	09	15	12	08
Total Marks 100	17	12	14	22	21	14

ETESC1004: Lab Basics of Electronics Engineering		
Teaching Scheme	**Examination Scheme**	
Practical: 2Hrs/Week	**ISE III**	**25 Marks**
Credits:01	**End Semester Evaluation**	**--**

Course Outcomes:

After completion of this course students will be able to:

	Course Outcomes
CO1	Explain the characteristics plot of diode and its application as a rectifier/regulator
CO2	Explain the characteristics plot of transistor and its application as amplifier
CO3	Interpret the operation and working of various gates as a combinational logic
CO4	Interpret the operation and working of various flipflops as a sequential logic

List of the Experiments

The student shall perform following experiments

Sr. No.	Title of the Experiments	Skill / Knowledge Level	CO	Marks for ISE
1	Plot the input/output characteristics of P-N Junction diode	K2,S2	CO1	25
2	Observe the diode circuit as a half wave and full-wave rectifier	K2,S2	CO1	25
3	Observe the zener diode circuit as voltage regulator	K2,S2	CO1	25
4	Plot the input/output characteristics of N-P-N transistor in CB configuration	K2,S2	CO2	25
5	Study of common emitter transistor as an amplifier	K2,S2	CO2	25
6	Verify the operation of basic and universal logic gates	K2,S2	CO3	25
7	Realize the half/full adder/subtractor circuit using gates	K2,S2	CO3	25
8	Realize the 4-bit binary adder using integrated circuit	K2,S2	CO3	25
9	Realize the given Boolean algebraic expression using gates	K2,S3	CO3	25
10	Realize the following combinational logic circuits : i) Prime number detection ii) Binary number divisible by 03/divisible by 04	K2,S3	CO3	25
11	Study of Flipflops : S-R, J-K, T, D-Flipflop	K2,S3	CO4	25
12	Realize the asynchronous counter circuit using J-K Flipflop	K2,S3	CO4	25

Assessment:

ISE III will be evaluation of performance of students during the lab hours, based on timely completion of journals and given tasks, punctuality, attendance, clarity of aim and grasp of the experiment performed. ISE III marks will be allotted at the end of the semester. Marks will be the average of the marks obtained in performing experiments till end of the semester.

Assessment Pattern:

Assessment Pattern Level No.	**Knowledge Level**	**ISEIII**	**End Semester Examination**
S1	Imitation	05	--
S2	Manipulation	05	--
S3	Precision	05	--
S4	Articulation	00	--
S5	Naturalization	00	--
Total Marks		25	--

Mapping of Course outcome with Program Outcomes and Program Specific 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	PSO 1	PSO 2	PSO 3
CO1				1	3										
CO2		1													
CO3		1	2												
CO4				1	2										

3 –High 2 –Medium 1 -Low

MEESC1001: Engineering Graphics (For MECH/ETC/CSE/IT)		
TeachingScheme	**Examination Scheme**	
Lectures:02Hrs /Week	**ISEI**	**10Marks**
Credits:02	**ISEII**	**10Marks**
	EndSemesterExamination	**30Marks**

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 AutoCAD, PHI 2009
5. Engineering Drawing and Graphics + Autocad, K. Venugopal, New Age International Publishers, New Delhi,2007
6. Engineering Drawing, Bhatt N. D., Panchal 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: Shallbe based onclass test on Second unit.

AssessmentPattern:

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
TotalMarks 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

MEESC1005: Lab Engineering Graphics Skills (For ETC/CSE/IT)		
Teaching Scheme	**Examination Scheme**	
Practical:02Hrs /Week	**ISEIII**	**25Marks**
Credit:01		

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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			
TotalMarks25		25	

Assessment table:

Assessment Tool	**S1 to S3**	**S1, S2**	**S1**
	CO1	CO2	CO3
ISEIII TW (50 Marks)	10	10	5
TotalMarks50	10	10	5

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

MEESC1006: Basics of Mechanical Engineering (For CSE/IT)		
Teaching Scheme	**Examination Scheme**	
Lectures:02Hrs / Week	**ISEI**	**10 Marks**
Credits:02	**ISEII**	**10 Marks**
	End Semester Examination	**30 Marks**

Course Description: After completing this course student will have a fundamental understanding of the thermodynamics, thermal machine source of energy, power transmission elements, identify manufacturing process and machines

Course Outcomes : After completing the course students will able to	
CO1	Explain basic concepts to be used in Mechanical Engineering
CO2	Apply the principles of thermodynamics to solve numerical problems
CO3	Compare the working principles of Energy conversion devices with their application in Mechanical Engineering
CO4	Explain the working principles of various transmission elements and basic mechanism employed in Mechanical Engineering.
C05	Compare the manufacturing Process based on the required application

Detailed Syllabus:

