



GOVERNMENT POLYTECHNIC, KOLHAPUR

(An Autonomous Institute of Government of Maharashtra)

Curriculum Document

CURRICULUM: MPECS-2023

(Outcome Based Curriculum)

for

DIPLOMA IN MECHANICAL ENGINEERING

Secretary

Chairman

Programme-wise Board of Studies (PBOS)
Mechanical Engineering Programme
Government Polytechnic, Kolhapur

GOVERNMENT POLYTECHNIC KOLHAPUR

Learning and Assessment Scheme for Post S.S.C Diploma Courses

Programme Name	: Diploma In Mechanical Engineering				
Programme Code	: ME	With Effect From Academic Year	: 2023-24		
Duration Of Programme	: 6 Semester	Duration	: 15 WEEKS		
Semester	: First	Scheme	: MPECS 2023		

Sr No	Course Title	Abbreviation	Course Type	level	Course Code	Total IKS Hrs for Sem.	Learning Scheme					Credits	Paper Duration (hrs.)	Assessment Scheme										Total Marks
							Actual Contact Hrs./Week			Self Learning (Activity/Assignment /Micro Project)	Notional Learning Hrs /Week			Theory				Based on LL & TL				Based on Self Learning		
							CL	TL	LL					FA-TH	SA-TH	Total		FA-PR		SA-PR		SLA		
																Max	Min	Max	Min	Max	Min	Max	Min	
1	BASIC MATHEMATICS	HBMT	AEC	1	CCH105	4	4	2	-	2	8	4	3	30	70	100	40	-	-	-	-	25	10	125
2	ENGINEERING CHEMISTRY- B	HCHB	DSC	1	CCH104	4	4	-	2	2	8	4	1.5	30* #	70* #	100	40	25	10	25@	10	25	10	175
3	ENGINEERING GRAPHICS	HGRB	DSC	1	CCH106	2	2	-	4	-	6	3	4	30	70	100	40	50	20	-	-	-	-	150
4	COMMUNICATION SKILLS	HCMS	AEC	2	CCH201	0	4	-	2	2	8	4	3	30	70	100	40	25	10	-	-	25	10	150
5	MECHANICAL WORKSHOP PRACTICES	HMWP	SEC	1	MEH101	2	-	-	4	-	4	2		-	-	-	-	50	20	50@	20	-	-	100
6	FUNDAMENTALS OF ICT	HICT	SEC	2	CCH202	0	1	-	2	1	4	2		-	-	-	-	25	10	25@	10	25	10	75
7	YOGA AND MEDITATION	HYAM	VEC	2	CCH203	1	-	-	1	1	2	1		-	-	-	-	25	10	-	-	25	10	50
Total						13	15	2	15	8	40	20		120	280	400		200		100		125		825

Abbreviations: CL- Classroom Learning, TL- Tutorial Learning, LL-Laboratory Learning, FA - Formative Assessment, SA -Summative Assessment, IKS - Indian Knowledge System, SLA - Self Learning Assessment

Legends: @ Internal Assessment, # External Assessment, *# On Line Examination, @\$ Internal Online Examination

Note:

1. FA-TH represents average of two class tests of 30 marks each conducted during the semester.
2. If candidate is not securing minimum passing marks in FA-PR of any course then the candidate shall be declared as "Detained" in that semester.
3. If candidate is not securing minimum passing marks in SLA of any course, then the candidate shall be declared as fail and will have to repeat and resubmit SLA work.
4. Notional Learning hours for the semester are (CL+LL+TL+SL) hrs.* 15 Weeks
5. 1 credit is equivalent to 30 Notional hrs.
6. * Self learning hours shall not be reflected in the Time Table.

Course Category: Discipline Specific Course Core (DSC): 2, Discipline Specific Elective (DSE): 0, Value Education Course (VEC): 1, Intern. /Apprentice. /Project. /Community (INP): 0, Ability Enhancement Course (AEC): 2, Skill Enhancement Course (SEC): 2, Generic Elective (GE): 0

GOVERNMENT POLYTECHNIC KOLHAPUR

Learning and Assessment Scheme for Post S.S.C Diploma Courses

Programme Name	: Diploma In Mechanical Engineering		
Programme Code	: ME	With Effect From Academic Year	: 2023-24
Duration Of Programme	: 6 Semester	Duration	: 15 WEEKS
Semester	: <u>Second</u>	Scheme	: MPECS 2023

Sr No	Course Title	Abbreviation	Course Type	level	Course Code	Total IKS Hrs for Sem.	Learning Scheme					Credits	Paper Duration (hrs.)	Assessment Scheme												
							Actual Contact Hrs./Week			Self Learning (Activity/Assignment /Micro Project)	Notional Learning Hours /Week			Theory				Based on LL & TL				Based on Self Learning		Total Marks		
							CL	TL	LL					FA-TH		SA-TH		Total		FA-PR		SA-PR			SLA	
														Max	Min	Max	Min	Max	Min	Max	Min	Max	Min		Max	Min
1	APPLIED MATHEMATICS	HAMT	AEC	3	CCH301	2	4	2	-	-	6	3	3	30	70	100	40	-	-	-	-	-	-	100		
2	ENGINEERING PHYSICS-B	HPHB	DSC	1	CCH102	4	4	-	2	2	8	4	1.5	30* #	70* #	100	40	25	10	25@	10	25	10	175		
3	ENGINEERING DRAWING (ME/MT)	HEDR	AEC	1	CCH110	4	2	-	4	2	8	4	4	30	70	100	40	25	10	25@	10	25	10	175		
4	APPLIED MECHANICS	HAPM	DSC	1	CCH108	2	4	-	2	2	8	4	3	30	70	100	40	25	10	25@	10	25	10	175		
5	MANUFACTURING PROCESSES	HMPR	SEC	3	MEH301	1	3	-	4	1	8	4	3	30	70	100	40	25	10	25@	10	25	10	175		
6	SOCIAL AND LIFE SKILLS	HSLS	VEC	2	CCH204	-	-	-	-	2	2	1	-	-	-	-	-	-	-	-	-	-	50	20	50	
Total						13	17	2	12	9	40	20		150	350	500		100		100		150		850		

Abbreviations: CL- Classroom Learning, TL- Tutorial Learning, LL-Laboratory Learning, FA - Formative Assessment, SA -Summative Assessment, IKS - Indian Knowledge System, SLA - Self Learning Assessment

Legends: @ Internal Assessment, # External Assessment, *# Online Examination, @\$ Internal Online Examination

Note:

1. FA-TH represents an average of two class tests of 30 marks each conducted during the semester.
2. If a candidate is not securing minimum passing marks in FA-PR of any course then the candidate shall be declared as "Detained" in that semester.
3. If a candidate is not securing minimum passing marks in SLA of any course, then the candidate shall be declared as fail and will have to repeat and resubmit SLA work.
4. Notional Learning hours for the semester are (CL+LL+TL+SL) hrs.* 15 Weeks
5. 1 credit is equivalent to 30 Notional hrs.
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Course Category: Discipline Specific Course Core (DSC): 2, Discipline Specific Elective (DSE): 0, Value Education Course (VEC): 1, Intern./Apprenti./Project./Community (INP) : 0, Ability Enhancement Course (AEC) : 2, Skill Enhancement Course (SEC) : 2, Generic Elective (GE) : 0

GOVERNMENT POLYTECHNIC KOLHAPUR

Learning and Assessment Scheme for Post S.S.C Diploma Courses

Programme Name	: Diploma In Mechanical Engineering		
Programme Code	: ME	With Effect from Academic Year	: 2024-25
Duration Of Programme	: 6 Semester	Duration	: 15 WEEKS
Semester	: Third	Scheme	: MPECS 2023

Sr No	Course Title	Abbreviation	Course Type	level	Course Code	Total IKS Hrs for Sem.	Learning Scheme					Credits	Assessment Scheme											
							Actual Contact Hrs./Week			Self Learning Activity/Assignment /Micro Project)	Notional Learning Hours /Week		Paper Duration (hrs.)	Theory				Based on LL & TL				Based on Self Learning		Total Marks
							C	T	L					FA-TH	SA-TH	Total		FA-PR		SA-PR		SLA		
																Max	Min	Max	Min	Max	Min	Max	Min	
1	THERMAL ENGINEERING	HTEG	DSC	3	MEH302	-	3	-	2	1	6	3	3	30	70	100	40	25	10	-	-	25	10	150
2	PRODUCTION DRAWING	HPDR	SEC	3	MEH303	-	2	-	4	2	8	4	4	30	70	100	40	25	10	25@	10	25	10	175
3	MECHANICS OF MATERIALS	HMOM	DSC	3	MEH305	1	4	-	2	-	6	3	3	30	70	100	40	25	10	-	-	-	-	125
4	FLUID MECHANICS AND MACHINERY	HFMM	DSC	3	MEH306	1	4	-	2	-	6	3	3	30	70	100	40	25	10	25#	10	-	-	150
5	BASIC ELECTRICAL & ELECTRONICS	HBEE	AEC	3	MEH309	-	4	-	2	2	8	4	3	30	70	100	40	25	10	25@	10	25	10	175
6	COMPUTER AIDED DRAFTING	HCAD	SEC	3	MEH315	-	-	-	4	-	4	2	-	-	-	-	-	25	10	25#	10	-	-	50
7	FUNDAMENTALS OF PYTHON PROGRAMMING	HFPP	AEC	3	MEH320	-	-	-	2	-	2	1	-	-	-	-	-	25	10	25@	10	-	-	50
Total						2	17	0	18	5	40	20		150	350	500		175		125		75		875

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3. If a candidate is not securing minimum passing marks in SLA of any course, then the candidate shall be declared as fail and will have to repeat and resubmit SLA work.
4. Notional Learning hours for the semester are (CL+LL+TL+SL) hrs.* 15 Weeks
5. 1 credit is equivalent to 30 Notional hrs.
6. * Self learning hours shall not be reflected in the Time Table.

Course Category: Discipline Specific Course Core (DSC): 2, Discipline Specific Elective (DSE): 0, Value Education Course (VEC): 1, Intern. /Apprenti./Project./Community (INP) : 0, Ability Enhancement Course (AEC) : 2, Skill Enhancement Course (SEC) : 2, Generic Elective (GE) : 0

SEMESTER 1 CURRICULUM

COURSE ID:
COURSE NAME : BASIC MATHEMATICS
COURSE CODE : CCH105
COURSE ABBREVIATION : HBMT

A. LEARNING SCHEME:

Scheme component		Hours	Credits
Actual Contact Hours / week	Classroom Learning	04	4
	Tutorial Learning	02	
	Laboratory Learning	-	
	SLH-SelfLearning	02	
	NLH-Notional Learning	08	

B: ASSESSMENT SCHEME: -

PAPER DURAT ION IN HRS	THEORY				BASED ON LL & TL				BASED ON SLA		TOTAL
					Tutorial						
	FA-TH	SA-TH	TOTAL		FA -PR		SA-PR		MAX	MIN	
	MAX	MAX	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	125
03	30	70	100	40			--	--	25	10	

(Total IKS Hrs. for Sem.: 06 Hrs.)

C: ABBREVIATIONS: -

CL-Class Room Learning, TL-Tutorial Learning, LL-Laboratory Learning, SLH-Self Learning Hours, NLH-Notional Learning Hours, FA - Formative Assessment, SA -Summative assessment, IKS - Indian Knowledge System, SLA -Self Learning Assessment

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3. If candidate is not securing minimum passing marks in SLA of any course then the candidate shall be declared as fail and will have to repeat and resubmit SLA work.
4. Notional Learning hours for the semester are (CL+LL+TL+SL) hrs.*15Weeks
5. 1(one) credit is equivalent to 30 Notional hrs.
6. *Self learning hours shall not be reflected in the Time Table.
 *Self learning includes micro project /assignment/other activities. (The list of all assignments are given in tabular format. At least 6 to 8 assignments to be given)

D. i) RATIONALE: -

Mathematics is an important prerequisite for the development and understanding of engineering and technological concepts. For an engineer and technologist, knowledge of mathematics is an effective tool to pursue and master the applications in the engineering and technological fields. Algebra provides the language and abstract symbols of mathematics. The topic Matrices is helpful for finding optimum solution of system of simultaneous equations which are formed in the various branches of engineering using different parameters. Trigonometry is the study of triangles and angles. Contents of this subject will form foundation for further study in mathematics. Statistics can be defined as a type of mathematical analysis which involves the method of collection and analyzing the data and summing of the data in numerical form for a given set of real world observations. Calculus is a branch of mathematics that calculates how matter, particles and heavenly bodies actually move. Derivatives are useful to find maxima & minima of a function, velocity & acceleration are also useful for many engineering problems. Hence the course provides the insight to analyze engineering problems scientifically using logarithms, matrices, trigonometry, straight line, differential calculus and statistics.

ii) Competency:

Apply principles of Basic Mathematics to solve industry-based technology problems.

1. **Cognitive** : To understand the mathematical concepts
2. **Psychomotor**: Proper handling of scientific calculator
3. **Affective** : Attitude of accuracy, punctuality, proper reasoning and presentation

E. COURSE LEVEL LEARNING OUTCOMES (COS)

CCH105-1 : To Apply concepts of algebra to solve engineering related problems

CCH105-2 : To Use techniques and methods of statistics to compare multiple sets of data

CCH105-3 : Solve area specific engineering problems under given conditions of straight lines

CCH105-4:- To memorize trigonometric formulae and solve problems based on them.

CCH105-5:- To solve the problems of maxima, minima, radius of curvature and geometrical applications.

Competency, course outcomes and programme outcomes/programme specific outcomes (cp-co-po/pso) matrix

[Note: Correlation levels: 1: Slight (Low), 2: Moderate (Medium), 3: Substantial (High), “0”

Competency and Cos	Programme Outcomes POs and PSOs								
	PO 1 Basic and Discipline specific knowledge	PO 2 Problem Analyses	PO 3 Design / Development of solutions	PO 4 Engineering Tools, Experimentation and Testing	PO 5 Engineering Practices for society, sustainability and Environment	PO 6 Project Management	PO 7 Life-long Learning	PSO1 Work in mfg & service sector	PSO 2 Start entrepreneurial activity
Competency: Use DC machines and transformers.	3	2	1	-	1	-	2		

Competency and Cos	Programme Outcomes POs and PSOs								
	PO 1 Basic and Discipline specific knowledge	PO 2 Problem Analyses	PO 3 Design / Development of solutions	PO 4 Engineering Tools, Experimentation and Testing	PO 5 Engineering Practices for society, sustainability and Environment	PO 6 Project Management	PO 7 Life-long Learning	PSO1 Work in mfg & service sector	PSO 2 Start entrepreneurial activity
CCH105-1	3	1	-	-	-	-	1		
CCH105-2	3	1	-	-	1	-	1		
CCH105-3	3	-	-	-	-	-	1		
CCH105-4	3	1	1	-	-	-	1		
CCH105-5	3	2	1	-	1	-	1		

F. CONTENT:

i) Tutorial exercises

Any **TEN** of the following Tutorial exercises shall be conducted in the Tutorial room in tutorial sessions of batches of about 20- 22 students:

Sr. no	Tutorial experiences	CO
1	Solve Simple problems of Logarithms based on given application	CCH105-1
2	Solve elementary problems on Algebra of Matrices	CCH105-1
3	Solve simultaneous equations using Matrix inversion method	CCH105-1
4	Resolve into Partial Fractions using linear non repeated, repeated and irreducible quadratic factors	CCH105-1
5	Practice problems on equation of straight lines using different forms, Solve problems on perpendicular distance, distance between two parallel lines and angle between two lines	CCH105-3
6	Solve problems on finding range, coefficient of range and mean deviation	CCH105-2
7	Solve problems on Standard deviation, coefficient of variation and comparison of two sets	CCH105-2
8	Solve problems on Allied & Compound angles	CCH105-4
9	Solve problems on Multiple & sub multiple angles	CCH105-4
10	Solve problems on factorization & De- factorization formulae	CCH105-4
11	Solve problems on Inverse Trigonometric Functions	CCH105-4

Sr. no	Tutorial experiences	CO
12	Solve examples on functions & rules of derivatives	CCH105-5
13	Solve examples on Derivative of composite function, inverse & parametric functions,	CCH105-5
14	Solve examples on Derivative of exponential, implicit and logarithmic functions	CCH105-5
15	Solve examples on Application of Derivatives	CCH105-5

II)Theory

Section I

Sr. no.	Topics/Subtopics	Learning (Hours)	Classroom learning evaluation Marks
<i>CO: CCH105-1: To Apply concepts of algebra to solve engineering related problems</i>			
Unit 1 Algebra	1.1 LOGARITHMS 1.1.1 Concept and laws of logarithm 1.1.2 Simple examples based on laws of Logarithms 1.2 MATRICES 1.2.1 Definition of a matrix, Types of matrices, Algebra of matrices, Equality of two matrices, Transpose of a matrix, 1.2.3 Adjoint and Inverse of a matrix 1.2.4 Solution of simultaneous equations having 3 unknowns using Matrix inversion method 1.3 PARTIAL FRACTIONS 1.3.1 Definition of rational, proper and improper fractions 1.3.2 Various cases of Partial fractions and Examples 1.4 Algebra of Indian Knowledge System: Solution of simultaneous equations using Vedic Mathematics	12	16
<i>CO: CCH105-2: To Use techniques and methods of statistics to compare multiple sets of data</i>			
Unit 2 Statistics	MEASURES OF DISPERSION 2.1 Range, Coefficient of Range of Discrete and grouped data 2.2 Mean deviation and Standard Deviation about mean for Discrete & Grouped Data (except Assumed mean method and Step deviation method) 2.3 Variance and coefficient of Variance 2.4 Comparison of 2 sets of observations	6	10
<i>CO: CCH105-3 : Solve area specific engineering problems under given conditions of straight lines</i>			
	THE STRAIGHT LINE 3.1 Slope, intercepts & various methods of finding slope 3.2 Conditions for two straight lines to be parallel and	6	8

Sr. no.	Topics/Subtopics	Learning (Hours)	Classroom learning evaluation Marks
Unit 3 Coordinate Geometry	Perpendicular to each other 3.3 Various forms of straight line 3.4 Perpendicular distance of a point from a line 3.5 Distance between two parallel lines 3.6 Angle between two straight lines 3.7 Geometry in Sulabh sutras in Indian Knowledge System		

Section –II

Sr. no.	Topics/Subtopics	Learning Hours	Classroom learning evaluation Marks
CO: CCH105-4:- To memorize trigonometric formulae and solve problems based on them.			
Unit 4 Trigonometry	<p><i>TRIGONOMETRY</i></p> 4.1 Fundamental Identities (Only state, No examples) 4.2 Conversion of degree into radian and vice versa of standard angles 4.3 Trigonometric ratios of Compound Angles (Without Proof), Examples 4.4 Trigonometric ratios of Allied Angles (Without Proof), Examples 4.5 Trigonometric ratios of Multiple and Submultiple Angles (Without Proof), Examples 4.6 Factorization and De-Factorization Formulae (Without Proof), Examples 4.7 Inverse Trigonometric ratios, Principle values and simple problems 4.8 Trigonometry in Indian Knowledge System: The evolution of sine function in India 4.9 Trigonometry in Indian Knowledge System: Indian Trigonometry-From ancient beginning to Nilakantha 4.10 Trigonometry in Indian Knowledge System: Ancient Indian Astronomy 4.11 Trigonometry in Indian Knowledge System: Pythagorean to triples in Sulabhsutras	14	14
CO: CCH105-5:- To solve the problems of maxima, minima, radius of curvature and geometrical applications.			

Unit 5 Differential Calculus	5.1 Functions: Concept of Functions and simple examples 5.2 Limits: Concept of Limits without examples 5.3 Derivatives: 5.3.1 Derivative of sum, difference, product and quotient of two or more functions 5.3.2 Derivative of composite functions 5.3.3 Derivative of Inverse functions 5.3.4 Derivative of Implicit functions 5.3.5 Derivative of Parametric functions 5.3.6 Derivative of exponential and logarithmic functions 5.3.7 Calculus in Indian Knowledge system “ Discovery of Calculus by Indian Astronomers (Indian Mathematics)	16	16
CO: CCH105-5:- To solve the problems of maxima, minima, radius of curvature and geometrical applications.			
Unit 6 Application of Derivatives	<i>APPLICATIONS OF DERIVATIVES</i> 6.1 Second Order Derivatives (without examples) 6.2 Equation of Tangent & Normal 6.3 Maxima & Minima (only for algebraic functions) 6.4 Radius of curvature	06	06

** No questions will be asked on IKS related subtopics in any question paper

G: LIST OF MICROPROJECT /ASSIGNMENTS UNDER SLA

Sr. No	List of Assignment (under SLA)	Hrs Allotted
1	Collect the Data of Marks obtained by your class in mid semester test. Compute the variance and coefficient of variance of the data	
2	Prepare a model using the concept of tangent and normal, bending of curves in case of sliding of a vehicle.	
3	Prepare charts of grouped and ungrouped data.	
4	Collect statistical data on real world problems and find Mean Deviation & S.D.	
5	Collect at least 10 examples based on real world applications which will be used to find S.D. /Variance.	
6	Prepare models to explain different concepts.	
7	Prepare a model using concept of radius of curvature of bending of railway tracks.	
8	A window in the form of rectangle surmounted by a semicircular opening. The total perimeter the window to admit maximum light through the whole opening, prepare a model using concept of Maxima & Minima for the above problem and verify the result.	
9	Collect applications of radius of curvature on lens design and optics, mirror and reflective surface properties, road and highway design, structural behavior, roller coaster track design & make a video of 5- minutes duration.	
10	Design a puzzle based on matrices. Create a grid of numbers and operations.	

11	Develop a math game based on operations of matrices.	
12	Collect examples based on real world applications of logarithm and prepare a pdf file.	
13	Measure height of trees/buildings in surrounding locations using trigonometry and prepare presentation.	
14	Apply trigonometric principles to calculate angles, distances, dimensions relevant to the chosen area and make a poster presentation.	
15	Find height of room or distance between two pillars by using concept of straight line.	

****Attempt any 10-12 Micro Projects, out of the given list.**

H: SPECIFICATION TABLE FOR SETTING QUESTION PAPER FOR SEMESTER END THEORY EXAMINATION

Section / Topic no.	Name of topic	Distribution of marks (level wise)			Total marks	CO
		Remember	Understand	Apply		
I / 1	Algebra	4	6	6	16	CCH105-1
I / 2	Statistics	2	4	4	10	CCH105-2
I / 3	Coordinate Geometry	2	2	4	8	CCH105-3
II / 4	Trigonometry	2	6	6	14	CCH105-4
II / 5	Differential Calculus	2	6	8	16	CCH105-5
II / 6	Application of Derivatives	2	2	2	6	CCH105-5
Total Marks					70	

I): -ASSESSMENT CRITERIA

Formative Assessment of Tutorial: -

Every Tutorial shall be assessed for 25 marks as per following criteria:

Domain	Particulars	Marks out of 25
Cognitive	Understanding	05
	Application	05
Psychomotor	Solving skill	05
	Remembering formulae & Accuracy	05
Affective	Discipline and punctuality	05
TOTAL		25

J) INSTRUCTIONAL METHODS:

1. Lectures cum Demonstrations,
2. Classroom practices.
3. Use of projector and soft material for demonstration
4. Use of internet.
5. WhatsApp groups.
6. Use of books

K) TEACHING AND LEARNING RESOURCES:

Chalk board, LCD presentations, Demonstrative kits, Demonstrative charts.

L) REFERENCE BOOKS:

S. N.	Name of Book	Author	Publication
1	A Text Book on Engineering Mathematics (First Year Diploma)	G. V. Kumbhojkar	Phadake Prakashan, Kolhapur
2	Basic Mathematics	Patel, Rawal and others	Nirali Prakashan, Pune
3	Basic Mathematics	Sachin S. Shah & Santosh R. Mitkari	Tech-Neo Publications
4	Basic Mathematics	Vitthal B. Shinde & others	Techical Publications
5	Higher Engineering Mathematics	Grewal B.S.	Khanna publication New Delhi, 2013 ISBN:8174091955
6	A text book of Engineering Mathematics	Dutta D.	New age publication New Delhi, 2006 ISBN:978-81-224-1689-3
7	Studies in the History of Indian Mathematics	C. S. Seshadri	Hindustan Book Agency, New Delhi 110016. ISBN 978-93-80250-06-9
8	Indian Mathematics Engaging with the World from Ancient to Modern Times	George Gheverghese Joseph	World Scientific Publishing Europe Ltd. ISBN 978-17-86340-61-0
9	Calculus and Its Applications	Marvin L. Bittinger David J. Ellenbogen Scott A. Sargent	Addison-Wealey 10 th Edition ISBN-13:978-0-321-69433-1
10	Mathematics- I	Deepak Singh	Khanna Book Publishing Co. (P) Ltd. ISBN:978-93-91505-42-4
11	Mathematics -II	Garima Singh	Khanna Book Publishing Co. (P) Ltd. ISBN:978-93-91505-52-3
12	Advance Engineering Mathematics	Das H.K.	S Chand publication New Delhi 2008 ISBN:9788121903455

13	Sansar ke Mahan Ganitagya	Gunakar Muley	Raj kamal Prakashan ISBN-13. 978-8126703579
14	An Introduction to Statistical learning with applications in R	Gareth James & others	Springer New York Heidelberg Dordrecht London ISBN:978-1-4614-7137-0

M) Learning Website & Software

- a. www.nptel.ac.in/courses/106102064/1
- b. www.scilab.org/-SCI Lab
- c. www.mathworks.com/product/matlab/-MATLAB
- d. Spreadsheet Applications
- e. <http://ocw.abu.edu.ng/courses/mathematics/>
- f. <https://ocw.mit.edu/>
- g. <https://libguides.cmich.edu/OER/mathematics>
- h. <https://libguides.furman.edu/oer/subject/mathematics>

COURSE ID:
COURSE NAME : **ENGINEERING CHEMISTRY**
COURSE CODE : **CCH 104**
COURSE ABBREVIATION : **HCHB**

A.LEARNING SCHEME:

Scheme component		Hours	Credits
Actual Contact Hours / week	Classroom Learning	04	4
	Tutorial Learning	00	
	Laboratory Learning	02	
	SLH-Self Learning	02	
	NLH-Notional Learning	08	

B. ASSESSMENT SCHEME: -

PAPER DURATION IN HRS	THEORY				BASED ON LL&TL				BASED ON SLA		TOTAL
					Practical						
	FA-TH	SA-TH	TOTAL		FA -PR		SA-PR		MAX	MIN	
	MAX	MAX	MAX	MIN	MAX	MIN	MAX	MIN			MAX
1.5	30 *#	70*#	100	40	25	10	25 @	10	25	10	

(Total IKS Hrs for Sem.: 04 Hrs)

C: ABBREVIATIONS: -

CL- Class Room Learning, TL- Tutorial Learning, LL-Laboratory Learning, SLH-Self Learning Hours, NLH-Notional Learning Hours, FA - Formative Assessment, SA -Summative assessment, IKS - Indian Knowledge System, SLA - Self Learning Assessment

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5. 1(one) credit is equivalent to 30 Notional hrs.
6. * Self learning hours shall not be reflected in the Time Table.

* Self learning includes micro project / assignment / other activities. (Provide list of all assignments here in tabular format At least 6 to 8 assignments to be given)

D. i) RATIONALE: -

Basic science such as Chemistry is the fundamental of Engineering & technology. It is most essential to learn the basic science to understand the fundamental concepts in Engineering & technology. Engineering chemistry deals with the study of structure, composition & properties of the materials, which form the core of the fundamental science. Many processes are based on principle of Chemistry in various industries. Topics such as Water, Electrochemistry, Corrosion, & protection of metals from corrosion are some of the direct applications of chemistry in engineering. Hence, the knowledge of chemistry is essential to the aspiring engineers of all branches in their field. Engineering materials like Steel, Rubber, Plastic, Thermocole, Glass wool, Paints, Lubricants are the backbone of various industries, machines, equipment & processes.

ii) INDUSTRY / EMPLOYER EXPECTED OUTCOME

Apply principles of advanced chemistry to solve engineering problems.

Cognitive: Understanding concepts of chemistry for applications in the area of engineering.

Psychomotor: Sketching and labeling the diagrams for extraction of copper

- i) Experimentally analyzing the water samples for preparing portable water by different methods.
- ii) Preparing chart of showing percentage, composition, properties and industrial applications of solders.
- iii) Handling & use of glassware & chemicals.

Affective: i) Accuracy ii) Safety iii) Punctuality iv. Attitude.

E. COURSE LEVEL LEARNING OUTCOMES (COS)

CCH104-1 Apply the basic knowledge of atom, molecules and compounds in Engineering Chemistry.

CCH104-2 Apply the concepts of Electrochemistry to interpret the reasons of corrosion with its remedies.

CCH104-3 Select the relevant catalyst, alloys, insulators, adhesives, composite materials, plastic and rubber for different applications in the field of engineering.

CCH104-4 Use of water in Domestic purpose, Industrial purpose and its relevant treatment to solve industrial problems.

CCH104-5 Explain the method of Extraction of Iron.

CCH104-6 Choose appropriate with relevant method of lubrication to solve industrial problem and applications of Paint and Varnish.

Competency, course outcomes and programme outcomes/programme specific outcomes (cp-co-po/ps) matrix

[Note: Correlation levels: 1: Slight (Low), 2: Moderate (Medium), 3: Substantial (High), “0”]

Competency and Cos	Programme Outcomes POs and PSOs								
	PO 1 Basic and Discipline specific knowledge	PO 2 Problem Analysis	PO 3 Design / development solution	PO 4 Engineering Tools, Experimentation and Testing	PO 5 Engineering practices for society, sustainability and environment	PO 6 Project management	PO 7 life-long learning	PSO1 Work in mfg & service sector	PSO 2 Start entrepreneurial activity
CCH104-1	3	2	-	1	3	1	3	1	1
CCH104 -2	3	2	-	1	2	1	3	-	-
CCH104 -3	3	1	-	-	2	1	3	-	-
CCH104 –4	3	2	-	1	3	1	3	-	-
CCH104-5	3	1	-	-	2	1	3	-	-
CCH10- 6	3	2	-	1	2	1	3	-	-

F. CONTENT:

i) PRACTICAL EXERCISES

The following practical exercises shall be conducted in the *Laboratory for Engineering Chemistry developed* by the Institute in practical sessions of batches of about 20- 22 students:

Sr. no	Laboratory experiences	CO
1	Introduction to Chemistry laboratory	CCH104-1
2	Volumetric analysis of solution.	CCH104-1
3	Preparation of 1 N, 0.5 N & 0.1 N Solutions of different chemicals like NaOH, HCl, Oxalic acid, FeSO ₄ , etc.	CCH104-1
4	Titration of strong acid and strong bases (HCl X NaOH)	CCH104-1
5	Double titration of strong acid, strong base & weak acid (HCl X NaOH X H ₂ C ₂ O ₄ .H ₂ O)	CCH103-1
6	Titration of weak base, strong acid & strong base (Na ₂ CO ₃ X H ₂ SO ₄ X KOH)	CCH103-1
7	Estimation of chloride content in water by Mohr’ s method	CCH103-4
8	Determination of amount of Ca and Mg ions present in given sample of water by E.D.T.A method	CCH103-4

Sr. no	Laboratory experiences	CO
9	Estimation of viscosity of oils/solutions by Ostwald's method	CCH103-6
10	Estimation of Ca in limestone.	CCH103-5
11	Titration of KMnO_4 & FeSO_4 (Redox titration)	CCH103-5
12	Estimation of % of Fe in given sample of steel.	CCH103-3
13	Determination of alkalinity of water.	CCH103-4
14	Determination of Electrochemical equivalent (ECE) by copper volt meter.	CCH104-2
15	To estimate volumetrically the percentage of copper in a given sample of Brass.	CCH104- 5
16	To demonstrate the different types of Solders.	CCH104-3

ii. THEORY

SECTION I

Sr. no.	Topics/Subtopics	Learning (Hours)	Classroom learning evaluation Marks
CO - CCH104-1 Apply the basic knowledge of atom, molecules and compounds in Engineering Chemistry.			
1	ATOMIC STRUCTURE AND CHEMICAL BONDING 1.1 Philosophy of atom by Acharya Kanad. 1.2 Atom, Fundamental particles, Nature of atom. 1.3 Atomic Number, Mass Number, Isotopes and isobars. 1.4 Bohr's theory of atom. 1.5 Statement of Aufbau's principle, Hund's rule of maximum multiplicity, Pauli's exclusion principle. 1.6 Lewis and Langmuir's concept of stable electronic configuration. 1.7 Electrovalency and Co-valency. 1.8 Formation Of electrovalent compounds- NaCl , CaCl_2 . 1.9 Formation of Covalent compounds- H_2O , CO_2	07	08
CO - CCH104-2 Apply the concepts of Electrochemistry to interpret the reasons of corrosion with its remedies.			
2	ELECTROCHEMISTRY AND CORROSION. 2.1 Definitions- Cathode, Anode, Conductor, Electrolyte, Electrode, Ionisation, Electrolysis. 2.2 Arrhenius Theory of Ionisation. 2.3 Degree of Ionisation & Factors affecting degree of ionisation. 2.4 Statement of Faraday's first and second law of electrolysis. 2.5 Relation between CE and ECE. 2.6 Electrolysis of molten NaCl . 2.7 Electrolysis of CuSO_4 solution by using Cu-Electrodes. 2.8 Industrial applications of electrolysis.	10	10

Sr. no.	Topics/Subtopics	Learning (Hours)	Classroom learning evaluation Marks
	2.8.1 Electroplating. 2.8.2 Electro refining of Cu. 2.9 Definition & types of corrosion. 2.10 Dry or Atmospheric corrosion, Oxide Film Formation & its types, Factors affecting atmospheric corrosion. 2.11 Wet or electrochemical corrosion 2.12 Factors influencing immersed corrosion 2.13 Methods of protection of metal from corrosion - Hot dipping (Galvanizing & Tinning), Metal spraying, Metal cladding, Cementation or sherardizing.		
CO - CCH104-3 Select the relevant catalyst, alloys, insulators, adhesives, composite materials, plastic and rubber for different applications in the field of engineering.			
3	CHEMISTRY OF ENGINEERING MATERIALS AND CATALYSIS. 3.1 INSULATORS 3.1.1 Definition & Characteristics of insulator. 3.1.2 Preparation, properties & uses of Glass wool, Thermocole. 3.2 COMPOSITE MATERIALS 3.2.1 Definition. 3.2.2 Classification, Properties & Application of composite materials. 3.3 PLASTICS 3.3.1 Definition of Polymer, Polymerization. 3.3.2 Types of polymerization – Addition & Condensation polymerization. 3.3.3 Classification of plastic - Thermosoftening & Thermosetting plastic. 3.3.4 Engineering properties & applications of plastic. 3.4 RUBBER 3.4.1 Elastomer 3.4.2 Drawbacks of Natural rubber. 3.4.3 Vulcanization of rubber. 3.4.4 Engineering properties & uses of rubber. 3.5 ADHESIVES 3.5.1 Definition of adhesives. 3.5.2 Characteristics of good adhesive. 3.5.3 Properties of adhesive. 3.6 CATALYSIS 3.6.1 Definition. 3.6.2 Types of Catalyst with example. - Positive catalyst	13	16

Sr. no.	Topics/Subtopics	Learning (Hours)	Classroom learning evaluation Marks
	- Negative catalyst 3.6.3 Types of Catalysis. - Homogeneous catalysis. - Heterogeneous catalysis 3.6.4 Catalytic Promoters. 3.6.4 Catalytic Inhibitors 3.6.5 Autocatalysis.		

Section –II

Sr. no.	Topics/Subtopics	Learning (Hours)	Classroom learning evaluation Marks
CO - CCH104-4 Use of water in Domestic purpose, Industrial purpose and its relevant treatment to solve industrial problems.			
4	WATER 4.1 Impurities in natural water. 4.2 Hard water & Soft water. 4.3 Hardness of water- Temporary & Permanent. 4.4 Reactions of hard water with soap. 4.5 Disadvantages of hard water for domestic & Industrial purpose - Textile Industry, Sugar Industry, Paper Industry Dying Industry. 4.6 Sterilization of water - Chlorination –by Cl ₂ , bleaching powder, Chloramines with chemical reactions. 4.7 Ion Exchange method to remove total hardness of Water.	09	12
CO - CCH104-5 Explain the method of Extraction of Iron.			
5	METALLURGY AND ALLOYS 5.1 Occurrence of metals, Definition of minerals, Ore, Flux, Gangue & Slag. 5.2 Flow chart of metallurgical processes. 5.3 Concentration of ores – Physical methods – 1. Gravity separation method 2. Electromagnetic separation method 3. Froth floatation method Chemical methods – 1. Calcination 2. Roasting	12	14

	<p>5.4 Ores of Iron.</p> <p>5.5 Extraction of Iron from its ore – Blast furnace – Construction, working, reactions & Products.</p> <p>5.6 Definition of alloys.</p> <p>5.7 Classification & purposes of making of alloys.</p> <p>5.8 Composition, properties & engineering application of – Non-ferrous alloys – Duralumin, Monal metal & Woods metal. Ferrous alloys – Heat resisting steel, magnetic steel, Stainless steel.</p>		
CO - CCH104-6 Choose appropriate with relevant method of lubrication to solve industrial problem and applications of Paint and Varnish.			
6	<p>LUBRICANTS, PAINT AND VARNISH</p> <p>6.1.1 Definition, Classification & Functions of lubricants.</p> <p>6.1.2 Characteristics of lubricants – Viscosity, Viscosity index, Oiliness, Volatility, Cloud point & Pour point, Flash & Fire point, Acid value.</p> <p>6.2 Oil paint – Definition & characteristics of oil paint.</p> <p>6.3 Purpose of using oil paint.</p> <p>6.4 Ingredients of oil paint with suitable example & its functions – Drying oil (Vehicle), Drier, Pigment, Thinner, Filler (Extenders), Plasticizer.</p> <p>6.5 Varnish – Definition, types, constituents, Properties & applications.</p> <p>6.6 Distinction between paint & varnish.</p>	09	10

** No questions will be asked on IKS learning subtopics in any question papers.

G : LIST OF ASSIGNMENTS UNDER SLA

Sr. No	List of Assignment (under SLA) (Any one of the following)	Hrs. Allotted
1	Prepare distinguish chart for Isotopes & Isobars, Electrovalent & Covalent bond	02
2	Prepare Charts of Bohr's Theory, Lewis & Langmuir's theory.	02
3	Faraday's First & Second law statements & formula.	02
4	Electroplating & Electrorefining with diagram	02
5	Note on corrosion due to Oxygen & its types	02
6	With neat labelled diagram explain the process of 1. Galvanizing, 2. Tinning, 3. Metal spraying, 4. Metal Cladding, 5. Sherardizing	02
7	Properties of Plastics, rubber, insulator, composite materials & adhesives.	02
8	Uses/Applications of Plastics, rubber, insulator, composite materials & adhesives.	02
9	Draw diagram of Ion Exchange method	02
10	Note on Impurities present in Natural Water.	02
11	Disadvantages of hard water in Domestic purposes	02
12	Disadvantages of hard water in Industrial purposes	02
13	Flow chart of Metallurgical processes	02
14	With neat labelled diagram explain 1. Gravity separation method. 2. Electromagnetic separation method. 3. Froth floatation method.	02
15	Explain ingredients present in Paints	02

**** From the above any two assignments to be completed by the students.**

H : SPECIFICATION TABLE FOR SETTING QUESTION PAPER FOR SEMESTER END THEORY EXAMINATION

Section / Topic no.	Name of topic	Distribution of marks (level wise)			Total marks	CO
		Remember	Understand	Apply		
I / 1	Atomic Structure and Chemical Bonding	4	2	2	08	CCH104-1
I / 2	Electrochemistry & Corrosion	4	4	2	10	CCH104-2
I / 3	Chemistry of Engineering materials & catalysis	6	6	4	16	CCH104-3
II / 4	Water	4	4	4	12	CCH104-4
II / 5	Metallurgy & Alloys	6	4	4	14	CCH104-5
II / 6	Lubricants, Paints & Varnish	4	4	2	10	CCH104-6
Total Marks					70	

I: - ASSESSMENT CRITERIA

i) Formative Assessment of Practical / Self learning assessment: -

Every assignment shall be assessed for 25 marks as per following criteria:

Domain	Particulars	Marks out of 25
Cognitive	Understanding	05
	Application	05
Psychomotor	Operating Skills	05
	Drawing / drafting skills	05
Affective	Discipline and punctuality	05
TOTAL		25

ii) Summative Assessment of Practical: -

Every practical assignment shall be assessed for 25 marks as per following criteria:

Sr. no	Criteria	Marks allotted
1	Attendance at regular practical	05
2	Preparedness for practical	05
3	Neat & complete Diagram.	05
4	Observations & handling of instrument.	05
5	Oral Based on Lab work and completion of task	05
TOTAL		25

J) INSTRUCTIONAL METHODS:

1. Lectures cum Demonstrations,
2. Class room practices.
3. Use of projector and soft material for demonstration
4. Charts
5. Simulation videos

K) TEACHING AND LEARNING RESOURCES: -

Chalk board, LCD presentations, Demonstrative kits, Demonstrative charts.

L) REFERENCE BOOKS:

Sr. No.	Author	Title	Publisher
1.	Jain & Jain	Engineering chemistry	Dhanpatrai publishing co.
2.	S. C. Rangawala	Engineering materials	Engineering publication
3.	Jain & Agarwal	Metallurgical Analysis	Agarwal publications
4.	O. P. Khanna	Material science & technology	Khanna publication on 2006
5.	Rollason	Metallurgy for Engineers	ASM publication
6.	J. C. Kuriacose	Chemistry in Engineering & Vol. 1 & 11	-
7.	P. C. Jain	Chemistry of Engineering Materials	-
8.	S. S. Dara	A text of Engineering Chemistry	-
9.	R. Gopalan, D. Venkappa	Engineering Chemistry	Vikas Publishing House.

M) LEARNING WEBSITE & SOFTWARE

- a. www.substech.com
- b. www.kentchemistry.com
- c. www.chemcollective.org
- d. www.wqa.org
- e. www.chemistryteaching.com
- f. www.ancient-origins.net/history-famous-people/indian-sage-acharya-kanad-001399

COURSE ID: ME

Course Name : ENGINEERING GRAPHICS (CE/ME/MT)

Course Code : CCH106

Course Abbreviation: HGRB

Course Type : DSC

A. LEARNING SCHEME:

Pre-requisite Course(s): Nil

Teaching Scheme:

Scheme component	Actual Contact Hours / week	Credits
Classroom Learning (CL)	02	3
Tutorial Learning (TL)	-	
Laboratory Learning (LL)	04	
Self-Learning Hours (SLH)	-	
Notional Learning (NLH)	06	

B. ASSESSMENT SCHEME:

PAPER DURATION IN HRS	Theory				Based on LL & TL				Based on Self Learning		Total Marks
					Practical						
	FA-TH	SA-TH	Total		FA-PR		SA-PR		SLA		
	Max	Max	Max	Min	Max	Min	Max	Min	Max	Min	
4	30	70	100	40	50	20	-	-	-	-	150

Total IKS Hrs for Sem: 2 Hrs

C. ABBREVIATIONS: CL- Classroom Learning, TL- Tutorial Learning, LL-Laboratory Learning, SLH-Self Learning Hours, NLH-Notional Learning Hours, FA - Formative Assessment, SA -Summative assessment, IKS - Indian Knowledge System, SLA - Self Learning Assessment
Legends: @ Internal Assessment, # External Assessment, *# On Line Examination, @\$ Internal Online Examination

1. FA-TH represents average of two class tests of 30 marks each conducted during the semester.
2. If candidate is not securing minimum passing marks in FA-PR of any course then the candidate shall be declared as "Detained" in that semester.
3. If candidate is not securing minimum passing marks in SLA of any course, then the candidate shall be declared as fail and will have to repeat and resubmit SLA work.
4. Notional Learning hours for the semester are (CL+LL+TL+SL) hrs.* 15 Weeks
5. 1(one) credit is equivalent to 30 Notional hrs.
6. * Self learning hours shall not be reflected in the Time Table.

* Self learning includes micro project / assignment / other activities. (Provide list of all 5 assignments here in tabular format)

D. i) RATIONAL:

Engineering graphics is the language of engineers. The concepts of graphical language are used in expressing the ideas, conveying the instructions, which are used in carrying out the jobs on the sites, shop floor etc. This course is useful in developing drafting and sketching skills in the student. It covers the knowledge & application of drawing instruments & also familiarizes the learner about Bureau of Indian Standards related to engineering drawing. The curriculum aims at developing the ability to draw and read various engineering curves, projections and dimensioning styles. The subject mainly focuses on use of drawing instruments, developing imagination and translating ideas into sketches. The course also helps to develop the idea of visualizing the actual object or part on the basis of drawings and blue prints. This preliminary course aims at building a foundation for the further courses related to engineering drawing and other allied courses in coming semesters

ii) INDUSTRY / EMPLOYER EXPECTED OUTCOME

The aim of this course is to help the student to attain the following industry identified outcome through various learning experiences:

- Prepare simple engineering drawing manually using drawing instruments.

E. COURSE LEVEL LEARNING OUTCOMES (CO'S)

CCH106-1 Understand various fundamentals in engineering drawing.

CCH106-2 Produce different types of engineering curves.

CCH106-3 Produce the projection of point & lines inclined to one reference plane.

CCH106-4 Produce the projection of different planes.

CCH106-5 Produce orthographic drawing and sectional orthographic drawing from given pictorial view.

Competency, course outcomes and programme outcomes/programme specific outcomes (CP-CO-PO/PSO) matrix

[Note: Correlation levels: 1: Slight (Low), 2: Moderate (Medium), 3: Substantial (High), "0"]

Competency and COs	Programme outcome POs and PSO's								
	PO 1 Basic and Discipline specific knowledge	PO 2 Problem Analysis	PO3 Design/develo pment of solutions	PO 4 Engineerin g Tools, Experiment ation & testing	PO 5 Engineering Practices for society, sustainability and Environment	PO 6 Project Manage ment	PO 7 Life-long learning	PSO1 Work in mfg & service sector	PSO 2 Start entrepreneu rial activity
CCH106-1	3	-	-	-	-	-	-	-	-
CCH106-2	3	-	1	-	-	-	-	-	-
CCH106-3	3	-	-	1	1	-	-	-	-
CCH106-4	3	-	1	-	-	-	-	-	-
CCH106-5	3	-	1	1	-	-	-	-	-

F. CONTENT:

i) Practical exercises

Practical Exercises and related skills to be developed:

The following practical exercises shall be conducted in the *Drawing Hall for Engineering drawing* in practical sessions of batches of about 20- 22 students:

Sr No	Laboratory Experiment / Practical Titles / Tutorial Titles	Number of hrs.	Relevant COs
1	Draw horizontal, vertical, 30-degree, 45 degrees, 60 & 75-degrees lines using Tee and Set squares/ drafter.	4	CO1
2	Draw different types of lines, dimensioning styles	4	CO1
3	Draw one figure showing dimensioning techniques, two problems on redraw the figures. (Sketch Book)	4	CO1
4	Draw one figure showing dimensioning techniques, two problems on redraw the figures and one problem on Scales. (01 Sheet)	4	CO1
5	Draw any four Engineering Curves (Sketchbook)	4	CO2
6	Draw any four Engineering Curves – (01 Sheet)	4	CO2
7	Draw any four problems on Line parallel to both the principal planes Line parallel to one principal planes & perpendicular to other Principal planes using first angle method of projection. (Sketchbook)	4	CO3 CO5
8	Draw any four problems on Line parallel to one principal plane & inclined to other principal planes using first angle method of projection - (01 Sheet)	4	CO3 CO5
9	Draw any four problems on Plane parallel to one principal plane & perpendicular to another Principal plane, Plane perpendicular to both the principal planes using first angle method of projection. (Sketchbook)	4	CO4 CO5
10	Draw any four problems on Plane inclined to one principal plane and perpendicular to other principal plane using first angle method of projection - (01 Sheet)	4	CO4 CO5

11	Draw two problems on orthographic projections using first angle method of projection having plain surfaces, slanting surfaces and slots etc.	4	CO5
12	Draw two problems on orthographic projections using first angle method of projection having cylindrical surfaces, ribs etc. (Sketchbook)	4	CO5
13	Draw two problems on orthographic projections using first angle method of projection having plain surfaces, slanting surfaces cylindrical surfaces, ribs and slots etc.- (01 Sheet)	4	CO5
14	Draw different types of sections of simple objects (Sketchbook)	4	CO5 CO6
15	Draw two problems on sections of solids having ribs, cylindrical surface etc. (01 Sheet)	4	CO5 CO6
16	Correlate ancient Indian sculptures, Indian temples, Monuments, etc. with Engineering Graphics. (IKS)	4	CO1 CO2 CO3 CO4 CO5

ii) **THEORY**

SECTION – I

Sr. No	Topics	Teaching (Hours)	Theory Evaluation Marks
<i>Course Outcome CCH106-1 Understand various fundamentals in engineering drawing</i>			
1.	INTRODUCTION TO ENGINEERING DRAWING 1.1 Drawing Instruments and their uses 1.2 Standard sizes of drawing sheets as per ISO-A series, Layout of sheet. 1.3 Letters and numbers (single stroke vertical) Convention of lines and their applications. 1.4 Scale (reduced, enlarged & full size) Plain scale and Diagonal scale. 1.5 Dimensioning technique as per SP-46 (Latest Edition), Elements of dimensioning, Types and applications of chain, parallel and Co-ordinate dimensioning	04	06

Course Outcome CCH106-2 Produce different types of engineering curves			
2.	ENGINEERING CURVES 2.1 Conic sections and their applications 2.2 Ellipse by Arcs of circle method & Concentric circles method. 2.3 Parabola by Directrix and focus method & Rectangle method 2.4 Hyperbola by Transverse Axis focus Method & Rectangular hyperbola (Inclined axes). 2.5 Involute of circle, & pentagon, hexagon 2.6 cycloid, epicycloids, hypocycloid 2.7 Helix & Archimedean spiral.	09	18
Course Outcome CCH106-3 Produce the projection of point & lines inclined to one reference plane			
3.	PROJECTION OF POINT AND LINES 3.1 Projection of points when point is in first quadrant only 3.2 Orientation of Line with respect to principal planes (Both ends of line should be in first quadrant) <ul style="list-style-type: none"> • Line parallel to both the principal planes • Line parallel to one principal planes & perpendicular to other Principal planes • Line parallel to one principal plane & inclined to other principal planes 	05	10

SECTION – II

Sr. No	Topics	Teaching (Hours)	Theory evaluation Marks
Course Outcome CCH106-4 Produce the projection of different planes.			
4.	PROJECTION OF PLANES 4.1 Types of Planes - Circular, Square, Triangular, Rectangular, Pentagonal, Hexagonal. 4.2 Orientation of plane with respect to principal planes (Planes in First Quadrant Only) – <ul style="list-style-type: none"> • Plane parallel to one principal planes & perpendicular to another Principal plane • Plane perpendicular to both the principal planes • Plane inclined to one principal plane and perpendicular to other principal plane 	03	10
Course Outcome CCH106-5 Produce orthographic drawing and sectional orthographic drawing from given pictorial view.			
5.	ORTHOGRAPHIC PROJECTIONS 5.1 Introduction to Orthographic Projections -First and Third angle Projection Method, their symbols 5.2 Conversion of Pictorial view into Orthographic Views. (First angle Projection Method Only)	05	14

<i>Course Outcome CCH106-5 Produce orthographic drawing and sectional orthographic drawing from given pictorial view</i>			
6.	SECTIONAL VIEWS 6.1 Types of sections 6.2 Conversion of pictorial view into sectional Orthographic views. (First Angle Projection Method only)	04	12
Total		30	70
1. Summative assessment – Theory paper should be such that total marks of questions on each topic is one and half times the marks allotted above but the candidates are able to attempt questions of the above allotted marks only.			