Unit 1	**Fundamentals of Thermodynamics** Pressure and pressure measurement, Temperature, Forms of energy, work transfer, heat transfer, Laws of thermodynamics, First law for cyclic and non-cyclic process, Concept of Heat Engine, Refrigerator and Heat pump, Statement and explanation of Fourier's law of heat conduction, Overall heat transfer coefficient, Newton's law of cooling, Stefan Boltzmann's law, Concept of heat exchanger, types of heat exchanger, and concept of effectiveness.
Unit 2	**Energy Conversion Devices** Steam generation process, Boiler: Mountings and accessories, working principles of Internal combustion Engine, two stoke and four stroke engines, Refrigeration – Definitions – Refrigerating effect, Ton of Refrigeration, COP, Relative COP, unit of Refrigeration. Principle and working of vapor compression refrigeration Principles and working of steam power plant and nuclear power plant.
Unit 3	**Fundamentals of Power Transmitting Elements and Mechanism** Working principles of shaft, Axle and Spindles. Friction clutches, Brakes – types of brakes, Couplings-types of couplings, Bearing- types of bearing, Drives- Belt drive: Flat and V belt drive, Open and Cross belt drive, Chain drive, Gears-classification of gears, Simple mechanism: Slider crank mechanism, Pendulum pump, Oscillating cylinder engine, Whitworth quick return mechanism
Unit 4	**Fundamentals of Manufacturing Process** Fundamentals of manufacturing process and their application, Casting, forging, soldering, Brazing and welding. Differences between soldering, brazing and Welding. Description of Electric Arc Welding and Oxy-Acetylene Welding, Adhesives.

Text and Reference Books

1. Nag P.K., *"Engineering Thermodynamics",* 3rd ed. Tata-McGraw Hill Publications, 2013.
2. Rajput R.K., *"Engineering Thermodynamics",* 4th ed. Laxmi Publications, 2014.
3. Hajra Choudhary, Bose, *"Work Shop Technology* (Vol.-I &JI)", 3rd ed. MPP publication, 2018.
4. Bhandari V.B., *"Machine Design ",* 3rd ed. Tata-McGraw Hill Publications, 2019.
5. Khurmi R.S., *"Machine Design* ",4th Edition. Eurasia Publishing House, 2019.
6. Domkundwar V.M. *"Engineering Thermodynamics",* 4th ed. Dhanpatrai Publication, 2020.
7. Rao P.N, *"Manufacturing Technology* Volume J", 3rd ed. Tata-McGraw Hill Publications, 2019
8. Holman J. P., "Heat transfer", McGraw Hill Publishing, New York

Mapping of Course outcomes with Program outcomes:

Course Outcomes	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12
CO1	1	2										
CO2	3	1				1						
CO3	1					1						
CO4	1					1						
CO5	1					1						

1 – Low, 2 – Medium, 3 – High

MEESC1007 : Lab Basics of Mechanical Engineering (For CSE/IT)		
Teaching Scheme	**Examination Scheme**	
Practical:02Hrs /Week	**ISEIII**	**25Marks**
Credit:01		

Course Description: After completing this course student will have a fundamental understanding of the thermodynamics,thermal machine source of energy, power transmission elements, identify manufacturing process and machines

Course Outcomes:
After completing the course students will able to

Course Outcomes	
CO1	Understand the operation of water tube boiler
CO2	Understand the operation of IC engine
CO3	Understand the operation of Refrigerator
CO4	Understand the operation of Brakes and clutch
CO5	Understand the manufacturing operation of lathe machine and welding process

List of the Experiments:

Sr. No.	Title of the Experiments
1	Study and Demonstration of Boiler, Mountings and Accessories.
2	Study and Demonstration of Lancashire/Cochran boiler
3	Study and Demonstration of Babcock and Wilcox Boiler
4	Study and Demonstration of two stroke petrol and Diesel Engine
5	Study and Demonstration of Four stroke petrol and Diesel Engine
6	Study of Domestic Refrigerator
7	Study of Power Transmission Devices
8	Performing simple welded joint

Mapping of Course outcomes with Program outcomes:

Course Outcomes	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	1											
CO2	1	1				1						
CO3	1	1				1						
CO4	1					1						
CO5	1											
CO6	1											

ITPCC1001 : Computer Organization	
Teaching Scheme **Lectures: 02Hrs/Week** **Credits: 02**	**Examination Scheme** **ISE I 10 Marks** **ISE II 10 Marks** **End Semester Exam 30 Marks**

Course Objectives: The course will discuss the basic concepts of computer architecture and organization that can help the students to understand working of computer system. It provides architectural framework and foundation needed to understand future trends in computer design.