** No questions will be asked on IKS learning subtopics in any question papers.

G. SUGGESTED MICRO PROJECTS / ASSIGNMENTS/ ACTIVITIES FOR SPECIFIC LEARNING / SKILLS DEVELOPMENT (SELF LEARNING) UNDER SLA

- NOT APPLICABLE

H. SPECIFICATION TABLE FOR SETTING QUESTION PAPER FOR SEMESTER END THEORY EXAMINATION

Topic No.	Name of topic	Distribution of marks (Cognitive level-wise)			Course Outcome	Total Marks
		Remember	Understand	Application		
1	Introduction To Engineering Drawing	00	06	00	CCH106-1	06
2	Engineering curves	00	12	06	CCH106-2	18
3	Projection of Point and Lines	00	10	00	CCH106-3	10
4	Projection of Planes	00	00	10	CCH106-4	10
5	Orthographic Projection	00	00	14	CCH106-5	14
6	Sectional Views.	00	00	12	CCH106-5	12
	Total	00	28	42		70

I. ASSESSMENT CRITERIA

Formative Assessment of Practical: -

Every assignment shall be assessed for 25 marks as per following criteria:

Domain	Particulars	Marks out of 25
Cognitive	Understanding	05
	Application	05
Psychomotor	Operating Skills	05
	Drawing / drafting skills	05
Affective	Discipline and punctuality	05
TOTAL		25

J. INSTRUCTIONAL METHODS:

- i) Lectures cum Demonstrations,
- ii) Class room practices.
- iii) Use of projector and soft material for demonstration

K. TEACHING AND LEARNING RESOURCES:

Chalk board, Power Point presentations and Demonstrative kits.

L. REFERENCE MATERIAL:

Sr. No.	Author	Title	Publisher
1.	N. D. Bhatt	Engineering Drawing	Charotar Publishing House 2010
2.	Amar Pathak	Engineering Drawing	Dreamtech Press, 2010
3.	D. Jolhe	Engineering Drawing	Tata McGraw Hill Edu., 2010
4.	M. B. Shah, B. C. Rana	Engineering Drawing	Pearson, 2010
5.	K. Venugopal	Engineering Drawing and Graphics + AutoCAD	New Age Publication, Reprint 2006
6.	IS Code, SP – 46	Engineering Drawing Practice	Bureau of Indian Standards

M. LEARNING WEBSITE & SOFTWARE: -

- i) <https://www.design-technology.info/IndProd/drawings/>
- ii) <https://graphicalcommunication.skola.edu.mt/syllabus/engineering-drawing/>
- iii) https://en.wikipedia.org/wiki/Engineering_drawing
- iv) <https://www.engineeringdrawing.org/>
- v) https://www.teachengineering.org/view_activity
- vi) <https://www.howtoread.co.in/2013/06/how-to-read-ed.html>
- vii) <https://www.slideshare.net/akhilrocker143/edp>
- viii) <https://www.24framesdigital.com/pstulpule>

COURSE ID :
COURSE NAME : **COMMUNICATION SKILLS**
COURSE CODE : **CCH201**
COURSE ABBREVIATION : **HCMS**

A. LEARNING SCHEME:

Scheme component		Hours	Credits
Actual Contact Hours / week	Classroom Learning	04	4
	Tutorial Learning	00	
	Laboratory Learning	02	
	SLH-Self Learning	02	
	NLH-Notional Learning	08	

B. ASSESSMENT SCHEME: -

PAPER DURATION IN HRS	THEORY				BASED ON LL&TL				BASED ON SLA		TOTAL
					Practical						
	FA-TH	SA-TH	TOTAL		FA -PR		SA-PR		MAX	MIN	
	MAX	MAX	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	150
03	30	70	100	40	25	10	-	-	25	10	

(Total IKS Hrs for Sem.: 00 Hrs)

C: ABBREVIATIONS: -

CL- Class Room Learning, TL- Tutorial Learning, LL-Laboratory Learning, SLH-Self Learning Hours, NLH-Notional Learning Hours, FA - Formative Assessment, SA -Summative assessment, IKS - Indian Knowledge System, SLA - Self Learning Assessment **Legends:** @ Internal Assessment, # External Assessment, *# On Line Examination, @\$ Internal Online Examination.

1. FA-TH represents average of two class tests of 30 marks each conducted during the semester.
2. If candidate is not securing minimum passing marks in FA-PR of any course then the candidate shall be declared as "Detained" in that semester.
3. If candidate is not securing minimum passing marks in SLA of any course, then the candidate shall be declared as fail and will have to repeat and resubmit SLA work.
4. Notional Learning hours for the semester are (CL+LL+TL+SL) hrs.* 15 Weeks
5. 1(one) credit is equivalent to 30 Notional hrs.
6. * Self learning hours shall not be reflected in the Time Table.

* Self learning includes micro project / assignment / other activities. (Provide list of all assignments here in tabular format At least 6 to 8 assignments to be given)

D. i) RATIONALE: -

Communication, being an integral part of every human activity, plays a fundamental role in education, science and technology. The communication skills are essential for engineering professionals to carry out routine tasks at workplace. These skills are also required for professional activities like dialogue, persuasion and negotiation. Considering the age group and socio-economical background of the students of the Institute, this course has been designed with a skill-oriented content with some necessary theoretical foundation. Thus, this course has been designed to enhance the skills to communicate effectively and skillfully at workplace.

ii) INDUSTRY / EMPLOYER EXPECTED OUTCOME

The aim of this course is to help the student to attain the following industry identified outcome through various learning experiences:

1. “Communicate in written and oral form of English effectively at workplace.”

E. COURSE LEVEL LEARNING OUTCOMES (COs)

CCH201-1 Use Contextual words in English appropriately.

CCH201-2 Comprehend the concept of communication and identify communication barriers.

CCH201-3 Prepare and participate in dialogue, conversation, elocution and debate.

CCH201-4 Make effective use of body language & graphical communication.

CCH201-5 Write letters, reports, e-mails and technical description in correct language.

CCH201-6 Prepare and present effective media aided presentation.

COMPETENCY, COURSE OUTCOMES AND PROGRAMME OUTCOMES (CP-CO-PO) MATRIX:

[Note: Correlation levels: 1: Slight (Low), 2: Moderate (Medium), 3: Substantial (High), “0”

	PO 1 Basic and Discipline specific knowledge	PO 2 Problem Analysis	PO 3 Design / Development of solutions	PO 4 Engineerin g Tools, Experiment ation and Testing	PO 5 Engineering Practices for society, sustainability and Environment	PO 6 Project Manage ment	PO 7 Life- long Learning	PSO1 Work in mfg & service sector	PSO 2 Start entrepre neurial activity
Competency	2	-	-	-	-	1	2		
CCH201-1	1	1	-	-	-	2	1		
CCH201-2	2	1	-	-	-	2	2		
CCH201-3	2	1	-	-	-	2	1		
CCH201- 4	2	-	-	-	-	2	2		
CCH201-5	2	-	-	-	-	2	1		
CCH201-6	1	1	-	-	-	1	1		

F. CONTENT:

I) PRACTICAL EXERCISES

The following practical exercises shall be conducted in the Laboratory for *Communication Skills* developed by the Institute in practical sessions of batches of about 20- 22 students:

Sr No.	Title of Practical Exercise	Course Outcome
1.	Vocabulary Building: Affixation	CCH201-1
2.	Vocabulary Building: Homophones	CCH201-1
3.	Vocabulary Building: Synonyms-Antonyms and Collocations	CCH201-1
4.	Communication Cycle and Communication Barriers	CCH201-2
5.	Oral Communication: Transcription	CCH201-3
6.	Oral Communication: Prepared Speech	CCH201-3
7.	Oral Communication: Conversation	CCH201-3
8.	Oral Communication: Group Discussion	CCH201-3
9.	Oral Communication: Group Debate	CCH201-3
10.	Non-verbal Communication: Graphic Communication	CCH201-4
11.	Non-verbal Communication: Body Language	CCH201-4
12.	Written Communication: Writing formal Letters	CCH201-5
13.	Written Communication: Writing Reports	CCH201-5
14.	Written Communication: Drafting of E-mail	CCH201-5
15.	Written Communication: Technical Writing	CCH201-5
16.	Presentation Aids	CCH201-6

II) THEORY

Section I

Sr. No.	Topics/Subtopics	Learning (Hours)	Classroom learning evaluation Marks
<i>CO: CCH201-1 Use Contextual words in English appropriately.</i>			
1	Vocabulary Building 1.1 Affixation: Prefix and Suffix, Definition and Examples, List of common Prefixes and Suffixes 1.2 Synonyms and antonyms: Vocabulary Expansion, Context and Usage 1.3 Homophones: Identifying Homophones, Meaning and Contest, Vocabulary Expansion 1.4 Collocation: Definition and Identification, Types of Collocations	8	08
<i>CO: CCH201-2 Comprehend the concept of communication and identify communication barriers.</i>			
2	Introduction to Communication 2.1 Definition and Importance of Communication 2.2 Model of Communication 2.3 Principles of Effective Communication 2.4 Types of Communication: Formal, Informal, Oral, Written, Verbal, Non-Verbal, Horizontal, Upward, Downward and Diagonal Communication 2.5 Barriers to communication: Physical, Mechanical, Psychological and Language Barriers	14	16
<i>CO: CCH201-3: Prepare and participate in dialogue, conversation, elocution and debate.</i>			
3	Oral Communication 3.1 Characteristics of Oral Communication. 3.2 Phonetics: IPA, Vowels (12), Consonants (24) and Diphthongs (12) 3.3 Tone, Pronunciation and Accents. 3.4 Spoken English: Prepared and Extempore speeches 3.5 Role Play: Conversation and Dialogue 3.6 Group Discussion and Debate	8	10

Section II

Sr. No.	Topics/Subtopics	Learning (Hours)	Classroom learning evaluation Marks
<i>CO: CCH201-4: Make effective use of body language & graphical communication.</i>			
4	Non-verbal Communication 4.1 Importance of Non-Verbal Communication. 4.2 Aspects of Body Language: Facial Expressions, Eye Contact, Vocalics, Gestures, Posture, Dress, Appearance and Personal Grooming and Haptics. 4.3 Non-Verbal Codes: Proxemics, chroemics, artefacts 4.4 Graphical Communication: 4.4.1 Advantages and Disadvantages of Graphical Communication. 4.4.2 Tabulation of Data and its depiction in the form of Bar Graphs and Pie Charts	08	12
<i>CO: CCH201-5 Write letters, reports, e-mails and technical description in correct language.</i>			
5	Written Communication 5.1 Characteristics of Written Communication. 5.2 Letter Writing: Application with Resume, Enquiry Letter, Order Letter and Complaint Letter 5.3 Writing Reports: Accident, Fall in Production Reports and Micro Project 5.4 Email Writing 5.5 Technical Writing: Object Description, Picture Description, Diary Writing 5.6 Paragraph Writing: Narrative, Descriptive and Technical	16	20
<i>CO: CCH201-6 Prepare and present effective media aided presentation.</i>			
6	Media-Aided Presentations 6.1 Media aids for Presentation: Strengths and Precautions 6.2 Planning, Preparing and Making a Presentation 6.3 Use of Presentation Media	06	04

** No questions will be asked on IKS learning subtopics in any question papers.

G : LIST OF ASSIGNMENTS/ACTIVITIES/MICRO-PROJECT UNDER SLA

**A learner should complete at least on major activity mentioned in the above list under the guidance of subject teacher.

Sr. No	List of Assignment (under SLA)	Hrs Allotted
1	Report different types of episodes and anecdotes	02
2	Seminar preparation and Presentation	04
3	Make a pod cost episode based on Indian freedom fighters.	02
4	Present summary of the editorial column of English news paper	02
5	Write review of on any one: short story, novel, film	02
6	Prepare a booklet on Indian scientist/ eminent persons	04
7	Prepare blog, vlogs and pod cast	04
8	Prepare questionnaire for interview on any one: industry personnel, social worker, entrepreneur and conduct interview.	02
9	Prepare charts/tables of vowels, diphthongs, consonant, organs of speech, vocabulary in English	02
10	Prepare charts/tables of types of communication, barrier in communication, aspects of body language	02
11	Prepare a micro project on a given topic.	04

H: SPECIFICATION TABLE FOR SETTING QUESTION PAPER FOR SEMESTER END THEORY EXAMINATION

Section/ Topic No.	Name of topic	Distribution of marks (level wise)			Total marks	CO
		Remember	Understand	Apply		
I / 1	Vocabulary Building	02	02	04	08	CCH201-1
I / 2	Introduction to Communication	04	06	06	16	CCH201-2
I / 3	Oral Communication	04	02	04	10	CCH201-3
II / 4	Non-verbal Communication	04	02	06	12	CCH201-4
II / 5	Written Communication	04	04	12	20	CCH201-5
II / 6	Media-aided Presentations	-	02	02	04	CCH201-6
	Total Marks				70	

I: -ASSESSMENT CRITERIA

i) Formative Assessment of Practical: -

Every assignment shall be assessed for 25 marks as per following criteria:

Domain	Particulars	Marks out of 25
Cognitive	Understanding	05
	Application	05
Psychomotor	Operating Skills	05
	Drawing / drafting skills	05
Affective	Discipline and punctuality	05
TOTAL		25

ii) Summative Assessment of Practical:

Every practical assignment shall be assessed for 25 marks as per following criteria:

Sr. No.	Criteria	Marks allotted
1	Attendance at regular practical	NA
2	Preparedness for practical	NA
3	Neat & complete Diagram.	NA
4	Observations & handling of instrument.	NA
5	Oral Based on Lab work and completion of task	NA
TOTAL		

J) INSTRUCTIONAL METHODS:

1. Lecture cum Demonstration,
2. Class room practices.
3. Use of projector and soft material for demonstration

K) TEACHING AND LEARNING RESOURCES:

Chalk board, LCD presentations, Demonstrative kits, Demonstrative charts.

L) REFERENCE BOOKS:

S.N.	Name of Book	Author	Publication
1	Communication Skills	Sanjay Kumar and Pushp Lata	Oxford University Press
2	Personality Development and Soft Skills	Brun K. Mitra	Oxford University Press
3	Effective Communication Skills	M Ashraf Rizvi	Tata McGraw-Hill
4	Human Communication	Burgoon Michael	SAGE Publication Inc.
5	101 Ways to Better Communication	Elizabeth Hiemey	Pustak Mahal
6	Technical Writing and Professional Communication	Thomas Huckin and Leslie	McGraw-Hill College Division

M) LEARNING WEBSITE & SOFTWARE

- a. www.nptel.com/iitm/
- b. <https://www.britishcouncil.in/english/learn-online>
- c. <https://www.vocabulary.com>
- d. www.newagegolden.com
- e. <https://www.internationalphoneticassociation.org>

COURSE ID : ME
Course Name : MECHANICAL WORKSHOP PRACTICES
Course Code : MEH101
Course Abbreviation : HMWP

A. LEARNING SCHEME:

Scheme component		Hours	Credits
Actual Contact Hours / week	Classroom Learning	00	02
	Tutorial Learning	00	
	Laboratory Learning	04	
	SLH-Self Learning	00	
	NLH-Notional Learning	04	

B. ASSESSMENT SCHEME: -

Theory				Based on LL & TL				Based on Self Learning		Total Marks
				Practical						
FA-TH	SA-TH	Total		FA-PR		SA-PR		SLA		
Max	Max	Max	Min	Max	Min	Max	Min	Max	Min	
-	-	-	-	50	20	50@	20	-	-	100

(Total IKS Hrs. for Sem. :02 Hrs.)

C. ABBREVIATIONS: -

CL-Class Room Learning, TL-Tutorial Learning, LL-Laboratory Learning, SLH-Self Learning Hours, NLH-Notional Learning Hours, FA -Formative Assessment, SA -Summative assessment, IKS - Indian Knowledge System, SLA -Self Learning Assessment

Legends: @Internal Assessment, #External Assessment, *#OnLine Examination, @\$InternalOnlineExamination

1. FA-TH represents average of two class tests of 30 marks each conducted during the semester.
2. If candidate is not securing minimum passing marks in FA PR of any course, then the candidate shall be declared as "Detained" in that semester.
3. If candidate is not securing minimum passing marks in SLA of any course, then the candidate shall be declared as fail and will have to repeat and resubmit SLA work.
4. Notional Learning hours for the semester are (CL+LL+TL+SL) hrs.*15 Weeks
5. 1(one) credit is equivalent to 30 Notional hrs.
6. *Self learning hours shall not be reflected in the Time Table.

*Self learning includes microproject/ assignment/ other activities. (Provide list of all assignments here in tabular format At least 6 to 8 assignments to be given)

D. i) RATIONALE:

Mechanical Workshop Practices mainly deals with Fitting, Plumbing and Wood working. A technician has to work in such an environment with his peers, superiors and subordinates for a major part of his life. Therefore, the emphasis on the practical work is needed for the primary experience of working in the team.

ii) INDUSTRY / EMPLOYER EXPECTED OUTCOME

Use different engineering tools for performing shop floor activities.

E. COURSE OUTCOMES:

MEH101-1: Practice safety in workshop and use firefighting tools and equipment.

MEH101-2: Prepare job using different tools in fitting shop

MEH101-3: Perform various operations using plumbing tools.

MEH101-4: Preparing simple components using carpentry tools.

MEH101-5: Produce simple job using different sheet metal operations.

F. COMPETENCY, COURSE OUTCOMES AND PROGRAMME OUTCOMES (CP-CO-PO) MATRIX:

[Note: Correlation levels: 1: Slight (Low), 2: Moderate (Medium), 3: Substantial (High), “-”: no correlation]

Competency and COs	Programme Outcomes POs and PSOs								
	PO 1 Basic and discipline specific knowledge	PO 2 Problem Analysis	PO 3 Design /development of solutions	PO 4 Engineering Tools, Experimentation and Testing	PO 5 Engineering practices for society, sustainability and environment	PO 6 Project Management	PO 7 Life-long learning	PSO 1 Work in mfg & service sector	PSO 2 Start entrepreneurial activity
Competency	1	-	-	3	-	-	-	2	-
MEH101-1	1	-	-	3	-	-	-	2	-
MEH101-2	1	-	-	3	-	-	-	2	-
MEH101-3	1	-	-	3	-	-	-	2	-
MEH101-4	1	-	-	3	-	-	-	2	-
MEH101-5	1	-	-	3	-	-	-	2	-

G. CONTENT

i) PRACTICAL EXERCISES:

Sr. No.	Topics/ Sub-Topics	Practical (Hours)/ Evaluation (Marks)
<i>Course outcome: MEH101-1: Practice safety in workshop and use firefighting tools and equipment.</i>		
01	General Workshop Practice 1.1 Safety Practices, Causes of accidents, General safety rules, Safety signs and symbols 1.2 First Aid 1.3 Fire, Causes of Fire, Basic ways of extinguishing the fire, Classification of fire, Class A, B, C, D, Firefighting equipment, fire extinguishers, and their types. 1.4 Workshop Layout 1.5 Issue and return system of tools, equipment and consumables	04/-
<i>Course outcome: MEH101-1: Practice safety in workshop and use firefighting tools and equipment.</i>		
<i>MEH101-2: Prepare job using different tools in fitting shop</i>		
02	Fitting Shop 2.1 Demonstration of different fitting tools-holding tools, marking & measuring tools, cutting tools, finishing tools, drilling and power tools and their specifications 2.2 Demonstration of different operations like marking, filing, cutting, drilling, tapping, dieing, chipping, scraping, grinding, sawing, reaming etc. 2.3 fitting shop machineries-care and maintenance, safety practices 2.4 One simple fitting job involving following operations- marking, punching, filing, chamfering, sawing, drilling, tapping etc. 2.5 One simple fitting job (Male Female assembly type) involving following operations- marking, punching, filing, chamfering, sawing, drilling, tapping etc.	14/14
<i>Course outcome: MEH101-1: Practice safety in workshop and use firefighting tools and equipment.</i>		
<i>MEH101-3: Perform various operations using plumbing tools.</i>		
03	Plumbing shop 3.1 Demonstration of Plumbing tools -pipe vice, pipe bending equipment, pipe wrenches, dies and their Specifications 3.2 Pipe fittings- bends, elbows, tees, cross, coupler, socket, reducer, cap, plug, nipple and their Specifications 3.3 Operation of Machineries in plumbing shops- pipe bending machine their specifications and maintenance. Basic process cutting, threading. 3.4 Demonstration of PVC pipe joint with various PVC fittings & accessories 3.5 One job on simple pipe joint with nipple coupling for Standard pipe, Pipe threading using standard die set (One job per one group of 04 students) One job on T joint/elbow joint pipe fitting job as per given drawing. (One job per one group of 04 students)	14/12

Course outcome: MEH101-1: Practice safety in workshop and use firefighting tools and equipment.
MEH101-4: Preparing simple components using carpentry tools.

04	Wood Working shop: -	<p>4.1 Demonstration of types of artificial woods such as plywood, block board, hardboard, laminated board, Veneer, fiber boards and their applications</p> <p>4.2 Demonstration of different wood working tools such as carpentry vice, marking and measuring tools, holding tools, planing tools, cutting tools, drilling and boring tools saws, claw hammer, mallet, chisels, jack plane, smoothing plane, etc.</p> <p>4.3 Demonstration of different wood working processes like marking, sawing, planing, chiseling, grooving, boring, Turning of wood etc.</p> <p>4.4 Operate different machines & equipments in carpentry shop, their specifications and maintenance, safe practices.</p> <p>4.5 One simple job involving measuring, marking, cutting, assembly etc. operations. (One job per one group of 04 students) One simple job involving cutting, planing, wood turning, joining, finishing, varnishing, etc. operations (One job per one group of 04 students)</p>	14/12
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Course outcome: Course outcome: MEH101-1: Practice safety in workshop and use firefighting tools and equipment.

MEH101-5: Produce simple job using different sheet metal operations.

05	Sheet Metal Shop	<p>5.1 Demonstration of different sheet metal tools and machines.</p> <p>5.2 Demonstration of sheet metal operations like Sheet cutting, Bending, Edging, End curling, Lancing, Riveting etc.</p> <p>5.3 One Job involving sheet metal operations from Dustbin, Letter Box, Tray, Bucket etc. (One job per one group of 04 students)</p>	14/12
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The students will submit the following.

Workshop record book showing the details of the job viz. Drawing, Raw material size, time required completing the job. The journal consisting of the neat sketches, specifications, use of the hand tool, and hand operations based on the demonstration in all the trades during the practical work.

H. ASSESSMENT CRITERIA

i) Formative Assessment of Practical: -

Every practical assignment shall be assessed for 50 marks as per following criteria:

Domain	Particulars	Marks out of 50
Cognitive	Understanding	10
	Application	10
Psychomotor	Operating Skills	10
	Drawing / drafting skills	10
Affective	Discipline and punctuality	10
TOTAL		50

ii) Summative Assessment of Practical:

Every student has to perform one practical within 2 hours at term end practical which shall be assessed as per following criteria.

Sr. no	Criteria	Marks allotted
1	Preparedness for practical	10
2	Correct figures / diagrams	10
3	Skill (Finishing in dimensions)	20
4	Safety / use of proper tools	10
	Total	50

I. INSTRUCTIONAL STRATEGIES: -

- i) Demonstration during Practicals.
- ii) Workshop Record Book

J. TEACHING AND LEARNING RESOURCES: -

- i) Shop Demonstration
- ii) Hands on training on machine

K. REFERENCE BOOKS:

Sr. No.	Author	Title	Publisher
1	S. K. Hajra Chaudhary, Bose, Roy	Elements of workshop Technology – Volume I & II	Media Promoters and Publishers limited
2	B.S. Raghuvanshi	Elements of workshop Technology – Volume I & II	Dhanpat Rai & Co.

L. LEARNING WEBSITE & SOFTWARE

- i) <http://nptel.ac.in>
- ii) <https://www.vlab.co.in/>
- iii) <https://ecoursesonline.iasri.res.in/>
- iv) www.egr.msu.edu/~pkwon/me478

COURSE ID:**Course Name : Fundamentals of ICT (CE/ME/EE/MT/ET/IT)****Course Code : CCH202****Course Abbreviation: HICT****A. LEARNING SCHEME:**

Scheme component		Hours	Credits
Actual Contact Hours / week	Classroom Learning	01	02
	Tutorial Learning	00	
	Laboratory Learning	02	
	SLH-Self Learning	01	
	NLH-Notional Learning	04	

B. ASSESSMENT SCHEME:

Paper Duration	Theory				Based on LL &TSL				Based on SL		Total Marks
					Practical						
	FA-TH	SA-TH	Total		FA-PR		SA-PR		SLA		
	Max	Max	Max	Min	Max	Min	Max	Min	Max	Min	
	-	-	-	-	25	10	25@	10	25	10	75

C. ABBREVIATIONS: -

CL-Class Room Learning, TL-Tutorial Learning, LL-Laboratory Learning, SLH-Self Learning Hours, NLH-Notional Learning Hours, FA - Formative Assessment, SA -Summative assessment, IKS - Indian Knowledge System, SLA -Self Learning Assessment

Legends: @Internal Assessment, #External Assessment, *#OnLine Examination,

@\$InternalOnlineExamination .

- FA-TH represents average of two class tests of 30 marks each conducted during the semester.
- If candidate is not securing minimum passing marks in FA PR of any course, then the candidate shall be declared as "Detained" in that semester.
- If candidate is not securing minimum passing marks in SLA of any course, then the candidate shall be declared as fail and will have to repeat and resubmit SLA work.
- Notional Learning hours for the semester are (CL+LL+TL+SL) hrs.*15 Weeks
- 1(one) credit is equivalent to 30 Notional hrs.
- *Self learning hours shall not be reflected in the Time Table.

*Self learning includes microproject/ assignment/ other activities. (Provide list of all assignments here in tabular format At least 6 to 8 assignments to be given)

D. RATIONALE:

In any typical business setup in order to carry out routine tasks related to create business documents, perform data analysis and its graphical representations and making electronic slide show presentations, the student need to learn various software as office automation tools like word processing applications, spreadsheets and presentation tools. They also need to use these tools for making their project reports and presentations. The objective of this course is to develop the basic competency in students for using these office automation tools to accomplish the job. This course also presents an overview of emerging technologies so that students of different discipline can appraise the applications of these technologies in their respective domain.

E. COMPETENCY:

Apply Fundamental knowledge of computer system to work with simple applications.

Cognitive : i) State the basic parts of a computer system and relationships among component. ii) State characteristics and functions of CPU's, motherboard, RAM, Storage devices etc.

Psychomotor: i) Use computers for Internet services, Electronics Documentation, Data Analysis and Slide Presentation.

ii) Appraise Application of ICT based Emerging Technologies.in different domain.

Affective : **Attitude** of i) Precision ii) Accuracy iii) Safety iv) Punctuality

F. COURSE OUTCOMES:

CCH202-1 - Use computer system and its peripherals for given purpose

CCH202-2 - Prepare Business document using Word Processing Tool

CCH202-3 - Analyze Data and represent it graphically using Spreadsheet

CCH202-4 - Prepare professional Slide Show presentations

CCH202-5 - Use different types of Web Browsers and Apps

CCH202-6 - Explain concept and applications of Emerging Technologies

G. COURSE OUTCOMES AND PROGRAMME OUTCOMES (CO-PO) MATRIX

	Programme Outcomes (POs)							Programme Specific Outcomes* (PSOs)	
	PO-1 Basic and Discipline Specific Knowledge	PO-2 Problem Analysis	PO-3 Design/ Development of Solutions	PO-4 Engineering Tools	PO-5 Engineering Practices for Society, Sustainability and Environment	PO-6 Project Management	PO-7 Life Long Learning	PSO 1 Work in mfg & service sector	PSO 2 Start entrepreneurial activity
CCH202-1	1	-	-	-	-	-	1		
CCH202-2	-	-	-	3	-	-	1		
CCH202-3	-	2	1	3	-	-	1		
CCH202-4	-	-	-	3	-	-	1		
CCH202-5	1	-	-	3	-	-	3		
CCH202-6	1	-	-	3	-	-	3		

Legends: - High:03, Medium:02, Low:01, No Mapping: -

*PSOs are to be formulated at institute level

H. LABORATORY WORK:

Laboratory experiments and related skills to be developed:

Sr. No.	Title of Experiment	Skills to be developed	Course outcome
1.	a) Work with Computer System, Input/output devices, and peripherals. b) Work with files and folders	1.1 Identify various Input/output devices, connections and peripherals of computer system 1.2 Work with Computer System, Input/output devices, and peripherals for manages files and folders for data storage.	CCH202-1
2.	Work with document files: a) Create, edit and save document in Word Processing. b) Text, lines and paragraph level formatting	2.1 Create and manage word document. 2.2 Apply formatting features on text at line, paragraph and page level.	CCH202-2
3.	Work with Images and Shapes in Word Processing.	3.1 Insert and edit images, shapes in a document file	CCH202-2
4.	Work with tables in Word Processing.	4.1 Insert table and apply various table formatting features on it.	CCH202-2
5.	Working with layout and printing a) Document page layout, Themes, and printing. b) Use of mail merge with options.	5.1 Apply page layout features in word processing. 5.2 Print a document by applying various print options 5.3 Use mail merge in word processing	CCH202-2
6.	Create, open and edit Worksheet.	6.1 Enter and format data in a worksheet. 6.2 Insert and delete cells, rows and columns 6.3 Apply alignment feature on cell	CCH202-3
7.	Formulas and functions in Worksheet.	7.1 Create formula and "If" condition on cell data 7.2 Apply various functions and named ranges in worksheet.	CCH202-3
8	Sort, Filter and validate data in Spreadsheet.	8.1 Implement data Sorting, Filtering and Data validation features in a worksheet.	CCH202-3
9	Charts for Visual Presentation in Spreadsheet.	9.1 Create charts using various chart options in spreadsheet.	CCH202-3
10	Worksheet Printing.	10.1 Print the worksheet by applying various	CCH202-3

		print options for worksheet	
11	Make Slide Show Presentation.	11.1 Apply design themes to the given presentation 11.2 Insert pictures text/images/shapes in slide 11.3 Use pictures text/images/shapes editing options.	CCH202-4
12	Use Tables and Charts in Slide	12.1 Add tables and charts in the slides. 12.2 Run slide presentation in different modes 12.3 Print slide presentation as handouts/notes	CCH202-4
13	a) Insert Animation effects to Text and Slides. b) Insert Audio and Video files in presentation	13.1 Apply animation effects to the text and slides 13.2 Add/set audio and video files in the presentation.	CCH202-4
14	a) Internet connection configuration b) Use Internet and Web Services.	14.1 Configure internet connection on a computer system 14.2 Use different web services on internet	CCH202-5
15	Working with Browsers.	15.1 Configure different browser settings 15.2 Use browsers for the given purpose	CCH202-5
16	Prepare Web Forms for Survey.	16.1 Create web forms for survey using different options.	CCH202-6
17	Prepare Web Forms for Quiz	17.1 Create web forms for Quiz using different options	CCH202-6

I. SUGGESTED MICRO PROJECT / ASSIGNMENT/ ACTIVITIES FOR SPECIFIC LEARNING SKILLS DEVELOPMENT (SELF LEARNING)

Self Learning

Following are some suggestive self-learning topics: 1) Use ChatGPT/any other AI tool to explore information 2) Use Calendar to Schedule and edit activities. 3) Use Translate app to translate the given content from one language to another. 4) Use cloud-based storage drive to store and share your files.

Assignment

Prepare journal of practical performed in the laboratory.

Micro project

The microproject has to be industry application based, internet-based, workshop-based, laboratory-based or based as suggested by Teacher. 1) Perform a survey on various input and output devices available in market and report. 2) Prepare Time Table, Prepare Notes on Technical Topics, Reports, Biodata with covering letter

(S teacher shall assign a document to be prepared by each student) 3) Prepare slides with all Presentation feature as: classroom presentation, presentation about department, presentation of Technical Topics. (Subject teacher assign a presentation to be prepared by each student). 4) Student Marksheet, Prepare Pay bills, tax statement, assessment record using spreadsheet. (Teacher shall assign a spreadsheet to be prepared by each student). 5) CSurvey on different web browsers. 6) Generate resume for different job profile, survey report of any industry ChatGPT/any other AI tool.

J. LABORATORY EQUIPMENT / INSTRUMENTS / TOOLS / SOFTWARE REQUIRED

Sr. No	Equipment Name with Broad Specifications
1	a) Computer System with all necessary Peripherals and Internet connectivity. b) Any Office Software c) Any Browser (Any General-Purpose Computer available in the Institute)

K. CONTENT:

Sr. No.	Topics / Sub-topics	Lectures (Hours)
Course Outcome CCH202-1 - Use computer system and its peripherals for given purpose.		
1	Unit - I Introduction to Computer System 1.1 Basics of Computer System: Overview of Hardware and Software: block diagram of Computer System, Input/Output unit CPU, Control Unit, Arithmetic logic Unit (ALU), Memory Unit 1.2 Internal components: processor, motherboards, random access memory (RAM), read-only memory (ROM), video cards, sound cards and internal hard disk drives) 1.3 External Devices: Types of input/output devices, types of monitors, keyboards, mouse, printers: Dot matrix, Inkjet and LaserJet, plotter and scanner, external storage devices CD/DVD, Hard disk and pen drive 1.4 Application Software: word processing, spreadsheet, database management systems, control software, measuring software, photo-editing software, video-editing software, graphics manipulation software System Software compilers, linkers, device drivers, operating system 1.5 Network environments: network interface cards, hubs, switches, routers and modems, concept of LAN, MAN, WAN, WLAN, Wi-Fi and Bluetooth 1.6 Working with Operating Systems: Create and manage file and folders, Copy a file, renaming and deleting of files and folders, Searching files and folders, application installation, creating shortcut of application on the desktop.	2
Course Outcome CCH202-2 - Prepare Business document using Word Processing Tool.		

Sr. No.	Topics / Sub-topics	Lectures (Hours)
2	<p>Word Processing</p> <p>2.1 Word Processing: Overview of Word processor Basics of Font type, size, colour, Effects like Bold, italic, underline, Subscript and superscript, Case changing options, Previewing a document, Saving a document, Closing a document and exiting application.</p> <p>2.2 Editing a Document: Navigate through a document, Scroll through text, Insert and delete text, Select text, Undo and redo commands, Use drag and drop to move text, Copy, cut and paste, Use the clipboard, Clear formatting, Format and align text, Formatting</p> <p>2.3 Changing the Layout of a Document: Adjust page margins, Change page orientation, Create headers and footers, Set and change indentations, Insert and clear tabs</p> <p>2.4 Inserting Elements to Word Documents: Insert and delete a page break, Insert page numbers, Insert the date and time, Insert special characters (symbols), Insert a picture from a file, Resize and reposition a picture</p> <p>2.5 Working with Tables: Insert a table, Convert a table to text, Navigate and select text in a table, Resize table cells, Align text in a table, Format a table, Insert and delete columns and rows, Borders and shading, Repeat table headings on subsequent page</p> <p>Working with Columned Layouts and Section Breaks: a Columns, Section breaks, Creating columns, Newsletter style columns, Changing part of a document layout or formatting, Remove section break, Add columns to remainder of a document, Column widths, Adjust</p>	3
Course Outcome CCG201-3: Design files of word processors, spreadsheets, presentation software, and database application.		
3	<p>Spreadsheets</p> <p>3.1 Working with Spreadsheets: Overview of workbook and worksheet, Create Worksheet Entering sample data, Save, Copy Worksheet, Delete Worksheet, Close and open Workbook.</p> <p>3.2 Editing Worksheet: Insert and select data, adjust row height and column width, delete, move data, insert rows and columns, Copy and Paste, Find and Replace, Spell Check, Zoom In-Out, Special Symbols, Insert Comments, Add Text Box, Undo Changes, - Freeze</p> <p>3.3 Formatting Cells and sheet: Setting Cell Type, Setting Fonts, Text options, Rotate Cells, Setting Colors, Text Alignments, Merge and Wrap, apply Borders and Shades, Sheet Options, Adjust Margins, Page Orientation, Header and Footer, Insert Page Breaks, S</p> <p>3.4 Working with Formula: Creating Formulas, Copying Formulas, Common spreadsheet Functions such as sum, average, min, max, date, In, And, or, mathematical functions such as sqrt, power, applying conditions using IF.</p> <p>3.5 Working with Charts: Introduction to charts, overview of different types of charts, Bar, Pie, Line charts, creating and editing charts. Using chart options: chart title, axis title, legend, data labels, Axes, grid</p>	3

Sr. No.	Topics / Sub-topics	Lectures (Hours)
	lines, moving chart in a separate sheet. Advanced Operations: Conditional Formatting, Data Filtering, Data Sorting, Using Ranges, Data Validation, Adding Graphics, Printing Worksheets, print area, margins, header, footer and other page setup options.	
<i>Course Outcome CCH202-4 - Prepare professional Slide Show presentations</i>		
4	Presentation Tool 4.1 Creating a Presentation: Outline of an effective presentation, Identify the elements of the User Interface, Starting a New Presentation Files, Creating a Basic Presentation, Working with textboxes, Apply Character Formats, Format Paragraphs, View a Presentation 4.2 Inserting Media elements: Adding and Modifying Graphical Objects to a Presentation - Insert Images into a Presentation, insert audio clips, video/animation, Add Shapes, Add Visual Styles to Text in a Presentation, Edit Graphical Objects on a Slide, Format 4.3 Working with Tables: Insert a Table in a Slide, Format Tables, and Import Tables from Other Office Applications. Working with Charts: Insert Charts in a Slide, Modify Chart, Import Charts from Other Office Applications.	4
<i>Course Outcome</i> <i>CCH202-5 - Use different types of Web Browsers and Apps</i> <i>CCH202-6 - Explain concept and applications of Emerging Technologies</i>		
5	Basics of Internet and Emerging Technologies 5.1 World Wide Web: Introduction, Internet, Intranet, Cloud, Web Sites, web pages, URL, web servers, basic settings of web browsers - history, extension, default page, default search engine, creating and retrieving bookmarks, use search engines effectively for 5.2 Web Services: e-Mail, Chat, Video Conferencing, e-learning, e-shopping, e-Reservation, e-Groups, Social Networking 5.3 Emerging Technologies: IOT, AI and ML, Drone Technologies, 3D Printing. Tools: Docs, Drive, forms, quiz, Translate and other Apps	3

L. ASSESSMENT METHODOLOGIES/TOOLS

Formative assessment (Assessment for Learning)

- Lab performance, Assignment, Self-learning and Seminar/Presentation

Summative Assessment (Assessment of Learning)

- Lab. Performance, viva voce

M. PROGRESSIVE SKILLS TEST:

i) Criteria for Continuous Assessment of Practical work and Progressive skill Test:

Sr. no	Criteria	Marks allotted
1	Attendance at regular practical	05
2	Preparedness for practical	02
3	Neat & complete Diagram.	04
4	Observations & computer handling skill	02
5	Use of toolbar, menu bar and short cut keys.	04
6	Logical thinking and approach	04
7	Oral Based on Lab work and completion of task	04
TOTAL		25

Assessment at semester end practical exam as per Pro-forma II.

ii) Criteria for assessment at semester end practical exam:

Sr. no	Criteria	Marks allotted
1.	Technical ability	10
2.	Communication skill	5
3.	Logical approach	10
TOTAL		25

N. INSTRUCTIONAL STRATEGIES:

Instructional Methods:

1. Lectures cum Discussions
2. Regular Home Assignments.
3. Laboratory experiences and laboratory interactive sessions

O. TEACHING AND LEARNING RESOURCES:

1. Chalk board
2. Slides (PPT)
3. Self-learning Online Tutorials

P. REFERENCE MATERIAL:

a) Books / Codes

Sr. No	Author	Title	Publisher
1	Goel Anita	Computer Fundamentals	Pearson Education, New Delhi, 2014, ISBN-13: 978-8131733097
2	Miller Michael	Computer Basics Absolute Beginner's Guide, Windows 10	QUE Publishing; 8th edition August 2015, ISBN: 978-0789754516

Sr. No	Author	Title	Publisher
3	Alvaro Felix	Linux: Easy Linux for Beginners	Createv Space Independent Publishing Platform- 2016, ISBN-13: 978-1533683731
4	Johnson Steve	Microsoft Office 2010: On Demand	Pearson Education, New Delhi India, 2010. ISBN :9788131770641
5	Schwartz Steve	Microsoft Office 2010 for Windows: Visual Quick Start	Pearson Education, New Delhi India, 2012, ISBN: 9788131766613
6	Leete Gurdy, Finkelstein Ellen, Mary Leete	OpenOffice.org for Dummies	Wiley Publishing, New Delhi, 2003 ISBN: 978-0764542220

Q. Suggested Websites and Portals

Sr. No	Link / Portal	Description
1	https://www.microsoft.com/en-in/learning/office-training.aspx	Office
2	http://www.tutorialsforopenoffice.org/	Open Office
3	https://s3-ap-southeast-1.amazonaws.com/r4ltue295xy0d/Special_Edition_Using_StarOffice_6_0.pdf	Open Office
4	https://ashishmodi.weebly.com/uploads/1/8/9/7/18970467/computer_fundamental.pdf	Computer Fundamental
5	http://www.tutorialsforopenoffice.org/	Open Office
6	https://www.tutorialspoint.com/computer_fundamentals/index.htm	Computer Fundamental
7	https://www.tutorialspoint.com/word/	Word Processing
8	https://www.javatpoint.com/ms-word-tutorial	Word Processing
9	https://support.microsoft.com/en-au/office/word-for-windows-training-7bcd85e6-2c3d-4c3c-a2a5-5ed8847	Word Processing
10	https://www.javatpoint.com/excel-tutorial	Spreadsheet
11	https://support.microsoft.com/en-au/office/excel-video-training-9bc05390-e94c-46af-a5b3-d7c22f6990bb	Spreadsheet
12	https://www.javatpoint.com/powerpoint-tutorial	Powerpoint Presentation

Sr. No	Link / Portal	Description
13	https://support.microsoft.com/en-au/office/powerpoint-for-windows-training-40e8c930-cb0b-40d8-82c4-b	Powerpoint Presentation
14	https://www.geeksforgeeks.org/ms-dos-operating-system/	Operating System
15	https://www.javatpoint.com/windows	Windows Operating System
16	https://www.javatpoint.com/what-is-linux	Linux Operating System
17	https://www.techtarget.com/iotagenda/definition/Internet-of-Things-IoT	IoT
18	https://www.geeksforgeeks.org/introduction-to-internet-of-things-iot-set-1/	IoT
19	https://www.javatpoint.com/machine-learning	AI & Machine Learning
20	https://www.skillrary.com/blogs/read/introduction-to-drone-technology	Drone Technology
21	https://www.cnet.com/tech/computing/what-is-3d-printing/	3D Printing
22	https://support.google.com/a/users/answer/9389764?hl=en	Apps

COURSE ID:
COURSE NAME : **YOGA &MEDITATION.**
COURSE CODE : **CCH203**
COURSE ABBREVIATION : **HYAM**

A. LEARNING SCHEME:

Scheme component		Hours	Credits
Actual Contact Hours / week	Classroom Learning	00	01
	Tutorial Learning	00	
	Laboratory Learning	01	
	SLH-Self Learning	01	
	NLH-Notional Learning	2	

B. ASSESSMENT SCHEME: -

PAPER DURATION IN HRS	THEORY				BASED ON LL&TL				BASED ON SLA		TOTAL
					Practical						
	FA-TH	SA-TH	TOTAL		FA -PR		SA-PR		MAX	MIN	
	MAX	MAX	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	50
-	-	-	-	-	25	10	-	-	25	10	

(Total IKS Hrs for Semester: 01Hr)

C: ABBREVIATIONS: -

CL-Class-Room Learning, TL-Tutorial Learning, LL-Laboratory Learning, SLH-Self Learning Hours, NLH-Notional Learning Hours, FA - Formative Assessment, SA -Summative assessment, IKS - Indian Knowledge System, SLA -Self Learning Assessment

Legends: @Internal Assessment, #External Assessment, *#OnLine Examination, @\$Internal Online Examination.

1. FA-TH represents average of two class tests of 30 marks each conducted during the semester.
2. If candidate is not securing minimum passing marks in FA-PR of any course then the candidate shall be declared as "Detained" in that semester.
3. If candidate is not securing minimum passing marks in SLA of any course then the candidate shall be declared as fail and will have to repeat and resubmit SLA work.
4. Notional Learning hours for these muster are(CL+LL+TL+SL)hrs.*15Weeks
5. 1(one)credit is equivalent to 30 Notional hrs.
6. *Self learning hours shall not be reflected in the Time Table.

*Self learning includes microproject/assignment/other activities. (Provide list of all assignments here in tabular format At least 6 to 8 assignments to be given)

D. i) RATIONALE

Diploma Graduate needs a sound body and mind to face the challenging situations in career as employee or as an entrepreneur. Yoga and Meditation brings about the holistic development of an individual and equips with necessary balance to handle the challenges. The age of polytechnic student is appropriate to get introduced to yoga practice as this will help them in studies as well as his professional life. Moreover, Yoga inculcates discipline in all walks of the life of student. Pranayama practice regulates breathing practices of the student to improve stamina, resilience. Meditation empowers a student to focus and keep calm to get peace of mind.

World Health Organization (WHO) has also emphasized the role of yoga and meditation as stress prevention measure. National Education Policy -2020 highlights importance of yoga and meditation amongst students of all ages. Therefore, this course for Diploma students is designed for the overall wellbeing of the student and aims to empower students to adopt and practice Yoga in daily life.

ii) INDUSTRY/EMPLOYER EXPECTED OUTCOME

By practicing basic yoga and pranayama in daily life, candidate should have attained the state of sound physique and balance mind to execute daily duties.

E. COURSE LEVEL LEARNING OUT-COMES (COS)

Students will be able to achieve & demonstrate the following Cos on completion of course based learning-

CCH203-1 Practice basic Yoga and Pranayama in daily life to maintain physical and mental fitness.

CCH203-2-Practice meditation regularly for improving concentration and better handling of stress and anxiety.

CCH203-3-Follow healthy diet and hygienic practices for maintaining good health.