Course Outcomes: Students will be able to:

	Course Outcomes
CO1	Discuss various trends in computer design and architecture of advanced processors
CO2	Describe the operation of computer system for Data processing, Data Storage , Data Movement and control
CO3	Summaries internal structure of a computer along with concepts related to design of modern processors, ALU, control unit, memories and I/Os
CO4	Aware issues related to control unit operations, memory organization and I/O

Detailed Syllabus:

UNIT 1	**Basic Concepts :** Organization and Architecture, Structure and Function, ,The Evolution of the Intel x86 Architecture, Embedded Systems, Cloud Computing Ahmdahl's Law and Little's Law, Basic Measures of Computer Performance
UNIT 2	**Computer Functions, Interconnection and Memory**: Computer Components, Computer Function, Interconnection Structures, Bus Interconnection, Principles of Cache Memory **Internal Memory:** Semiconductor Main Memory, DDR DRAM, Flash Memory, Newer Non-volatile Solid-State Memory Technologies, **External Memory:** Magnetic Disk, RAID, Solid State Drives, Optical Memory
UNIT 3	**Input/Output:** External Devices I/O Modules, Programmed I/O, Interrupt-Driven I/O, Direct Memory Access, Direct Cache Access, I/O Channels and Processors
UNIT 4	**Arithmetic and Logic:** Computer Arithmetic, Integer Representation ,Integer Arithmetic, Floating-Point Representation, Floating-Point Arithmetic, Boolean Algebra ,Gates **Central Processing Unit:** Instruction Sets: Characteristics and Functions Machine Instruction Characteristics, Types of Operands, Types of Operations, Addressing Modes, Processor Organization

Text and Reference Books

1. William Stallings, Computer Organization and Architecture: Designing for Performance, Pearson Education, 10th Edition

Reference Books:

1. David A. Patterson and John L. Hennessy, Computer Organization and Design: The Hardware/Software Interface, Elsevier.
2. Carl Hamachar, Zvonco Vranesic and Safwat Zaky, Computer Organization, McGraw Hill.
3. John P. Hayes, Computer Architecture and Organization, McGraw Hill.
4. Vincent P. Heuring and Harry F. Jordan, Computer Systems Design and Architecture, Pearson Education.

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Reference websites:

1. http://nptel.ac.in/courses/106103068/
2. https://archive.nptel.ac.in/courses/106/105/106105163/
3. https://www.tutorialspoint.com/computer_organization/index.asp
4. http://www.cse.iitm.ac.in/~vplab/courses/comp_org.htm

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

3 – High 2 – Medium 1 – Low

Course outcome	Program Outcomes												PSO's		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	1											1	1		
CO2		2													
CO3			1										2		
CO4			1										1		

Assessment:
ISE I: Class Test-I of Maximum Marks-10
ISE II: Class Test-II of Maximum Marks-10
ESE: End Semester Examination of Maximum Marks-30

Recommended Assessment pattern

Assessment Pattern Level No.	Knowledge Level	Test-1	Test-2	Teachers Assessment/ Assignment	End Semester Examination
K1	Remember	05	00	00	12
K2	Understand	05	05	00	12
K3	Apply	00	05	00	06
K4	Analyze	00	00	00	00
K5	Evaluate	00	00	00	00
K6	Create	00	00	00	00
Total Marks 100		10	10	00	30

Assessment table

Assessment Tool	K1	K2	K3	K2
	C01	C02	C03	CO4
Class Test 1 (10 Marks)	05	05	00	00
Class Test 2 (10 Marks)	00	00	05	05
ESE Assessment (30 Marks)	05	05	10	10

ETVSE1002: Engineering Exploration	
Teaching Scheme **04Hrs/Week** **Total Credits:2** **Contact Hours 40**	**Examination Scheme** **ISE II:25 Marks** **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 automation etc (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

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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.
Module 4	**Platform Based Development 12 Hrs** 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
Module 5	**Project Management 3 Hrs** Introduction to Agile practices, Significance of teamwork, Project management tools: Checklist, Timeline, Gantt Chart, Significance of documentation
Module 6	**Sustainability and Ethics in Engineering 4 Hrs** 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
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	PO 5	PO6	PO 7	PO 8	PO9	PO10	PO1 1	PO1 2	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	

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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

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INCCC1002: NSS / INCCC1003: Sports / INCCC1004: Club Activities Co Curricular Course (Liberal Learning Course)	
Teaching Scheme: 04Hrs/Week **Total Credits: 2**	**Examination Scheme** **ISE III :50 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 Students affairs and all program heads will formulate additional modalities for smooth conduction of cocurricular activities as and when required.

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Bridge Courses for exit:

The candidate should complete the internship of two months for 8 credits.

OR

The candidate should pass the following two courses of 8 credits.

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 and complete one project to qualify for Certificate** 3. Data Structures 4. Object Oriented Programming

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