Competency, course outcomes and programme outcomes/programme specific outcomes (cp-co-po/psos) matrix

[Note: Correlation levels: 1: Slight (Low), 2: Moderate (Medium), 3: Substantial (High), "0"

Course Outcomes (COs)	Programme Outcomes (POs)							Programme Specific Outcomes* (PSOs)	
	PO-1 Basic and Discipline Specific Knowledge	PO-2 Problem Analysis	PO-3 Design/Development of Solutions	PO-4 Engineering Tools	PO-5 Engineering Practices for Society, Sustainability and Environment	PO-6 Project Management	PO-7 Life Long Learning	PSO 1 Work in mfg & service sector	PSO 2 Start entrepreneurial activity
CO1	-	-	-	-	3	-	1	-	-
CO2	-	-	-	-	3	-	1	-	-
CO3	-	-	-	-	3	-	1	-	-

Legends: -High:03, Medium:02, Low:01, No Mapping: -
*PSOs are to be formulated at institute level

F.CONTENT:

i) PRACTICAL EXERCISES

Sr.No	Laboratory Experiment/Practical Titles/Tutorial Titles	Learning Of hrs.	Relevant COs
1	Introduction: - 1.1 Introduction to AshtangYog 1.2 Presentations on Introduction to Yoga and its History, Omkar chanting, prayer, Padmasan, Siddhasan & Vajrasan Lab Exp: 1. Perform warming up exercises to prepare the body from head to toe for Yoga - i)Nack Movement ii) Shoulder Movement iii) Trunk Movement iv) Knee Movement v) Ankle Movement	03	CCH203-1
2	Lab Exp: 2. After warmup, perform all the postures of Surya Namaskar one by one in a very slow pace, Lab Exp 3. Perform multiple Surya-Namaskar (Starting with three and gradually increasing it to twelve) in one go. (Experiment 2to 4 must be followed by shavasana for self-relaxation.)	4	CCH203-1, CCH203-2
3	Lab Exp: 4 Perform Sarvangasna, Halasana, Kandharasana (setubandhasana), Uttanpadasan, Pavanmuttasan. LabExp:5 Perform Bhujangasana, Naukasana, Mandukasana. LabExp:6 Perform Shalbhasan, Dhanurasan, Vakrasan, Goumukhasan, Paschimottasana, Ardhamasendrasan LabExp: 7 PerformVeerasan, Veer-Bhadrasana, Vrukshasana, Trikonasana. (Follow up experiment 5 to7 with shavasana for self-relaxation)	4	CCH203-2
4	Lab Exp: 8 Perform Deep brathing, Anulom Vilom Pranayam Kriya LabExp:9 Practice Kapalbhati Pranayam Kriya, Bhastrika LabExp:10 Practice Bhramary Pranayam and Sheetali Pranayam	2	CCH203-3
5	Lab Exp: 11 Perform sitting in Dhyan Mudra and meditating. Start with five minute and slowly increasing to higher durations. Introduction to Vipprasanna, Anappan& Chakras. (Trainer will explain the benefits of Meditation before practice)	2	CCH203-3

iii. THEORY: (NOT APPLICABLE)

G: LIST OF ASSIGNMENTS UNDER SLA

Sr. No.	List of Assignment (under SLA)	Hrs Allotted
1	Maintain a diary indicating date-wise practice done by the student with a photograph of self-yogic posture	02
2	Prepare Diet for and nutrition chart self	01
3	Practice at least thrice a week.	02
4	Read books on different methods to maintain health, wellness and to enhance mood	02
5	Watch videos on Yoga Practices.	01
6	Post your selfie with one asana on social media	02
7	Post your selfie with meditation posture on social media FB	02
8	Create your short video clip while performing one or two asanas	02
9	Create your short video performing Sun Salutation (Suyranamaskar)	01
	Total	15

****Candidate has to complete at least one major assignment from the given during his or her a single semester.**

- Maintain a diary indicating date wise practice done by the student with a photograph of self in yogic posture. Prepare Diet for and nutrition chart self

Assignment:

Prepare Diet for and nutrition chart for your self

- **Self-Learning**
 - Practice at least thrice a week.
 - Read books on different methods to maintain health, wellness and to enhance mood
 - Watch videos on Yoga Practices.

H: SPECIFICATION TABLE FOR SETTING QUESTION PAPER FOR SEMESTER END THEORY EXAMINATION:

- NA

I: -ASSESSMENT CRITERIA

i) Formative Assessment of Practical: -

Every assignment shall be assessed for 25 marks as per the following criteria

Domain	Particulars	Marks out of 25
Cognitive	Understanding	05
	Application	05
Psychomotor	Performance Skills	10
Affective	Discipline and Mind Balance	05
	TOTAL	25

J) INSTRUCTIONAL METHODS:

1. Lectures cum Demonstrations
2. Laboratory practices.
3. Use of third-party audio-visual material for demonstration
4. Demonstration Chart

K) TEACHING AND LEARNING RESOURCES:

Presentations, Yoga kits, Demonstrative charts, Actual Practice demonstration

L) REFERENCE BOOKS:

S.N.	Name of Book	Author	Publication
1	Patanjalis Yoga Sutras	Swami Vivekananda	Fingerprint Publishing (2023) Prakash Books India Pvt Ltd, NewDelhi ISBN-13?:?978-9354407017
2	Yoga for Every Body: A beginner's guide to the practice of yoga postures, breathing Exercises and me	Luisa Ray, Angus Sutherland	Vital Life Books (2022) ISBN-13?:?978-1739737009
3	Mudras for Modern Living: 49inspiring cards to boost your health, enhance your yoga and deepen your mind	Swami Saradananda	Watkins Publishing (2019) ISBN-13?:?978-1786782786
4	The Relaxation and Stress Reduction Workbook	Martha Davis, Elizabeth Robbins, Matthew McKay, Eshelman MSW	A New Harbinger Self-Help Workbook (2019)
5	Science of Yoga: Understand the Anatomy and Physiology to Perfect Your Practice	Ann Swanson	ISBN-13?:?978-1465479358

M) LEARNING WEBSITE & SOFTWARE:

- 1 [https://onlinecourses.swayam2.ac.in/aic19_ed28/preview- introduction to Yoga and Applications of Yoga](https://onlinecourses.swayam2.ac.in/aic19_ed28/preview-introduction%20to%20Yoga%20and%20Applications%20of%20Yoga)
- 2 [https://onlinecourses.swayam2.ac.in/aic23ge09/preview - YogaforCreativity](https://onlinecourses.swayam2.ac.in/aic23ge09/preview-YogaforCreativity)
- 3 [https://onlinecourses.swayam2.ac.in/aic23_e05/preview- YogaforCreativity](https://onlinecourses.swayam2.ac.in/aic23_e05/preview-YogaforCreativity)
- 4 [https://onlinecourses.nptel.ac.in/noc2lhs29/preview- Psychology of Stress, Health and Well-being](https://onlinecourses.nptel.ac.in/noc2lhs29/preview-Psychology%20of%20Stress,%20Health%20and%20Well-being)
- 5 <https://onlinecourses.swayam2.ac.in/aic23e0>
- 6 [preview- yoga for memory development](#)
- 7 [https://onlinecourses.swayam2.ac.in/ncel9sc04/preview-Food Nutrition for Healthy Living Course](https://onlinecourses.swayam2.ac.in/ncel9sc04/preview-Food%20Nutrition%20for%20Healthy%20Living%20Course)

SEMESTER 2
CURRICULUM

COURSE ID:
COURSE NAME : **APPLIED MATHEMATICS**
COURSE CODE : **CCH301**
COURSE ABBREVIATION : **HAMT**

A. LEARNING SCHEME:

Scheme component		Hours	Credits
Actual Contact Hours / week	Classroom Learning	04	3
	Tutorial Learning	02	
	Laboratory Learning	-	
	SLH-Self Learning	00	
	NLH-Notional Learning	06	

B. ASSESSMENT SCHEME: -

PAPER DURATION IN HRS	THEORY				BASED ON LL&TL				BASED ON SLA		TOTAL
	FA-TH	SA-TH	TOTAL		Tutorial		FA -PR	SA-PR	MAX	MIN	
	MAX	MAX	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	100
03	30	70	100	40	--	--	--	--	--	--	

(Total IKS Hrs. for Sem.: 02 Hrs.)

C. ABBREVIATIONS: -CL-Classroom Learning, TL-Tutorial Learning, LL-Laboratory Learning, SLH-Self Learning Hours, NLH-Notional Learning Hours, FA - Formative Assessment, SA - Summative assessment, IKS - Indian Knowledge System, SLA -Self Learning Assessment
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3. If candidate is not securing minimum passing marks in SLA of any course then the candidate shall be declared as fail and will have to repeat and resubmit SLA work.
4. Notional Learning hours for the semester are (CL+LL+TL+SL) hrs.*15Weeks
5. 1(one) credit is equivalent to 30 Notional hrs.
6. *Self-learning hours shall not be reflected in the Time Table.
 *Self-learning includes micro project /assignment/other activities. (The list of all assignments is given in tabular format. At least 6 to 8 assignments to be given)

F.CONTENT:

i) TUTORIAL EXERCISES

Any **TEN** of the following Tutorial exercises shall be conducted in the Tutorial room in tutorial sessions of batches of about 20- 22 students:

Sr. no	Tutorial experiences	Number of hrs.	Relevant COs
1	Solve simple problems of Integration by substitution.	02	CCH301-1
2	Solve integration using by parts.	02	CCH301-1
3	Solve examples on Definite Integral based on given methods.	02	CCH301-1
4	Solve problems on properties of definite integral.	02	CCH301-1
5	Solve given problems for finding the area under the curve and area between two curves. (Only for civil and mechanical engg. group)	02	CCH301-1
6	Solve examples on mean value and root mean square value. (Only for Computer, Electrical and Electronics engg. group)	02	CCH301-1
7	Solve first order first degree differential equation using variable separable method.	02	CCH301-2
8	Solve first order first degree differential equation using exact differential equation and linear differential equation.	02	CCH301-2
9	Solve engineering application problems using differential equation.	02	CCH301-2
10	Solve problems on Bisection method, Regula falsi and Newton-Raphson method.	02	CCH301-3
11	Solve problems on Jacobi's method and Gauss Seidel method.	02	CCH301-3
12	Use Bakshali iterative methods for finding approximate value of square root. (IKS)	02	CCH301-3
13	Solve engineering problems using Binomial Distribution, Poisson Distribution and Normal Distribution.	02	CCH301-4
14	Solve problems on Laplace transform and properties of Laplace transform.	02	CCH301-5
15	Solve problems on Inverse Laplace transform and properties of Inverse Laplace transform.	02	CCH301-5

ii) Theory

Section I

Sr. no.	Topics/Subtopics	Learning (Hours)	Classroom learning evaluation Marks
<i>Course Outcome CCH301-1: To solve examples on integration using various techniques.</i>			
1	Indefinite Integration 1.1 Definition, Standard formulae 1.2 Rules of Integration (without proof), Examples 1.3 Integration by substitution	14	16

Sr. no.	Topics/Subtopics	Learning (Hours)	Classroom learning evaluation Marks
	1.4 Integration by parts 1.5 Integration by partial fractions (only linear non repeated factors at denominator of proper fraction)		
<i>Course Outcome CCH301-1: To solve examples on integration using various techniques</i>			
2	Definite Integration 2.1 Definition, Examples 2.2 Properties of Definite Integration (without proof), Examples based on properties	8	8
<i>Course Outcome CCH301-2: To solve Differential equation of first order and first degree by various methods</i>			
3	Differential equation 4.1 Definition of differential equation 4.2 Order & degree of Differential equations 4.3 Methods of solving Differential equations of first order & first degree of following types: 4.3.1 Variable separable form 4.3.2 Exact Differential equations 4.3.3 Linear Differential Equations	8	10

Section –II

Sr. no.	Topics/Subtopics	Learning Hours	Classroom learning evaluation Marks
<i>Course Outcome CCH301-3: - To find approximate solution of algebraic equations and simultaneous equations by various methods.</i>			
4	Numerical Methods 4.1 Numerical solution of Algebraic Equations 4.1.1 Bisection Method 4.1.2 Regula- Falsi Method 4.1.3 Newton –Raphson method. 4.2 Numerical solution to simultaneous equations 4.2.1 Jacobi's Method 4.2.2 Gauss-Seidel method Bakhshali iterative method for finding approximate square root. (IKS)	10	14
<i>Course Outcome CCH301-4: - To solve problems on Probability distributions</i>			

5	Probability Distribution 5.1 Binomial distribution 5.2 Poisson's distribution 5.3 Normal distribution	8	8
<i>Course Outcome CCH301-5: - Solve examples on Laplace Transform.</i>			
6	Laplace Transform 6.1 Definition, Linearity property 6.2 Laplace Transforms of Standard functions (without proof) and examples 6.3 First shifting property and examples 6.4 Examples on Multiplication by t^n 6.5 Inverse Laplace Transform, Definition 6.6 Standard formulae (without proof) and examples 6.7 Inverse L.T.by using First shifting property 6.8 Inverse L.T. by using Partial fraction method	12	14

** No questions will be asked on IKS related subtopics in any question paper

G: Specification table for setting question paper for semester end theory examination

Section / Topic no.	Name of topic	Distribution of marks (level wise)			Total marks	CO
		Remember	Understand	Apply		
I / 1	Indefinite Integration	4	6	6	16	CCH301-1
I / 2	Definite Integration	-	4	4	8	CCH301-1
I / 3	Differential equation	2	4	4	10	CCH301-2
II / 4	Numerical Methods	2	4	8	14	CCH301-3
II / 5	Probability Distribution	-	4	4	8	CCH301-4
II/6	Laplace Transform	2	6	6	14	CCH301-5
Total Marks					70	

H. -Assessment Criteria

- i) **Formative Assessment (Assessment for Learning)**
 - Not Applicable
- ii) **Summative Assessment (Assessment of Learning)**
 - Not Applicable

I. - Instructional Methods:

1. Lectures cum Demonstrations
2. Classroom practices
3. Use of projector and soft material for demonstration
4. Use of softwares such as Geogebra

J. Teaching and Learning resources:

Chalk board, LCD presentations, Demonstrative kits, Demonstrative charts.

K. Reference Books:

S.N.	Name of Book	Author	Publication
1	Higher Engineering Mathematics	Grewal B.S.	Khanna publication New Delhi,2013 ISBN:8174091955
2	A textbook of Engineering Mathematics	Dutta. D.	New age publication New Delhi,2006 ISBN:978-81-224-1689-3
3	Advance Engineering Mathematics	Kreysizg, Ervin	Wiley publication New Delhi,2016 ISBN:978-81-265-5423-2
4	Advance Engineering Mathematics	Das H.K.	S Chand publication New Delhi,2008 ISBN:978-81-219-0345-5
5	Introductory Methods of Numerical Analysis	S. S. Sastry	PHI Learning Private Limited, New Delhi.ISBN:978-81-203-4592-8
6	Studies in the History of Indian Mathematics	C. S. Seshadri	Hindustan Book Agency (India) P 19 Green Park Extension New Delhi. ISBN 978-93-80250-06-9
7	Calculus & Its Applications	Marvin L. Bittinger David J. Ellenbogen Scott A. Surgent	Addison-Wesley 10 th Edition ISBN-13:978-0-321-69433-1
8	An Introduction to Statistical Learning with Application	Gareth James, Hastie Robert & Tibshirani	Springer New York Heidelberg Dordrecht London ISBN:978-1-4614-7138-7(eBook)

L) Learning Website & Software

1. <http://nptel.ac.in/courses/106102064/1>
2. <https://www.woframalpha.com/>
3. <http://www.sosmath.com/>
4. <http://mathworld.wolfram.com>
5. <https://www.brilliant.org/>
6. <https://ocw.mit.edu/index.htm>

COURSE ID:
COURSE NAME : ENGINEERING PHYSICS (CE/ME/MT)
COURSE CODE : CCH102
COURSE ABBREVIATION : HPHB

A. LEARNING SCHEME:

Scheme component		Hours	Credits
Actual Contact Hours / week	Classroom Learning	04	4
	Tutorial Learning	-	
	Laboratory Learning	02	
	SLH-Self Learning	02	
	NLH-Notional Learning	08	

B. ASSESSMENT SCHEME: -

PAPER DURATI ON IN HRS	THEORY				BASED ON LL & TL				BASED ON SLA		TOTAL
					Practical						
	FA-TH	SA-TH	TOTAL		FA -PR		SA-PR		MAX	MIN	
	MAX	MAX	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	175
1.5	30*#	70*#	100	40	25	10	25@	10	25	10	

(Total IKS Hrs. for Sem.: 04 Hrs.)

C: ABBREVIATIONS: - CL-Classroom Learning, TL-Tutorial Learning, LL-Laboratory Learning, SLH-Self Learning Hours, NLH-Notional Learning Hours, FA - Formative Assessment, SA - Summative assessment, IKS - Indian Knowledge System, SLA -Self Learning Assessment
Legends: @Internal Assessment, #External Assessment, *# Online Examination, @\$Internal Online Examination

1. FA-TH represents average of two class tests of 30 marks each conducted during the semester.
2. If candidate is not securing minimum passing marks in FA-PR of any course then the candidate shall be declared as "Detained" in that semester.
3. If candidate is not securing minimum passing marks in SLA of any course, then the candidate shall be declared as fail and will have to repeat and resubmit SLA work.
4. Notional Learning hours for the semester are (CL+LL+TL+SL) hrs.*15Weeks
5. 1(one) credit is equivalent to 30 Notional hrs.
6. *Self-learning hours shall not be reflected in the Time Table.

*Self-learning includes microproject / assignment / other activities. (Provide list of all assignments here in tabular format At least 6 to 8 assignments to be given)

D. i) RATIONALE: -

Physics is the foundation of engineering and technology. The development of all engineering areas requires good understanding of fundamental principles in physics. Studying physics develops scientific methodology and technical aptitude in the students. Applications of principles of physics in engineering fields create interest and motivate the students.

ii) INDUSTRY/ EMPLOYER EXPECTED OUTCOME

Apply principles of Physics to solve engineering problems as follows:

Cognitive : i) Understanding and applying principles and laws of Physics to simple practical problems/ situations. ii) Observing iii) Classifying iv) Interpreting

Psychomotor : Handling of instruments, apparatus and tools

Affective : Skill of i) working in team ii) curiosity, interest and self-confidence

E. COURSE LEVEL LEARNING OUTCOMES (COS)

CCH102-1 Estimate errors in measurement of physical quantities.

CCH102-2 Express importance of semiconductors and nanotechnology.

CCH102-3 Select proper material in engineering industry by analysis of its physical properties.

CCH102-4 Apply principles of electricity and magnetism to solve engineering problems.

CCH102-5 Apply principles of optics to solve engineering problems.

CCH102-6 Apply principles of acoustics and ultrasonics for related engineering applications.

Course outcomes and programme outcomes/ programme specific outcomes (co-po/ps) matrix

[Note: Correlation levels: 1: Slight (Low), 2: Moderate (Medium), 3: Substantial (High), “0”

Cos	Programme Outcomes POs and PSOs								
	PO 1 Basic and Discipline specific knowledge	PO 2 Problem Analysis	PO 3 Design / Develop ment of solutions	PO 4 Engineering Tools, Experiment ation and Testing	PO 5 Engineering Practices for society, sustainability and Environment	PO 6 Project Manage ment	PO 7 Life-long Learning	PSO 1 Work in Mfg. & service sector	PSO2 Start entrepre neurial activity
CCH102-1	3	1	-	1	1	1	1		
CCH102-2	3	-	-	-	1	1	1		
CCH102-3	3	1	-	1	1	1	1		
CCH102-4	3	1	-	1	1	1	1		
CCH102-5	3	1	-	-	1	1	1		
CCH102-6	3	-	-	-	1	1	1		

F. CONTENT:

i) PRACTICAL EXERCISES:

The following practical exercises shall be conducted in the *Laboratory for Physics developed* by the Institute in practical sessions of batches of about 20- 22 students:

Sr. no	Laboratory experiences	Number of hrs.	CO
1	To measure internal and external dimensions of hollow cylinder by using Vernier Caliper	02	CCH102-1
2	To measure the diameter of bob and thickness of plate by using Vernier Caliper	02	CCH102-1
3	To measure the diameter of bob and thickness of plate by using Micrometer screw gauge	02	CCH102-1
4	To determine forbidden energy band gap in semiconductors	02	CCH102-2
5	To determine the viscosity of liquid by Stokes method.	02	CCH102-3
6	To determine the buoyancy force on a solid immersed in a liquid	02	CCH102-3
7	To measure unknown resistance of wire by Ohm's law	02	CCH102-4
8	To verify series law of resistances	02	CCH102-4
9	To verify parallel law of resistances	02	CCH102-4
10	To draw magnetic lines of force for given magnet by using magnetic compass	02	CCH102-4
11	To verify Snell's law using glass slab	02	CCH102-5
12	To study variation of δ with i for a prism by pin method	02	CCH102-5
13	To determine velocity of sound by resonance tube	02	CCH102-6
14	To measure distance using ultrasonic meter	02	CCH102-6
15	To be added by the subject teacher as per requirement		

ii) THEORY

Section I

Sr. no.	Topics/Subtopics	Learning (Hours)	Classroom learning evaluation Marks
<i>Course Outcome CCH102-1 Estimate errors in measurement in Physical quantities.</i>			
1	UNITS AND MEASUREMENT 1.1 Unit, Physical Quantities: Fundamental and Derived Quantities and their units 1.1 Systems of units: CGS, MKS, FPS and SI 1.1 Errors, Types of errors: Instrumental, Systematic and Random error, Estimation of errors: Absolute, Relative and percentage errors 1.1 Significant figures 1.1 Ancient Astronomical Instruments: Chakra, Dhanuryantra, Yasti and Phalaka yantra (IKS learning)	10	12

Sr. no.	Topics/Subtopics	Learning (Hours)	Classroom learning evaluation Marks
	1.1 Simple Numerical problems		
<i>Course Outcome CCH102-2 Express the importance of Semiconductors and nanotechnology.</i>			
2	<p>INTRODUCTION TO SEMICONDUCTORS AND NANOTECHNOLOGY</p> <p>2.1 SEMICONDUCTORS 2.1.1 Conductors, insulators and semiconductors 2.1.2 Energy bands 2.1.3 Intrinsic and extrinsic semiconductors 2.1.4 Minority and majority charge carriers 2.1.5 P and N type semiconductors 2.1.6 Properties of semiconductors 2.1.7 Applications of semiconductors No numericals on above topic</p> <p>2.2 Nanotechnology 2.2.1 Definition of nanoscale, nanometer, nanoparticle 2.2.2 Definition and examples of nanostructured materials 2.2.3 Applications of nanotechnology in electronics, automobile, textile, space, medicine, cosmetics and environment No numericals on above topic</p>	<p>08 (06)</p> <p>(02)</p>	<p>08 (06)</p> <p>(02)</p>
<i>Course Outcome CCH102-3 Select proper material in engineering industry by analysis of its physical properties.</i>			
3	<p>PROPERTIES OF MATTER</p> <p>3.1 ELASTICITY 3.1.1 Definitions of elasticity, plasticity, rigidity, deforming force, restoring force 3.1.2 Stress, Strain and their types 3.1.3 Elastic Limit, Statement of Hooke's law 3.1.4 Modulus of elasticity and its types, Relation between Y, K and η (No derivation) 3.1.5 Ultimate stress, breaking stress, Working stress, Factor of safety 3.1.6 Applications of elasticity 3.1.7 Simple Numerical problems</p> <p>3.2 VISCOSITY 3.2.1 Definition and meaning of viscosity, velocity gradient 3.2.2 Newton's law of viscosity, Coefficient of viscosity 3.2.3 Stokes law</p>	<p>12 (06)</p> <p>(06)</p>	<p>14 (10)</p> <p>(04)</p>

Sr. no.	Topics/Subtopics	Learning (Hours)	Classroom learning evaluation Marks
	3.2.4 Derivation of expression for coefficient of viscosity of liquid by Stokes method 3.2.5 Effect of temperature and adulteration on viscosity of liquids 3.2.6 Applications of viscosity No numericals on above topic		

Section –II

Sr. no.	Topics/Subtopics	Learning (Hours)	Classroom learning evaluation Marks
<i>Course Outcome CCH102-4 Apply principles of electricity and magnetism to solve engineering problems</i>			
4	ELECTRICITY AND MAGNETISM	10	12
	4.1 ELECTRICITY	(06)	(08)
	4.1.1 Concept of charge, Coulomb's inverse square law, 4.1.2 Electric field, Electric field intensity		
	4.1.3 Electric potential and potential difference		
	4.1.4 Electric current, Resistance, Ohm's law		
	4.1.5 Specific resistance		
	4.1.6 Resistances in series and parallel		
	4.1.7 Simple Numerical problems	(04)	(04)
	4.2 MAGNETISM		
	4.2.1 Magnetic field and magnetic field intensity and its units		
	4.2.2 Magnetic lines of force, magnetic flux		
	No numericals on above topic		
<i>Course Outcome CCH102-5 Apply principles of optics to solve engineering problems</i>			
5	OPTICS	14	18
	5.1 PROPERTIES OF LIGHT	(06)	(08)
	5.1.1 Refraction of light		
	5.1.2 Laws of Refraction of Light, Snell's law		
	5.1.3 Refraction through glass prism		
	5.1.4 Dispersion & Dispersive Power (in terms of angles of deviation only)		
	5.1.5 Simple Numerical problems	(04)	(06)
	5.2 LASER		
	5.2.1 Introduction of LASER		
	5.2.2 Properties of laser		

	5.2.3 Spontaneous and stimulated emission 5.2.4 Population inversion and optical pumping 5.2.5 Applications of LASER No numericals on above topic 5.3 X-RAYS 5.3.1 Nature and properties of x-rays. 5.3.2 Production of x-rays by Coolidge tube 5.3.3 Applications of x-rays No numericals on above topic	(04)	(04)
<i>Course Outcome CCH102-6 Apply principles of acoustics and ultrasonics for related engineering applications.</i>			
6	ACOUSTICS AND ULTRASONICS 6.1 ACOUSTICS 6.1.1 Echo and reverberation of sound 6.1.2 Sabine's formula 6.1.3 Requirements of good acoustics 6.1.4 Acoustical planning of an auditorium No numericals on above topic 6.2 ULTRASONICS 6.2.1 Limits of audibility 6.2.2 Ultrasonic waves 6.2.3 Ultrasonic transducers: Piezoelectric and Magnetostriction 6.2.4 Applications of ultrasonic waves No numericals on above topic	06	06

** No questions will be asked on IKS learning subtopics in any question papers.

G: LIST OF MICROPROJECTS/ ASSIGNMENTS/ OTHER ACTIVITIES UNDER SLA

Sr. No.	List of Microprojects (any one of the following under SLA)	Hrs Allotted
1	Prepare chart showing multipliers required for converting units of physical quantities.	02
2	Prepare prototype vernier caliper of desired least count using card sheet.	02
3	Collect information about ancient astronomical instruments like Chakra, Dhanuryantra, Yasti and Phalaka yantra.	02
4	Collect different materials such as metal, plastic, glass etc. and prepare models to show their electrical conductivity.	02
5	Collect different sizes of same material (e.g. sugar, salt etc.) and list the physical/electrical/optical/chemical/mechanical characteristics for each of them.	02
6	Prepare chart showing the three types of modulus of elasticity developed in a material.	02
7	Prepare working model to differentiate liquids on the basis of viscosity.	02

8	Prepare chart/models to demonstrate magnetic lines of force of different types of magnets.	02
9	Prepare chart/models for series and parallel combination of resistances of different values.	02
10	Prepare a model to demonstrate the variation of angle of refraction with respect to angle of incidence.	02
11	Use keychain laser to differentiate laser with ordinary light.	02
12	Prepare a presentation for application of x-rays in different fields.	02
13	Collect information using internet about ancient acoustic architecture. (For CE/ME/MT students)	02
OR		
Sr. No	List of Assignment (any one of the following under SLA)	Hrs Allotted
1	Write fundamental and derived Physical quantities with their SI units	02
2	Enlist the rules used to decide significant figures in measurements.	02
3	Write points to differentiate conductors, semiconductors and insulators on the basis of energy band diagram.	02
4	List applications of semiconductors in Civil, Mechanical, Electrical, Information Technology, Electronics and Telecommunication, Metallurgical Engineering etc.	02
5	Write down the applications of nanotechnology in the field of electronics, cosmetics, textile, environment, medical, space and defense, automobiles.	02
6	Write applications of elasticity.	02
7	Explain free fall of a sphere in a liquid column.	02
8	Write information of electric lines of force and magnetic lines of force.	02
9	Explain conversion of galvanometer into ammeter/voltmeter of desired range.	02
10	Draw ray diagrams showing different phenomena of light (reflection, refraction, dispersion etc.).	02
11	Enlist the properties and applications of laser.	02
12	Explain production of X-rays using Coolidge tube.	02
13	Write the information of factors to be considered while planning of an auditorium. (For CE/ME/MT students).	02
AND		
Sr. No	List of Activity (Compulsory activity under SLA)	Hrs Allotted
	Write importance and significance of calibration of measuring instruments. Collect information of related industries in nearby industrial areas.	02

****One microproject/ assignment and given activity is to be completed during the semester.**

H: SPECIFICATION TABLE FOR SETTING QUESTION PAPER FOR SEMESTER END THEORY EXAMINATION

Section / Topic no.	Name of topic	Distribution of marks (level wise)			Total marks	CO
		Remember	Understand	Apply		
I / 1	Units and measurements	2	4	6	12	CCH102-1
I / 2	Introduction to Semiconductors and Nanotechnology	2	2	4	08	CCH102-2
I / 3	Properties of matter (Elasticity and Viscosity)	4	2	8	14	CCH102-3
II / 4	Electricity and Magnetism	2	4	6	12	CCH102-4
II / 5	Optics (Properties of light, Laser & X-rays)	6	6	6	18	CCH102-5
II / 6	Acoustics and Ultrasonics	2	2	2	06	CCH102-6
Total Marks					70	

I: -ASSESSMENT CRITERIA

i) Formative Assessment of Practical: -

Every practical assignment shall be assessed for 25 marks as per following criteria:

Domain	Particulars	Marks out of 25
Cognitive	Understanding	05
	Presentation (Observations, calculations & Result table)	05
Psychomotor	Operating Skills	05
	Drawing skills (Neat & complete circuit Diagram / schematic Diagram)	05
Affective	Discipline and punctuality	05
TOTAL		25

ii) Summative Assessment of Practical:

Every practical assignment shall be assessed for 25 marks as per following criteria:

Sr.no	Criteria	Marks allotted
1	Attendance at regular practical	05
2	Preparedness for practical	05
3	Neat & complete Diagram / observation table	05
4	Observations / Calculations / Result / Graph	05
5	Safety / use of proper tools	05
TOTAL		25

iii) Assessment of SLA: -

Every Self-learning assignment shall be assessed for 25 marks as per following criteria:

Sr.no	Criteria	Marks allotted
1	Attendance	05
2	Preparedness and workmanship	05
3	Presentation (neat figures/ diagrams/ tables/ graphs etc.)	05
4	Conclusion / Inference	05
5	Oral Based on microproject/ assignment/ activity	05
TOTAL		25

J) INSTRUCTIONAL METHODS:

1. Lectures cum Discussions
2. Regular Home Assignments
3. Laboratory work
4. Use of projector and soft material for demonstration

K) TEACHING AND LEARNING RESOURCES:

1. Chalk board
2. Video clips
3. Slides
4. Item Bank
5. Charts

L) REFERENCE BOOKS:

S.N.	Name of Book	Author	Publication
1	Text book of Physics for class XI & XII (Part-I, II)	Narlikar	N.C.E.R.T Delhi
2	Engineering Physics	P.V.Naik.	Pearson Edu. Pvt. Ltd, New Delhi.
3	Concepts in Physics, Vol. I & II.	Narkhede, Pawar, Sutar	Bharti Bhawan Ltd, New Delhi.
4	Principles of Physics.	Walker, Halliday, Resnik	Wiley Publication. , New Delhi.
5	Engineering Physics	B.L. Theraja	S. Chand Publishers – New Delhi
6	Concept of modern physics	Beiser	Tata Mc-Graw Hill
7	Physics for Technicians	E. Zebro Wski	Tata Mc-Graw Hill
8	Engineering Physics	V. Rajendran	Tata McGraw-Hill Publications
9	The Archaic and The Exotic : Studies in the history of Indian astronomical instruments	Steeramula Rajeswara Sarma	Manohar Book Services
10	The Surya Siddhanta	Aryabhata	Baptist Mission Press, Calcutta

M) LEARNING WEBSITE & SOFTWARE

1. <http://www.physicsclassroom.com>
2. <http://scienceworld.wolfram.com/physics/>
3. <http://physics.about.com/>
4. <http://nptel.ac.in/course.php?disciplineId=115>
5. <http://nptel.ac.in/course.php?disciplineId=104>
6. www.fearofphysics.com
7. www.science.howstuffworks.com
8. www.iksindia.org

COURSE ID : ME
Course Name : ENGINEERING DRAWING (ME/MT)
Course Code : CCH110
Course Abbreviation: HEDR
Course Type : AEC

A. LEARNING SCHEME:

Scheme component	Actual Contact Hours / week	Credits
Classroom Learning (CL)	02	4
Tutorial Learning (TL)	-	
Laboratory Learning (LL)	04	
Self-Learning Hours (SLH)	02	
Notional Learning (NLH)	08	

B. ASSESSMENT SCHEME:

PAPER DURATION IN HRS	Theory				Based on LL & TL				Based on Self Learning		Total Marks
					Practical						
	FA-TH	SA-TH	Total		FA-PR		SA-PR		SLA		
	Max	Max	Max	Min	Max	Min	Max	Min	Max	Min	
4	30	70	100	40	25	10	25 @	10	25	10	175

(Total IKS Hrs for Sem: 4 Hrs)

C. ABBREVIATIONS:

CL- Classroom Learning, TL- Tutorial Learning, LL-Laboratory Learning, SLH-Self Learning Hours, NLH-Notional Learning Hours, FA - Formative Assessment, SA -Summative assessment, IKS - Indian Knowledge System, SLA - Self Learning Assessment

Legends: @ Internal Assessment, # External Assessment, *# On Line Examination, @\$ Internal Online Examination

1. FA-TH represents average of two class tests of 30 marks each conducted during the semester.
2. If candidate is not securing minimum passing marks in FA-PR of any course then the candidate shall be declared as "Detained" in that semester.
3. If candidate is not securing minimum passing marks in SLA of any course, then the candidate shall be declared as fail and will have to repeat and resubmit SLA work.
4. Notional Learning hours for the semester are (CL+LL+TL+SL) hrs.* 15 Weeks
5. 1(one) credit is equivalent to 30 Notional hrs.
6. * Self learning hours shall not be reflected in the Time Table.

* Self learning includes micro project / assignment / other activities. (Provide list of all 5 assignments here in tabular format)

D. i) RATIONALE:

Engineering drawing is the graphical language of Engineers. This is a graphical tool used by the Designers, Planners, Supervisors and Technicians to express their thoughts, ideas and concepts. It offers students an insight into the methods of dealing with engineering drawing problems. This course aims at developing the ability to read and draw Isometric view of a solid, also intends to develop the ability to visualize and draw curves of development of lateral surfaces of various solids. The main focus of the course is in developing imagination, drafting and sketching skills of students, also aims at building a foundation for further course in machine drawing and other allied subjects.

ii) INDUSTRY / EMPLOYER EXPECTED OUTCOME

The aim of this course is to help the student to attain the following industry identified outcome through various learning experiences:

- 1) Use different drawing instruments for solving broad based engineering problems.
- 2) Improved drafting skills, imagination and planning of drawings.

E. COURSE LEVEL LEARNING OUTCOMES (CO'S)

CCH110-1 Draw projections of given solids for various orientations.

CCH110-2 Draw isometric views of given component or from orthographic projections.

CCH110-3 Interpret the views & complete the missing view.

CCH110-4 Draw development of lateral surfaces of various solids.

CCH110-5 Draw proportionate free hand sketches.

Competency, course outcomes and programme outcomes/programme specific outcomes (CP-CO-PO/PSO) matrix

[Note: Correlation levels: 1: Slight (Low), 2: Moderate (Medium), 3: Substantial (High), "0"]

Competency and Cos	Programme outcome POs and PSO's								
	PO 1 Basic and discipline specific knowledge	PO 2 Problem analysis	PO 3 Design/ development of solutions	PO 4 Engineering tools, experimentation & testing	PO 5 Engineering practices for society, sustainability and environment	PO 6 project management	PO 7 Life-long learning	PSO 1 Work in Mfg & service sector	Ps 2 Start entrepreneurial activity
Competency									
CCH110-1	3	-	-	-	-	-	1	2	
CCH110-2	3	-	1	1	-	-	1	2	1
CCH110-3	3	-	-	-	-	-	1	1	
CCH110-4	3	-	1	1	-	-	1	2	1
CCH110-5	3	-	-	-	-	-	1	2	

F. CONTENT:

i) Practical exercises

The following practical exercises shall be conducted in the *Drawing Hall for Engineering drawing* in practical sessions of batches of about 20- 22 students:

Sr No	Laboratory Experiment / Practical Titles / Tutorial Titles	Number of hrs.	Relevant COs
1	Draw any two problems on projection of solids with axis perpendicular to one of the principal projection planes.	04	CO1
2	Draw any two problems on projection of solids with axis inclined to one of the principal planes and parallel to the other. (Sketchbook)	04	CO1
3	Draw any two problems on projection of solids with axis parallel to both principal planes. (Sketchbook)	04	CO1
4	*Draw any four problems on projection of solids with axis inclined to one of the principal planes and parallel to the other. (01 sheet)	04	CO1
5	Draw two problems on Isometric view of simple objects having plain and slanting surfaces by using natural scale. (Sketchbook)	04	CO2
6	Draw two problems on Isometric Projection of objects having cylindrical surfaces and slots on slanting surfaces by using isometric scale. (Sketchbook)	04	CO2
7	*Draw one problem on Isometric Projection of objects having cylindrical surfaces and slots on slanting surfaces by using isometric scale, and one problem of isometric view by using natural scale (01 sheet)	04	CO2
8	Problem Based Learning: Given the orthographic views of at least three objects with few missing lines, the student will try to imagine the corresponding objects, complete the views and draw these views (sketch book).	04	CO3
9	Draw two problems on Missing view having plain and slanting surfaces, cylindrical surfaces and slots on slanting surfaces (Sketchbook)	04	CO3
10	Draw two problems on Missing view having cylindrical surfaces and slots on slanting surfaces (01 sheet)	04	CO3
11	Draw two problems on developments of lateral surfaces of cube, prisms.	04	CO4
12	Draw two problems on development of lateral surfaces of cylinder, pyramids.	04	CO4
13	*Draw four problems on developments of lateral surfaces of solids. (01 sheet)	04	CO4
14	*Draw freehand Sketches of 12 different standard components (1 Sheet)	04	CO5

15	Prepare a report on the use of various solid geometrical shapes employed in ancient Indian constructions (IKS).	04	CO1 CO2 CO3 CO4 CO5
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ii) THEORY

SECTION – I

Sr. No	Topics/ Subtopics	Learning (Hours)	Classroom learning evaluation Marks
<i>Course Outcome CCH110-1 Draw projections of given solids for various orientations.</i>			
1.	Projection of Solids Projection of Solids like Cube, Prisms, Pyramids, Cone, Cylinders and Tetrahedron. 1.1. Axis of Solids perpendicular to one reference plane and Parallel to another Reference Plane) 1.2. Axis of Solids inclined to one reference plane and Parallel to another Reference Plane) **various solid geometrical shapes employed in ancient Indian constructions (IKS).	08	16
<i>Course Outcome CCH110-2 Draw isometric views of given component or from orthographic projections.</i>			
2.	Isometric Projection 2.1. Isometric Axes 2.2. Isometric scale 2.3. Isometric view and Isometric Projection 2.4. Conversion of Orthographic Views into Isometric View/Projection (Including rectangular, cylindrical objects, representation of slots on sloping as well as plane surfaces)	08	18

SECTION – II

Sr. No	Topics/ Subtopics	Learning (Hours)	Classroom learning evaluation Marks
<i>Course Outcome CCH110-3 Interpret the views & complete the missing view.</i>			
3.	Missing View 3.1 Interpretation of the given two orthographic views and draw missing view from the given two Orthographic views. (First Angle Projection Method only)	06	14
<i>Course Outcome CCH110-4 Draw development of lateral surfaces of various solids.</i>			
4.	Developments of Surfaces 4.1 Methods of Development 4.2 Developments of Lateral surfaces of right solids Prism, Cylinder, Pyramid and Cone.	06	12

<i>Course Outcome CCH110-5 Draw proportionate free hand sketches.</i>			
5.	Free Hand Sketches 5.1 Profiles of Screw Threads (V (BSW, Sellers), Square, ACME, Buttress, Knuckle Thread) Conventional representation of threads. 5.2 Free hand sketches of nuts and bolts, Washer, Locking arrangement of nuts, Foundation bolts (Eye, Rag, Lewis), Riveted Joints.	02	10
Total		30	70
Summative assessment – Theory paper should be such that total marks of questions on each topic are one and half times the marks allotted above but the candidates are able to attempt questions of the above allotted marks only.			

** No questions will be asked on IKS learning subtopics in any question papers.

G. SUGGESTED MICRO PROJECTS / ASSIGNMENTS/ ACTIVITIES FOR SPECIFIC LEARNING / SKILLS DEVELOPMENT (SELF LEARNING) UNDER SLA

*Complete all assignments mentioned below or any one microproject or activity given by subject teacher.

List of Assignments

Sr. No.	List of Assignment (under SLA)
1	Projection of solids. One problem for each type of solids.
2	Isometric Projection. Two problems on Conversion of orthographic views into isometric View/projection.
3	Missing View. Two problems on drawing missing view from the given two Orthographic views.
4	Development of lateral surfaces of solids. One problem for each type of solids.
5	Free Hand Sketches. Draw freehand Sketches of 8 different standard components.

Note: Assignments are aimed at enhancing the imagination and drawing skills of students. Separate books are recommended for assignments.

Suggested List of Microprojects

1. Collect industrial part/job and draw its Orthographic Views.
2. Prepare Wooden models of various solids.
3. Draw Development of various given solids by collecting component, job/sample from nearby workshops/industries.
4. Prepare a model of sheet metal from given development.
5. Prepare isometric drawing from any industrial drawing.

Suggested Activity for Students

Each student will assess at least one sheet of other students (May be a group of 4 students identified by teacher can be taken) and will note down the mistakes committed by them. Student will also guide the students for correcting the mistakes, if any. Similar other activities can also be considered.

H. SPECIFICATION TABLE FOR SETTING QUESTION PAPER FOR SEMESTER END THEORY EXAMINATION:

Section / Topic no.	Name of topic	Distribution of marks (level wise)			Total marks	CO
		Remember	Understand	Apply		
I/1	Projection of Solids	0	0	16	16	CO1
I/2	Isometric Projection	0	0	18	18	CO2
II/3	Missing View	0	14	0	14	CO3
II/4	Developments of Surfaces	0	0	12	12	CO4
II/5	Free Hand Sketches	0	10	0	10	CO5
TOTAL			22	48	70	

I. ASSESSMENT CRITERIA:

i) Formative Assessment of Practical: -

Every assignment shall be assessed for 25 marks as per following criteria:

Domain	Particulars	Marks out of 25
Cognitive	Understanding	05
	Application	05
Psychomotor	Drawing / drafting skills	10
Affective	Discipline and punctuality	05
TOTAL		25

ii) Summative Assessment of Practical:

Every practical assignment shall be assessed for 25 marks as per following criteria:

Sr.no	Criteria	Marks allotted
1	Understanding	05
2	Preparedness for practical	05
3	Neat & complete Drawing	05
4	Drawing / drafting skills	10
TOTAL		25

iii) Assessment of SLA: -

Every Self-learning assignment shall be assessed for 25 marks as per following criteria:

Sr.no	Criteria	Marks allotted
1	Punctuality	05
2	Presentation (neat figures/ drawing etc.)	05
3	Drawing / drafting skills	10
4	Understanding	05
TOTAL		25

J. INSTRUCTIONAL METHODS:

1. Lectures cum Demonstrations,
2. Class room practices.
3. Use of projector and soft material for demonstration

K. TEACHING AND LEARNING RESOURCES:

Chalk board, Power Point presentations and Demonstrative kits.

L. REFERENCE BOOKS:

Sr. No.	Name of Book	Author	Publication
1.	Engineering Drawing	N. D. Bhatt	Charotar Publishing House 2010
2.	Engineering Drawing	Dhawan, R. K.	S. Chand and Company New Delhi
3.	Engineering Drawing	D. A. Jolhe	Tata McGraw Hill Edu., 2010
4.	Engineering Drawing	M. B. Shah, B. C. Rana	Pearson, 2010
5.	Engineering Drawing	Agrawal Basant, Agrawal C.M.	McGraw Hill Education, New Delhi
6.	Engineering Drawing Practice	IS Code, SP – 46	Bureau of Indian Standards

M. LEARNING WEBSITE & SOFTWARE: -

1. <https://www.design-technology.info/IndProd/drawings/>
2. <https://graphicalcommunication.skola.edu.mt/syllabus/engineering-drawing/>
3. https://en.wikipedia.org/wiki/Engineering_drawing
4. <https://www.engineeringdrawing.org/>
5. https://www.teachengineering.org/view_activity
6. <https://www.howtoread.co.in/2013/06/how-to-read-ed.html>
7. <https://www.slideshare.net/akhilrocker143/edp>
8. <https://www.24framesdigital.com/pstulpule>

COURSE ID :
COURSE NAME : APPLIED MECHANICS (CE/ME/MT)
COURSE CODE :CCH108
COURSE ABBREVIATION :HAPM

A. LEARNING SCHEME:

Scheme component		Hours	Credits
Actual Contact Hours / week	Classroom Learning	04	4
	Tutorial Learning	-----	
	Laboratory Learning	02	
	SLH-Self Learning	02	
	NLH-Notional Learning	08	

B. LEARNING SCHEME

PAPER DURATION IN HRS	THEORY			BASED ON LL&TL				BASED ON SLA		TOTAL	
	FA-TH	SA-TH	TOTAL	Practical		FA -PR	SA-PR	MAX	MIN		
03	MAX	MAX	MAX	MIN	MAX	MIN	MAX	MIN		175	
	30	70	100	40	25	10	25@	10	25		10

(Total IKS hours for sem: 02 hours)

C. ABBREVIATIONS: -

CL- Class Room Learning, TL- Tutorial Learning, LL-Laboratory Learning, SLH-Self Learning Hours, NLH-Notional Learning Hours, FA - Formative Assessment, SA -Summative assessment, IKS - Indian Knowledge System, SLA - Self Learning Assessment

Legends: @ Internal Assessment, # External Assessment, *# On Line Examination, @\$ Internal Online Examination.

1. FA-TH represents average of two class tests of 30 marks each conducted during the semester.
2. If candidate is not securing minimum passing marks in FA-PR of any course then the candidate shall be declared as "Detained" in that semester.
3. If candidate is not securing minimum passing marks in SLA of any course, then the candidate shall be declared as fail and will have to repeat and resubmit SLA work.
4. Notional Learning hours for the semester are (CL+LL+TL+SL) hrs.* 15 Weeks
5. 1(one) credit is equivalent to 30 Notional hrs.
6. * Self learning hours shall not be reflected in the Time Table.

* Self learning includes micro project / assignment / other activities. (Provide list of all assignments here in tabular format At least 6 to 8 assignments to be given)

D. RATIONALE:

The role of an engineer is to dream a mechanism for the present and the future generation. Understand the concept of existing mechanism thoroughly. An engineer in his initial stages of learning need to understand the basics of components of the machine, then forces in those components, interaction of these forces resulting in an engineering marvel or a mechanism. The contents of this most versatile basic course for engineering curriculum aims at providing fundamental meaning of various engineering principles and concept in engineering applications. The contents also form basic or primary set for higher level of subject such as strength of material, analysis of structures and design of steel structures and RCC structures. The subject being first and foremost entry level curriculum for the various programs in engineering it acts as gateway for engineering career. With the learning outcomes of the subject, learner can get clues for various fields such as mechanical, civil, metallurgical and varied courses like aerodynamics, space mechanics, marine structures. The subject being interdisciplinary in nature it comes under allied department applied mechanics.

E. COURSE LEVEL LEARNING OUTCOMES (COs):

- CCH108-1** Understanding mechanisms for the interaction of various forces in their components with types and corresponding effects. With due focus on rigid body concept, principle of superposition resolution and composition of forces.
- CCH108-2** Study of equilibrium for concurrent and non-concurrent force system and finding resultant and equilibrant graphically and analytically.
- CCH108-3** Problems on equilibrium condition involving friction and support reactions in beams graphically and analytically.
- CCH108-4** Knowing simple lifting mechanisms establishing law of machine, evaluating efficiency for set of loads.
- CCH108-5** Studying equations of motion for rectilinear and circular motion, establishing relation between linear and angular motion parameters.
- CCH108-6** Understanding effect of force for executing work, energy principles and conservation of energy concept.

Competency, course outcomes and programme outcomes/programme specific outcomes (CO-PO/PSO matrix)

[Note: Correlation levels: 1: Slight (Low), 2: Moderate (Medium), 3: Substantial (High), "0"]

Competency and COs	Programme Outcomes POs and PSOs								
	PO 1 Basic and Discipline specific knowledge	PO 2 Problem Analysis	PO 3 Design / Development of solutions	PO 4 Engineering Tools, Experimentation and Testing	PO 5 Engineering Practices for society, sustainability and Environment	PO 6 Project Management	PO 7 Life-long Learning	PSO 1 Work in Mfg & service sector	Ps 2 Start entrepreneurial activity
Competency: Applied Mechanics	3	2	2	2	3	1	2	2	2
CCH108-1	3	2	-	2	-	1	2	2	1
CCH108-2	3	2	1	2	-	1	2	3	1
CCH108-3	3	2	1	2	-	1	2	3	1

Competency and COs	Programme Outcomes POs and PSOs								
	PO 1 Basic and Discipline specific knowledge	PO 2 Problem Analysis	PO 3 Design / Development of solutions	PO 4 Engineering Tools, Experimentation and Testing	PO 5 Engineering Practices for society, sustainability and Environment	PO 6 Project Management	PO 7 Life-long Learning	PSO 1 Work in Mfg & service sector	Ps 2 Start entrepreneurial activity
CCH108-4	3	2	1	3	2	1	2	2	2
CCH108-5	2	1	1	2	-	1	2	1	1
CCH108-6	2	2	1	2	-	1	2	2	2

F. CONTENT:

i) LABORATORY WORK

Practical Exercise and related skills to be developed

The following exercises shall be conducted as practical work as detailed in laboratory manual for Applied Mechanics developed by the institute in practical sessions of batches of about 20- 22 students. In the list, Expt. No.1 to7 exercises are compulsory and from 8 to 12, any three exercises shall be conducted. in all 10 experiments are mandatory.

Sr no	Title of practical exercise	Course Outcome
1	Verification Law of parallelogram of forces	CCH108-1
2	Verification Law of polygon of forces	CCH108-1
3	Verification of Lamis theorem	CCH108-2
4	Determination of Beam reaction (Graphically and Analytically)	CCH108-2
5	Graphic statics (To find resultant of concurrent and non-concurrent force system)	CCH108-2
6	Determination of centroid (regular and irregular laminas)	CCH108-2
7	Determination of coefficient of friction between different surfaces	CCH108-3
8	Simple lifting machine introduction of basic terms Study of differential axle and wheel	CCH108-4
9	Screw jack Application and finding efficiency and its law	CCH108-4
10	Study of worm and worm wheel	CCH108-4
11	Gear mechanism (Either single or double)	CCH108-4
12	Experiment on simple pendulum to know dynamic characteristics	CCH108-5

ii) **THEORY:**

Section I

Sr no	Course content	Lecture hours (class room learning)	Theory Assessment marks
<i>CO: CCH108-1 Understanding mechanisms for the interaction of various forces in their components with types and corresponding effects. With due focus on rigid body concept, principle of superposition resolution and composition of forces.</i>			
1	Force systems and principles 1.1 Rigid body concepts, physical quantities and their units 1.2 Free body diagram for various mechanisms 1.3 Force characteristics, definition, force and force system-principles and laws 1.4 Different type of actions and their representation, with their effect (resultant moment, couple etc.) 1.5 Application on force system – numerical on law of parallelogram of forces, law of polygon of forces	8	12
<i>CO: CCH108-2 Study of equilibrium for concurrent and non-concurrent force system and finding resultant and equilibrant graphically and analytically.</i>			
2	Equilibrium of bodies 2.1 Two force system resultant and equilibrium inference 2.2, Lami's theorem for three force system and its application 2.3 Varignon's principle and its application 2.4 Solving graphically and analytically beams with roller and hinge support 2.5 Definition of centroid and centroid for standard areas / sections. Its determination experimentally for irregular areas	12	12
<i>CO: CCH108-3 Problems on equilibrium condition involving friction and support reactions in beams graphically and analytically.</i>			
3	Friction on bodies and beam statics 3.1 Laws of dry friction 3.2 Free body diagram to derive expression for μ_s & μ_k 3.3 Problems on block and ladder friction 3.4 Reaction in beams carrying point load and udl with hinge and roller support. 3.5 Beam carrying transverse loads and couple	10	10
Total		30	34

Section II

Sr. no.	Topics/Subtopics	Learning (Hours)	Classroom learning evaluation Marks
<i>CO: CCH108-4 Knowing simple lifting mechanisms establishing law of machine, evaluating efficiency for set of loads.</i>			
4	Simple Lifting machines 4.1 Basic definition of terms involved in lifting mechanisms. 4.2 Different types of simple lifting machines such as simple gears differential axial and wheel, screw jack 4.3 Inclined plane and evaluating coefficient of static friction	12	14
<i>CO: CCH108-5 Studying equations of motion for rectilinear and circular motion, establishing relation between linear and angular motion parameters.</i>			
5	Kinematics and kinetics 5.1 Kinematics and kinetic equations of motion 5.2 D'Alembert's principle for dynamic equilibrium 5.3 Kinetics for circular motion 5.4 Evaluating dynamic characteristics of simple pendulum	10	12
<i>CO: CCH108-6 Understanding effect of force for executing work, energy principles and conservation of energy concept</i>			
6	Work, power and energy 6.1 Definition of work done and dot product of force and displacement vectors 6.2 Energy types and law of conservation of energy 6.3 Collision of bodies and problem solving 6.4 Power and its interpretation in different mechanism	8	10
Total		30	36

G. List of Assignments/Microprojects under SLA

Sr. No	List of Microproject objectives	Format	Assessment criteria
1	Mechanism –free body diagrams, force equations and efficiency	Title: Objectives: Study scheme: 2* 15 = 30 hours planning Procedure: theory/modeling Observations: Inference:	Objectives:5 marks Methodology:10 marks Presentation /inferences:10 marks
2	Equilibrium of static force systems - Buildings, Dams, Engineering structures case studies		
3	Gear systems –case studies		
4	Rope drives, weighing machines case studies		

5	Rolling, sliding friction field applications.	Conclusion Bibliography	
6	Machine foundation aspects		
7	Vibration analysis of simple motions		
8	Motion of bodies, projectile, space mechanics preliminary studies		
9	Energy principles, fly wheel machine concept and applications		

**assignments/Microproject are to be completed during the semester.

H: Specification table for setting question paper for semester end theory examination

Section / Topic no.	Name of topic	Distribution of marks (level wise)			Total marks	CO
		Remember	Understand	Apply		
I / 1	Force systems and principles	4	4	4	12	CCH108-1
I / 2	Equilibrium of bodies	4	4	4	12	CCH108-2
I / 3	Friction on bodies and beam statics	4	2	4	10	CCH108-3
II / 4	Simple Lifting machines	4	2	8	14	CCH108-4
II / 5	Kinematics and kinetics	4	4	4	12	CCH108-5
II / 6	Work, power and energy	4	2	4	10	CCH108-6
Total Marks					70	

I: -Assessment Criteria

i) Formative Assessment of Practical: -

Every assignment shall be assessed for 25 marks as per following criteria:

Domain	Particulars	Marks out of 25
Cognitive	Understanding	05
	Application	05
Psychomotor	Operating Skills	05
	Drawing / drafting skills	05
Affective	Discipline and punctuality	05
TOTAL		25

ii) Summative Assessment of Practical:

Every practical assignment shall be assessed for 25 marks as per following criteria:

Sr. no	Criteria	Marks allotted
1	Attendance at regular practical	05
2	Preparedness for practical	05
3	Neat & complete Diagram.	05
4	Observations & handling of instrument.	05
5	Oral Based on Lab work and completion of task	05
TOTAL		25

iii) Assessment of SLA: -

Every Self-learning assignment/microproject shall be assessed for 25 marks as per assessment shown in table of criteria G.

J. Instructional Methods:

1. Lectures cum Demonstrations,
2. Class room practices.
3. Use of projector and soft material for demonstration

K. Teaching and Learning resources:

1. Chalk board
2. LCD presentations
3. Demonstrative kits
4. Demonstrative charts
5. Question Bank
6. Digital learning resources

L. REFERENCE BOOKS

a) Book / journals / IS code

Sr no	Name of Book	Author	Publication
1	Engineering Mechanics	S Timoshenko and young	McGraw- Hill,1995
2	Vector Mechanics for Engineer	Beer, Johnston	McGraw- Hill,1995
3	Engineering Mechanics	S S BHAVIKATTI S.S and Rajashekharappa K.G.	New age international publisher
5	Engineering Mechanics	K L KUMAR	Tata McGraw- Hill Publishing company Limited
6	Text book on engineering mechanics	Khurmi R .S.	S. Chand Publications, New Delhi
7	Engineering Mechanics	Singer F.L.	Harper and Row Pub. York.

M. Learning Website & Software

- a. www.nptel.com/iitm/
- b. www.howstuffworks.com/
- c. www.vlab.com
- d. [https:// en.wikipedia.org/wiki/applied_mechanics](https://en.wikipedia.org/wiki/applied_mechanics)

COURSE ID : ME
Course Name : MANUFACTURING PROCESSES
Course Code : MEH301
Course Abbreviation : HMPR

A. LEARNING SCHEME:

Scheme component		Hours	Credits
Actual Contact Hours / week	Classroom Learning	03	04
	Tutorial Learning	00	
	Laboratory Learning	04	
	SLH-Self Learning	01	
	NLH-Notional Learning	08	

B. ASSESSMENT SCHEME: -

PAPER DURATION IN HRS	Theory				Based on LL & TL				Based on Self Learning		Total Marks
					Practical						
03	FA-TH	SA-TH	Total		FA-PR		SA-PR		SLA		175
	Max	Max	Max	Min	Max	Min	Max	Min	Max	Min	
	30	70	100	40	25	10	25@	10	25	10	

(Total IKS Hrs for Sem. :01 Hrs)

C. ABBREVIATIONS: -

CL-Class Room Learning, TL-Tutorial Learning, LL-Laboratory Learning, SLH-Self Learning Hours, NLH-Notional Learning Hours, FA - Formative Assessment, SA -Summative assessment, IKS - Indian Knowledge System, SLA -Self Learning Assessment

Legends: @ Internal Assessment, # External Assessment, *# Online Examination, @\$ Internal Online Examination

1. FA-TH represents average of two class tests of 30 marks each conducted during the semester.
2. If candidate is not securing minimum passing marks in FA-PR of any course then the candidate shall be declared as "Detained" in that semester.
3. If candidate is not securing minimum passing marks in SLA of any course then the candidate shall be declared as fail and will have to repeat and resubmit SLA work.
4. Notional Learning hours for the semester are (CL+LL+TL+SL) hrs.*15 Weeks
5. 1(one) credit is equivalent to 30 Notional hrs.
6. *Self-learning hours shall not be reflected in the Time Table.

*Self-learning includes microproject/ assignment/ other activities. (Provide list of all assignments here in tabular format At least 6 to 8 assignments to be given)

D. i) RATIONALE:

Diploma graduates frequently encounter diverse manufacturing processes. This core manufacturing processes course aims to enhance student's comprehension of manufacturing methods, like turning, drilling, milling, casting, forming, and joining, etc.

ii) INDUSTRY / EMPLOYER EXPECTED OUTCOME

Produce a given component using various manufacturing processes

E. COURSE OUTCOMES:

MEH301-1: Prepare a wooden pattern and prepare a mould for given pattern

MEH301-2: Produce a part using casting processes as per given drawing.

MEH301-3: Produce a part using joining processes as per given drawing.

MEH301-4: Produce a part using forming processes as per given drawing.

MEH301-5: Produce a part using a lathe and drilling machine as per given drawing.

COMPETENCY, COURSE OUTCOMES AND PROGRAMME OUTCOMES (CP- CO-PO) MATRIX:

[Note: Correlation levels: 1: Slight (Low), 2: Moderate (Medium), 3: Substantial (High), “-”: no correlation]

Competency and COs	Programme Outcomes POs and PSOs								
	PO 1 Basic and discipline specific knowledge	PO 2 Problem Analysis	PO 3 Design /development of solutions	PO 4 Engineering Tools, Experimentation and Testing	PO 5 Engineering practices for society, sustainability and environment	PO 6 Project Management	PO 7 Life-long learning	PSO 1 Work in mfg & service sector	PSO 2 Start entrepreneurial activity
Competency	3	2	2	2	-	2	2	2	-
MEH301-1	3	2	2	2	-	2	2	2	-
MEH301-2	3	2	2	2	-	2	2	2	-
MEH301-3	3	2	2	2	-	2	2	2	-
MEH301-4	3	2	2	2	-	2	2	2	-
MEH301-5	3	2	2	2	-	2	2	2	-

G. CONTENT

i) PRACTICAL EXERCISES:

Sr No	Laboratory Experiment / Practical Titles / Tutorial Titles	Number of Hrs.	Relevant COs
1	*Produce a simple wooden pattern for the given component.	4	CO1
2	*Produce a simple wooden job involving measuring, marking, cutting, assembly etc. operations.	4	CO1
3	*Produce a sand mould for the given pattern.	4	CO1
4	*Produce a casting from the given mould.	4	CO2
5	*Fabricate structure using arc welding machine as per given drawing.	4	CO3

6	Demonstrate soldering/brazing operations.	4	CO3
7	Identify various welding defects from given castings.	2	CO3
8	Demonstrate components of a forging machine and its safety considerations.	2	CO4
9	*Produce a bolt head/cold chisel/hook using forging.	4	CO4
10	Demonstrate the various parts of rolling mill/machine and various safety aspects of it.	2	CO4
11	Demonstrate production process of washer.	2	CO4
12	*Produce a job on a lathe machine that comprises facing, plain turning and step turning operations as per the given drawing.	4	CO5
13	*Produce a job on a lathe machine that comprises taper turning and grooving operations as per the given drawing.	4	CO5
14	*Produce a job on a lathe machine that comprises knurling and chamfering operations as per the given drawing.	4	CO5
15	*Produce a job on a drilling machine comprising drilling and reaming operations as per the given drawing.	4	CO5
16	*Produce a job on drilling machine comprising tapping operation as per the given drawing.	4	CO5
17	Produce a job on a drilling machine comprising counter-boring operation as per the given drawing.	4	CO5

The students will submit the following.

Workshop record book showing the details of the job viz. Drawing, Raw material size, time required completing the job. The journal consisting of the neat sketches, specifications, use of the hand tool, and hand operations based on the demonstration in all the trades during the practical work.

ii) THEORY

SECTION I

Unit No	Topics / Sub-topics	Lectures (Hours)	Theory Evaluation (Marks)
<i>Course Outcome- MEH301-1: Prepare a wooden pattern and prepare a mould for given pattern</i>			
1	PATTERN MAKING AND MOULDING PATTERN MAKING: 1.1 Basic steps in making pattern 1.2 Pattern making materials (wood, plastics, rubbers, Plasters, waxes, metallic pattern) 1.3 Types of patterns: Single piece pattern, Split pattern, Match plate pattern, Sweep pattern, Skeleton pattern 1.4 Pattern making allowances: Shrinkage, draft, machining, distortion, rapping 1.5 Color coding for patterns and core boxes. Moulding: 1.6 Molding sand: Green, Dry, Loam, Facing, baking, Parting, Core 1.7 Properties of Molding sand	09	14

	1.8 Core prints: Horizontal, vertical, hanging, balancing wing 1.9 Molding processes: Green sand, Dry sand, Machine and Shell Molding 1.10 Gating and risering system		
<i>Course Outcome- MEH301-2: Produce a part using casting processes as per given drawing.</i>			
2	CASTING 2.1 **Casting in Indus valley civilization (IKS) 2.2 Centrifugal casting, investment casting, shell moulding and applications, 2.3 Die casting methods: Hot chamber die casting method, Cold chamber die casting method 2.4 Defects in casting: Causes and remedies 2.5 Safety practices/ precautions in foundry shop.	05	08
<i>Course Outcome- MEH301-3: Produce a part using joining processes as per given drawing</i>			
3	METAL JOINING PROCESSES 3.1 Welding Processes: welding and weldability, types and classification of welding processes. 3.2 Gas welding: gas welding equipments, oxy-acetylene welding, types of flame. 3.3 Arc welding: arc welding equipments, flux shielded metal arc welding, TIG and MIG welding. 3.4 Resistance welding: Spot, Projection, Seam, Percussion. 3.5 Soldering and brazing process, Comparison, fillers, merits, demerits and applications. 3.6 Defects in welding joints: causes and remedies. 3.7 Safety practices/ precautions in welding shop.	08	12

SECTION II

Unit No	Topics / Sub-topics	Lectures (Hours)	Theory Evaluation (Marks)
<i>Course Outcome- MEH301-4: Produce a part using forming processes as per given drawing.</i>			
4	FORMING PROCESSES 4.1 Drop forging: Introduction to forging, upset forging, press forging, open die and closed die, forging operations- Fullering, Edging, Bending, Blocking 4.2 Rolling: Principle of rolling, hot and cold rolling and applications, rolling mill. 4.3 Extrusion: Principles of extrusion, methods of extrusion: Direct, Indirect, Backward & Impact Extrusion 4.4 Press working operations: Cutting, bending, drawing, punching, blanking, notching, lancing 4.5 Press tool, simple, progressive and forming dies and applications.	09	14

	4.6 Die set components: Punch and die shoe, guide pin, Bolster plate, Stripper, stock guide, feed stock, pilot 4.7 Safety practices/ precautions in forging and press shop.		
<i>Course Outcome- MEH301-5:</i> Produce a part using a lathe and drilling machine as per given drawing.			
5	FUNDAMENTALS OF LATHE 5.1 Basics of Machining: Single point cutting Tool and its nomenclature 5.2 Cutting tool materials, Tool signature, Tool angles 5.3 Mechanics of Chip formation, Types of Chips, Cutting fluids or coolants 5.4 Lathe machine: Classification, specification of centre lathe 5.5 Basic parts and accessories like chucks (three jaw, four jaw, and magnetic chuck), mandrels, rests, faceplate, centres and angle plate of centre lathe and their functions. 5.6 Lathe operations: facing, plain turning, taper turning, thread cutting, chamfering, grooving, knurling 5.7 Cutting parameters like speed, feed, depth of cut and machining time.	09	14
<i>Course Outcome- MEH301-5:</i> Produce a part using a lathe and drilling machine as per given drawing.			
6	DRILLING MACHINES 6.1 Drill machine: Classification, specification of drilling machine 6.2 Basic parts of radial drilling machine, Sensitive drilling and their function. 6.3 Drilling machine operations: Drilling, reaming, boring, counter sinking, counter boring, spot facing 6.4 Cutting parameters- speed, feed, depth of cut and machining time. 6.5 Twist drill nomenclature, Types of drills	05	08

H. SUGGESTED MICRO PROJECT / ASSIGNMENT/ ACTIVITIES FOR SPECIFIC LEARNING /SKILLS DEVELOPMENT (SELF LEARNING)

Assignment

- i. Justify why lathe machine is called mother of all machines.
- ii. Collect information regarding car bonnet manufacturing in automobile industry.
- iii. Collect information of material used for preparation of pattern.
- iv. Justify necessity of safety precaution in industries.
- v. Prepare a list of machine tools seen in the industry during industrial visit.

Micro project

- i. Prepare a list of machine tools available in the workshop of the institute.
- ii. Prepare list of similar operations that can be performed on different machine tools.
- iii. Collect specification of machine tools available in the institute workshop.
- iv. Collect different welding equipments required for a welding shop.
- v. Collect a information about operations required for key manufacturing.

I. SPECIFICATION TABLE FOR SETTING QUESTION PAPER FOR SEMESTER END THEORY EXAMINATION:

Topic No.	Name of topic	Distribution of marks (Cognitive level-wise)			Total Marks	Course Outcome
		Remember	Understand	Application		
1	Pattern making and Moulding	2	8	4	14	CO1
2	Casting processes	2	2	4	08	CO2
3	Metal joining processes	4	4	4	12	CO3
4	Forming processes	2	4	8	14	CO4
5	Fundamentals of Lathe machines	2	4	8	14	CO5
6	Drilling machines	2	2	4	08	CO5
	TOTAL	14	24	32	70	

J. ASSESSMENT CRITERIA

i) Formative Assessment of Practical: -

Every practical assignment shall be assessed for 50 marks as per following criteria:

Domain	Particulars	Marks out of 25
Cognitive	Understanding	05
	Application	05
Psychomotor	Operating Skills	05
	Drawing / drafting skills	05
Affective	Discipline and punctuality	05
TOTAL		25

ii) Summative Assessment of Practical:

Every student has to perform one practical within 2 hours at term end practical which shall be assessed as per following criteria.

Sr. no	Criteria	Marks allotted
1	Preparedness for practical	05
2	Correct figures / diagrams	05
3	Skill (Finishing in dimensions)	10
4	Safety / use of proper tools	05
	Total	25

iii) Assessment of SLA: -

Every Self-learning assignment shall be assessed for 25 marks as per following criteria:

Sr.no	Criteria	Marks allotted
1	Punctuality	05
2	Presentation (neat figures/ drawing etc.)	05
3	Drawing / drafting skills	10
4	Understanding	05
	TOTAL	25

K. INSTRUCTIONAL STRATEGIES: -

- i) Lectures
- ii) Model and Video Demonstration
- iii) Demonstration during Practicals.
- iv) Hands on training on machine

L. TEACHING AND LEARNING RESOURCES: -

- i) Chalk-Board
- ii) LCD Projector

M. REFERENCE BOOKS:

Sr. No	Author	Title	Publisher with ISBN Number
1	P N RAO	Manufacturing Technology Vol-1	McGraw Hill, New Delhi. ISBN-1259062570, 9781259062575
2	P N RAO	Manufacturing Technology Vol-2	McGraw Hill, New Delhi, ISBN: 9789353160524
3	S K Hajra Choudhury, A K Hajra Choudhury, Nirjhar Roy	Elements Of Workshop Technology Vol-1	Media Propoters & Publisher PVT. LMT. ISBN-13 5551234102415
4	S K Hajra Choudhury, A K Hajra Choudhury, Nirjhar Roy	Elements Of Workshop Technology Vol-2	Media Propoters & Publisher PVT. LMT., ISBN: 978-8-185-09915-6.
5	D.P. Agrawal	Ancient Metal Technology and Archaeology of South Asia: a Pan-Asian perspective	Aditya Prakashan, New Delhi. ISBN: 9788173051777

N. LEARNING WEBSITE & SOFTWARE:

1. <https://www.youtube.com/watch?v=Wc2gpWcmGK4>
2. <https://www.youtube.com/watch?v=DGsV6RhBnbM>
3. <https://www.youtube.com/watch?v=zzXdddrV2so>
4. <https://www.youtube.com/watch?v=2CIcyB72dmk>
5. <https://www.youtube.com/watch?v=-w7E88zox6w>
6. <https://www.youtube.com/watch?v=RyLvVMg84xs>

COURSE ID :
COURSE NAME : SOCIAL AND LIFE SKILLS
COURSE CODE : CCH114
COURSE ABBREVIATION: HSLS

A. LEARNING SCHEME:

Scheme component		Hours	Credits
Actual Contact Hours / week	Classroom Learning	00	1
	Tutorial Learning	00	
	Laboratory Learning	00	
	SLH-Self Learning	02	
	NLH-Notional Learning	02	

B. ASSESSMENT SCHEME: -

PAPER DURATION IN HRS	THEORY				BASED ON LL&TL				BASED ON SLA		TOTAL
					Practical						
	FA-TH MAX	SA-TH MAX	TOTAL MAX MIN		FA -PR MAX MIN		SA-PR MAX MIN		MAX	MIN	
00	00	00	00	00	00	00	-	-	50	20	50

(Total IKS Hrs for Sem.: 00 Hrs)

C: ABBREVIATIONS: -

CL- Class Room Learning, TL- Tutorial Learning, LL-Laboratory Learning, SLH-Self Learning Hours, NLH-Notional Learning Hours, FA - Formative Assessment, SA -Summative assessment, IKS - Indian Knowledge System, SLA - Self Learning Assessment **Legends:** @ Internal Assessment, # External Assessment, *# Online Examination, @\$ Internal Online Examination.

1. FA-TH represents average of two class tests of 30 marks each conducted during the semester.
2. If candidate is not securing minimum passing marks in FA-PR of any course then the candidate shall be declared as "Detained" in that semester.
3. If candidate is not securing minimum passing marks in SLA of any course, then the candidate shall be declared as fail and will have to repeat and resubmit SLA work.
4. Notional Learning hours for the semester are (CL+LL+TL+SL) hrs.* 15 Weeks
5. 1(one) credit is equivalent to 30 Notional hrs.
6. * Self learning hours shall not be reflected in the Time Table.

* Self learning includes micro project / assignment / other activities. (Provide list of all assignments here in tabular format At least 6 to 8 assignments to be given)

D. i) RATIONALE: -

Life skills can be defined as abilities that enable an individual to deal effectively with the demands and challenges of life. Social skills are a subset of life skills that are needed for successful, healthy relationships to easily adapt when moving from one social situation to the next. They help regulate our emotions effectively and develop enduring, supportive relationships, we're happier and healthier. This is why developing life skills and eventually social skills is key not only to being successful in life, it's key for our health and well-being. Thus, Teaching of Social and life skills provide students with essentials of knowing, understanding attitudes, values, morals, social skills and better equip them to handle stress and build their self-efficacy, self-esteem and self-confidence.

Note: The course offers four different alternatives (modules) for achieving above outcomes. Students must complete any one module from the following given options.

A) MODULE-I : Unnat Maharashtra Abhiyan (UMA)

B) MODULE-II : National Service Scheme (NSS)

C) MODULE-III : Universal Human Values

D) MODULE-IV: Value Education (Unati Foundation)

E) MODULE-V : Financial Literacy (NABARD)

The institute can choose to offer any one MODULE to the groups of the students by taking into consideration the resources required and resources available in the institute. Different group of students may be offered different MODULE based on their choices.

ii) INDUSTRY / EMPLOYER EXPECTED OUTCOME

Exhibit psychosocial competencies, workplace ethics, resilience, positive attitude, integrity and self- confidence

E. COURSE LEVEL LEARNING OUTCOMES (COs)

Students will be able to achieve & demonstrate the following COs on completion of course based learning

CCH114-1 - Develop ability to adapt to new challenges.

CCH114-2 - Manage emotions effectively.

CCH114-3 - Follow workplace ethics and practices

CCH114-4 - Manage time effectively.

CCH114-5 - Increased self-confidence to handle stress.

COMPETENCY, COURSE OUTCOMES AND PROGRAMME OUTCOMES (CP-CO-PO) MATRIX:

[Note: Correlation levels: 1: Slight (Low), 2: Moderate (Medium), 3: Substantial (High), “0”]

	PO 1 Basic and Discipline specific knowledge	PO 2 Problem Analysis	PO 3 Design / Developme nt of solutions	PO 4 Engineer in g Tools, Experim ent ation and Testing	PO 5 Engineerin g Practices for society, sustainabil ity and Environm ent	PO 6 Project Managem ent	PO 7 Life- long Learning	PSO 1 Work in Mfg & service sector	PSO 2 Start entreprene rial activity
Competency:									
CCH114-1							2		
CCH114-2							2		
CCH114-3							2		
CCH114-4						2	2		
CCH114-5							2		
CCH114-6						2	2		

F. CONTENT:

i) **Practical Exercises: Not Applicable**

ii) **Theory**

Sr. No	Theory Learning Outcomes (TLOs) Aligned to COs.	Learning content mapped with Theory Learning Outcomes (TLO's) and CO's.	Suggested Learning Pedagogies.
1	TLO 1.1 Explain developmental needs and connection of various stakeholders TLO 1.2 Enlist the local problems	Unit - I MODULE I : Activities Under Unnat Maharashtra Abhiyan (UMA) 1.1 Introduction to Societal Needs and respective stakeholders: Regional societal issues that need engineering intervention 1.2 Multidisciplinary approach-linkages of academia, society and technology 1.3 Stakeholders' involvement 1.4 Introduction to Important secondary data sets available such as census, district economic surveys, cropping pattern, rainfall data, road network data etc. 1.5 Problem Outline and stakeholders: Importance of activity and connection with Mapping of system components and stakeholders (engineering / societal)	Implementation Methodology: Considering the nature of the course designed, following points shall be considered while implementing the course.

<p>TLO 1.3 Design a methodology for fieldwork TLO 1.4 Select the attributes of engineering and social system for measurement, quantification, and documentation TLO 1.5 Measure & quantify the quantities / systems parameters TLO 1.6 Write a report using information collected. Study the data collected from fieldwork and conclude the observations.</p>	<p>1.6 Key attributes of measurement 1.7 Various instruments used for data collection - survey templates, simple measuring equipments 1.8 Format for measurement of identified attributes/ survey form and piloting of the same 1.9 Fieldwork: Measurement and quantifications of local systems such as agriculture produce, rainfall, Road network, production in local industries, Produce /service which moves from A to B 1.10 Analysis and Report writing Report writing containing- 1. Introduction of the topic 2. Data collected in various formats such as table, pie chart, bar graph etc. Observations of field visits and data collected.</p>	<p>i) Regroup in the batches of 5-6 students for conducting the fieldwork from the bigger group. ii) Assign a few batches of the students for this course to all the faculty members. iii) A group of course teachers will visit local governance bodies such as Municipal Corporations, Village Panchayats, Zilla Parishads, Panchayat Samitis to assess the small technological / engineering needs in their area of work. iv) The group of course teachers will carry out initial field visits to evaluate the various possibilities of field visits / various scenarios wherein students can conduct field work to measure / quantify the parameters / attributes. v) The course will be implemented in eight sessions and fieldwork. a) Session I - Introduction to development paradigm, fieldwork and case study as pedagogy b) Session II - VII - Society, stakeholders and value creation, measurements, rudimentary analysis and reporting c) Session VIII - Final closure session feedback and assessment d) Field work - 1. Pilot Visit - Pilot of survey instrument Survey Visit 1 - Data gathering / Information Collection 3. Survey Visit 2 - Data gathering 1. Summary Visit - Closure after analysis</p>
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2	<p>TLO 2.1 Adoption of Village or Slum TLO 2.2 Survey and Problem Identification TLO 2.3 Conduct Project / Programs in the selected village / slum TLO 2.4 Undertake Special Camping Programme</p>	<p>Unit - II MODULE II: National Service Scheme (NSS) 2.1 Contacting Village/Area Leaders 2.2 Primary socio-economic survey of few villages in the vicinity of the institute. 2.3 Selection of the village for adoption - conduct of activities 2.4 Comprehensive Socio-Economic Survey of the Village/Area 2.5 Identification of Problem(s) 2.6 Dissemination of information about the latest developments in agriculture, watershed management, wastelands development, non-conventional energy, low-cost housing, sanitation, nutrition and personal hygiene, schemes for skill development, income generation, government schemes, legal aid, consumer protection and allied fields. A liaison between government and other development agencies for the implementation of various development schemes in the selected village / slum.</p>	<p>i) The teachers should visit the village / slum before adopting it for NSS activities. ii) The selected area should be compact. iii) The community people should be receptive to the ideas of improving their living standard. They should also be ready to coordinate and involve in the projects undertaken by the NSS for their up- liftment iv) The areas where political conflicts are likely to arise should be avoided by the NSS units. The area should be easily accessible to the NSS volunteers to undertake frequent visits to slums;</p>
3	<p>TLO 3.1 Love and Compassion (Prem and Karuna) TLO 3.2 Truth (Satya) TLO 3.3 Non-Violence (Ahimsa) TLO 3.4 Righteousness (Dharma) TLO 3.5 Peace (Shanti) TLO 3.6 Service (Seva) TLO 3.7 Renunciation (Sacrifice) Tyaga TLO 3.8 Gender Equality and Sensitivity</p>	<p>Unit - III MODULE-III: Universal Human Values 1.1 Love and Compassion (Prem and Karuna): Introduction, Practicing Love and Compassion (Prem and Karuna) 2. Truth (Satya) : Introduction, Practicing Truth (Satya) 3. Non-Violence (Ahimsa) : Introduction, Practicing Non-Violence (Ahimsa) 4. Righteousness (Dharma) : Introduction, Practicing Righteousness (Dharma) 5. Peace (Shanti) : Introduction, Practicing Peace (Shanti) 6. Service (Seva) : Introduction, Practicing Service (Seva) 7. Renunciation (Sacrifice) Tyaga: Introduction, Practicing Renunciation (Sacrifice) Tyaga</p>	<p>i) Lectures ii) Demonstration iii) Case Study iv) Role Play v) Observations vi) Portfolio Writing vii) Simulation Motivational talks by Practitioners Site/Industry Visit</p>

		Gender Equality and Sensitivity: Introduction, Practicing Gender Equality and Sensitivity	
4	TLO 4.1 Punctuality TLO 4.2 Cleanliness, Hygiene and Orderliness TLO 4.3 Responsibility TLO 4.4 Gratitude and Appreciations TLO 4.5 Determination & Persistence TLO 4.6 Respect TLO 4.7 Team Spirit TLO 4.8 Caring & Sharing TLO 4.9 Honesty TLO 4.10 Forgive and Forget	Unit - IV MODULE-IV: Value Education (Unnati Foundation) 4.1 Punctuality, Icebreaker and Simple Greeting, Understanding & Managing Emotions, Introducing Self, The power of a Positive Attitude, talking about one's Family, talking about one's Family, making a Positive Impression, give word list for a Word based .2 Cleanliness, Hygiene and Orderliness, Likes and Dislikes, Developing Confidence in Self and Others, Strengths and Weaknesses, Listening Skills, Greeting gestures, Gender Equality and Sensitivity .3 Responsibility, OCSEM- Visual Comprehension and Word-Based Learning, Goal Setting – Make it happen, Follow, Like & Share Unnati social media - Facebook / Instagram/ Twitter Introducing Others, Time Management, Talking about the daily routine, Money Management .4 Gratitude and Appreciation, Asking Simple Questions & Asking for the price, Stress Management, Student Referral process, Comprehending & Paraphrasing Information, A Plate of Rice and Dignity of Labour, Topics for Public Speaking, Placement Process, OCSEM- E- Newspaper, Critical Thinking to overcome challenges .5 Determination and Persistence, Guiding and Giving Directions, Language Etiquette & Mannerism, . Unnati Philosophy, b. Unnati Branding - Follow, Like & Share Unnati social media - Facebook / Instagram/ Twitter, Simple instructions to follow procedures, Assertiveness, give topics for Debate, describing a	i) Video Demonstrations ii) Flipped Classroom iii) Case Study iv) Role Play v) Collaborative learning vi) Chalk-Board

		<p>person/Objects, Refusal Skills, Word List for Word based Learning</p> <p>.6 Respect, Comparing, OCSEM - Public Speaking, Student referral process, attending a phone call, Being a Good Team Player, Placement Process, At a Restaurant, Workplace ethics</p> <p>.7 Team Spirit, Inviting someone, OCSEM - Picture Reading & Word, a. Unnati Philosophy & b. Unnati Branding - Follow, Like & Share Unnati social media - Facebook / Instagram/ Twitter, Apologizing, Apologizing, Dealing effectively with Criticism, Introduce Importance of Self Learning and up skilling</p> <p>Caring and Sharing , Handling Customer queries, Flexibility & Adaptability, Student referral process, Writing a Resume, OCSEM- Public Speaking, Placement Process, Meditation/ Affirmation & OCSEM-Debate, Introduce Certif-ID, how to create Certif-ID Project ,</p> <p>4.9 Honesty, Email etiquette & Official Email communication, Alcohol & Substance use & abuse, Describing a known place , Leadership Skills, Describing an event, OSCEM-Picture</p> <p>.8 Reading & Visual Comprehension Forgive and Forget, Facing and Interview, OSCEM-Public Speaking, Attending a telephonic/Video interview & Mock Interview, Affirmation, Pat-a-Back & Closure (Valediction, Unnati Branding, Student Testimonials), Meditation/ Affirmation & Sponsor connect (Speak to UNXT HO)</p>	
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5	<p>TLO 5.1 Literacy About Savings and Investments</p> <p>TLO 5.2 Literacy About Financial Planning</p> <p>TLO 5.3 Literacy About Transactions</p> <p>TLO 5.4 Literacy About Income, expenditure and budgeting</p> <p>TLO 5.5 Literacy About Inflation</p> <p>TLO 5.6 Literacy About Loans</p> <p>TLO 5.7 Literacy About the Importance of Insurance</p> <p>TLO 5.8 Literacy About the Dos and Don'ts in finances</p>	<p>Unit - V MODULE-V: Financial Literacy</p> <p>1 Introduction - Life Goals and financial goals</p> <p>2 Savings and Investments - Three pillars of investments, Popular asset classes, Government schemes, Mutual Funds, Securities markets (Shares and bonds), Gold, Real Estate, Do's and Don'ts of investments</p> <p>3 Retirement planning</p> <p>4 Cashless transactions</p> <p>5 Income, expenditure and budgeting – Concepts and Importance</p> <p>6 Inflation- Concept, effect on financial planning of an individual</p> <p>7 Loans – Types, Management of loans, Tax benefits</p> <p>8 Insurance – Types, Advantages, selection</p> <p>Dos and Don'ts in Financial planning and Transactions</p>	<p>i) Online/Offline Mode of Instructions</p> <p>ii) Video Demonstrations</p> <p>iii) Presentations</p> <p>iv) Case Study</p> <p>v) Chalk-Board Collaborative learning</p>
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** No questions will be asked on IKS learning subtopics in any question papers.

G: LIST OF ASSIGNMENTS/ACTIVITIES/MICRO-PROJECT UNDER SLA

Suggestive list of activities during Regular as well as Special Camping (NSS Activities)

Following list is only an illustrative list of the type of activities that can be undertaken. Under the programme it would be open to each NSS Unit to undertake one of these programmes or any other activity which may seem desirable to them according to local needs. The NSS Unit should aim at the integrated development of the area selected for its operation which could be a village or a slum. It has also to be ensured that at least a part of the programme does involve manual work.

- (a) Environment Enrichment and Conservation: The activities under this sub-theme would inter-alia, include:
 - (i) plantation of trees, their preservation and upkeep
 - (ii) Construction & maintenance of village streets, drains
 - (iii) Cleaning of village ponds and wells;
 - (iv) Popularization and construction of Gobar Gas Plants, use of non-conventional energy;
 - (v) Disposal of garbage & composting;
 - (vi) Prevention of soil erosion and work for soil conservation,
 - (vii) Watershed management and wasteland development
 - (viii) Preservation and upkeep of monuments, and creation of consciousness about the preservation of cultural heritage among the community.
- (b) Health, Family Welfare and Nutrition Programme:

- (i) Programme of mass immunization;
 - (ii) Working with people in nutrition programmes with the help of Home Science and medical college students;
 - (iii) Provision of safe and clean drinking water;
 - (iv) Integrated child development programmes;
 - (v) Health education, AIDS Awareness and preliminary health care.
 - (vi) Population education and family welfare programme;
 - (vii) Lifestyle education centres and counselling centres.
 - (viii)
- (c) Programmes aimed at creating an awareness for improvement of the status of women:
- (i) programmes of educating people and making them aware of women's rights both constitutional and legal;
 - (ii) creating consciousness among women that they too contributed to economic and social well-being of the community;
 - (iii) creating awareness among women that there is no occupation or vocation which is not open to them provided they acquire the requisite skills; and
 - (iv) imparting training to women in sewing, embroidery, knitting and other skills wherever possible.
- (d) Social Service Programmes:
- (i) work in hospitals, for example, serving as ward visitors to cheer the patients, help the patients, arranging occupational or hobby activities for long term patients; guidance service for out-door-patients including guiding visitors about hospital's procedures, letter writing and reading for the patients admitted in the hospital; follow up of patients discharged from the hospital by making home visits and places of work, assistance in running dispensaries etc.
 - (ii) work with the organizations of child welfare;
 - (iii) work in institutions meant for physically and mentally handicapped;
 - (iv) organizing blood donation, eye pledge programmes;
 - (v) work in Cheshire homes, orphanages, homes for the aged etc.;
 - (vi) work in welfare organizations of women;
 - (vii) prevention of slums through social education and community action;
- (e) Production Oriented Programmes:
- (i) working with people and explaining and teaching improved agricultural practices;
 - (ii) rodent control land pest control practices;
 - (iii) weed control;
 - (iv) soil-testing, soil health care and soil conservation;
 - (v) assistance in repair of agriculture machinery;
 - (vi) work for the promotion and strengthening of cooperative societies in villages;
 - (vii) assistance and guidance in poultry farming, animal husbandry, care of animal health etc.;
 - (viii) popularization of small savings and assistance in procuring bank loans
- (f) Relief & Rehabilitation work during Natural Calamities:
- (i) assisting the authorities in distribution of rations, medicine, clothes etc.;
 - (ii) assisting the health authorities in inoculation and immunization, supply of medicine etc.;

- (iii) working with the local people in reconstruction of their huts, cleaning of wells, building roads etc.;
- (iv) assisting and working with local authorities in relief and rescue operation;
- (v) collection of clothes and other materials, and sending the same to the affected areas;

(g) Education and Recreations: Activities in this field could include:

- (i) adult education (short-duration programmes);
- (ii) pre-school education programmes;
- (iii) programmes of continuing education of school drop outs, remedial coaching of students from weaker sections;
- (iv) work in crèches;
- (v) participatory cultural and recreation programmes for the community including the use of mass media for instruction and recreation, programmes of community singing, dancing etc.;
- (vi) organization of youth clubs, rural land indigenous sports in collaboration with Nehru Yuva Kendras;
- (vii) programmes including discussions on eradications of social evils like communalism, casteism, regionalism, untouchability, drug abuse etc.;
- (viii) non-formal education for rural youth and
- (ix) Legal-literacy, consumer awareness.

H: SPECIFICATION TABLE FOR SETTING QUESTION PAPER FOR SEMESTER END THEORY EXAMINATION:

- Not Applicable

I: -ASSESSMENT CRITERIA:

iii) Formative Assessment of Practical: -

Formative assessment (Assessment for Learning) report and presentation of fieldwork activities, self-learning (Assignment)

i) Summative Assessment of Practical:

(Assessment of Learning)

J) INSTRUCTIONAL METHODS:

1. Group Discussion, Flipped Classroom
2. Demonstration, Case Study, Role Play, Collaborative Learning, Cooperative Learning
3. Field Visit, Survey
4. Use of projector and soft material for Demonstration (ppt, audio, video etc.)

K. TEACHING AND LEARNING RESOURCES:

Chalk board, LCD presentations, Demonstrative kits, Demonstrative charts.

L) REFERENCE BOOKS:

S.N.	Name of Book	Author	Publication
1	Compendium of Training Materials for the Capacity Building of the Faculty and Students of Engineering Colleges on 'IMPROVING THE PERFORMANCE OF RURAL WATER SUPPLY AND SANITATION SECTOR IN MAHARASHTRA' Districts Economic survey reports	IRAP, Hyderabad, CTARA, IIT Bombay and UNICEF, Mumbai	UNICEF
2	Central Public Health and Environmental Engineering Organization	Manual on Water Supply and Treatment	Ministry of Urban Development, New Delhi
3	Specifications And Standards Committee	Indian Standards (IS) Codes and Indian Roads Congress (IRC) Codes	Bureau of Indian Standards and The Indian Road Congress
4	Prepared by each district administration	Districts Economic survey reports	Govt. of Maharashtra
5	Local college students, UMA staffs	Sample Case Studies on UMA website	IITB-UMA team

M) LEARNING WEBSITE & SOFTWARE

1. <https://gr.maharashtra.gov.in/Site/Upload/Government%20Resolutions/English/201601131501523808.pdf> (Government Resolution of Government of Maharashtra regarding Unnat Maharashtra Abhiyan)
2. <https://gr.maharashtra.gov.in/Site/Upload/Government%20Resolutions/English/201606151454073708.pdf> (Government Resolution of Government of Maharashtra regarding Unnat Maharashtra Abhiyan Guidelines)
3. <https://censusindia.gov.in/census.website/> (A Website of Census of India)
4. <https://gsda.maharashtra.gov.in/english/> (A Website of Groundwater Survey and Development Agency, GoM)
5. <https://mrsac.gov.in/MRSAC/map/map> (A Website where district-wise maps showcasing different attributes developed by Maharashtra Remote Sensing Applications Centre.)
6. <https://ejalshakti.gov.in/jjmreport/JJMIndia.aspx> (A Website of Jal Jivan Mission, Government of India)
7. <https://cpcb.nic.in/> (A Website of Central Pollution Control Board, Government of India)
8. <http://www.mahapwd.com/#> (A Website of Public Works Department, GoM)
9. <http://tutorial.communitygis.net/> (A Website for GIS data sets developed by Unnat Maharashtra Abhiyan)
10. <https://youtu.be/G71maumVZ1A?si=TzDTxKUpLYaRos7U> (A video record of lecture by Prof. Milind Sohoni, IIT Bombay, on Engineering, Development and Society)
11. <https://youtu.be/TUcPNwtdKyE?si=wnSWrhGc9dJTC-ac> (A keynote talk by Prof. Milind Sohoni, IIT Bombay, on Interdisciplinary Engineering: The Road Ahead)

SEMESTER 3

CURRICULUM

COURSE ID:
COURSE NAME : THERMAL ENGINEERING
COURSE CODE : MEH302
COURSE ABBREVIATION : HTEG

A. LEARNING SCHEME:

Scheme component		Hours	Credits
Actual Contact Hours / week	Classroom Learning	03	03
	Tutorial Learning	00	
	Laboratory Learning	02	
	SLH-Self Learning Hours	01	
	NLH- Notional Learning	06	

B. ASSESSMENT SCHEME: -

PAPER DURATION IN HRS	THEORY				BASED ON LL & TL				BASED ON SLA		TOTAL
	Practical								MAX	MIN	
03	FA-TH	SA-TH	TOTAL		FA -PR		SA-PR				25
	MAX	MAX	MAX	MIN	MAX	MIN	MAX	MIN			
	30	70	100	40	25	10	-	-			
150											

(Total IKS Hrs for Sem.: 00 Hrs)

C. ABBREVIATIONS: -

LL-Laboratory Learning, SLH-Self Learning Hours, NLH- Notional Learning Hours,
 FA - Formative Assessment, SA -Summative assessment, IKS - Indian Knowledge System,
 SLA - Self Learning Assessment

Legends: @ Internal Assessment, # External Assessment, *# On Line Examination,
 @\$ Internal Online Examination.

1. FA-TH represents an average of two class tests of 30 marks each conducted during the semester.
2. If a candidate is not securing minimum passing marks in FA-PR of any course then the candidate shall be declared as "Detained" in that semester.
3. If a candidate is not securing minimum passing marks in SLA of any course, then the candidate shall be declared as fail and will have to repeat and resubmit SLA work.
4. Notional Learning hours for the semester are (CL+LL+TL+SL) hrs.* 15 Weeks
5. 1(one) credit is equivalent to 30 Notional hrs.
6. * Self learning hours shall not be reflected in the Time Table.

* Self learning includes micro projects / assignments / other activities. (Provide list of all assignments here in tabular format At least 6 to 8 assignments to be given)

D. i) RATIONALE: -

Thermal Engineering is a fundamental branch of mechanical engineering dealing with the generation, transformation, transmission, and utilization of thermal energy. Understanding the principles of thermal engineering is essential for designing and analyzing systems that involve heat transfer and energy conversion, such as power plants, refrigeration systems, and internal combustion engines. This subject provides a comprehensive introduction to the principles of thermodynamics, the behaviour of ideal gases and steam, and the components and operations of steam power plants and heat exchangers. It also covers the basics of internal combustion engines, which are pivotal in automotive and industrial applications.

ii) INDUSTRY / EMPLOYER EXPECTED OUTCOME

The aim of this course is to help the student to attain the following industry identified outcome through various learning experiences:

1. A solid understanding of core thermal engineering principles and their applications.
2. Proficiency in using thermal systems and simulation tools.
3. Practical skills in designing, testing, and maintaining thermal systems.
4. Awareness of industry standards, safety, and environmental regulations.
5. A mindset geared towards innovation and adaptability.

E. COURSE LEVEL LEARNING OUTCOMES (CO'S)

MEH302-1 Apply fundamental concepts of thermodynamics to various thermodynamic systems.

MEH302-2 Determine various properties of steam using a steam table.

MEH302-3 Use suitable strategies to maintain steam turbine, steam condenser & cooling towers efficiently.

MEH302-4 Select proper heat exchanger for given application.

MEH302-5 Identify different components of an I.C. Engine.

Competency, course outcomes and programme outcomes/programme specific outcomes (CP-CO-PO/PSO) matrix

[Note: Correlation levels: 1: Slight (Low), 2: Moderate (Medium), 3: Substantial (High), "0"]

Competency and Cos	Programme Outcomes POs and PSOs								
	PO 1 Basic and Discipline specific knowledge	PO 2 Problem Analysis	PO 3 Design / Development of solutions	PO 4 Engineering Tools, Experimentation and Testing	PO 5 Engineering Practices for society, sustainability and Environment	PO 6 Project Management	PO 7 Life-long Learning	PSO 1 Work in Mfg & service sector	PSO2 Start entrepreneurial activity
Competency:	3	2	2	2	2	2	2	3	2
MEH302-1	3	2	1	2	2	1	2	2	1
MEH302-2	3	3	2	2	1	2	1	2	1
MEH302-3	3	2	2	2	2	1	2	2	2
MEH302-4	3	2	2	2	2	1	1	2	1
MEH302-5	3	2	2	2	2	1	2	2	1

F. CONTENT:

i) Practical exercises

The following practical exercises shall be conducted in the *Laboratory developed* by the Institute in practical sessions of batches of about 20- 22 students. (*mandatory practicals)

Sr. no	Title of Practical	Number of hrs.	CO
1	Determination of dryness fraction of steam	02	MEH302-1
2	Measurement of discharge of air using air box	02	MEH302-2
3	*Trace the path of flue gases and water steam circuit with the help of Fire Tube Boiler - Cochran Boiler	02	MEH302-3
4	*Trace the path of flue gases and water steam circuit with the help of Water Tube Boiler - Babcock & Wilcox Boiler.	02	MEH302-3
5	*Demonstration & working of Boiler Mountings (Any Two)	02	MEH302-3
6	*Demonstration & working of Boiler Accessories (Any Two)	02	MEH302-3
7	*Demonstration & working of Impulse & Reaction steam turbine.	02	MEH302-3
8	Illustrate the methods of compounding used in steam turbines.	02	MEH302-3
9	Demonstration & working of condensers a. Water Cooled condensers. b. Air cooled condensers.	02	MEH302-3
10	Observe simulation of Thermal Power Plant And write specifications of boilers, turbines, condensers and electrical generators.	02	MEH302-3
11	*Conduct a trial on conduction set up of metallic rod and calculate thermal conductivity.	02	MEH302-4
12	Conduct a trial on Stefan Boltzmann setup and calculate Stefan Boltzmann constant.	02	MEH302-4
13	Identify different equipment in laboratories having heat exchangers and classify heat exchangers. Write construction and working any 03 of above heat exchangers.	02	MEH302-4
14	Identify different components of multi cylinder I.C. Engine and write function of each component.	02	MEH302-5
15	Industrial visit (Collect information about boiler, accessories, mountings, condenser, cooling tower nozzle and turbines used in industry)	02	MEH302-4

ii) Theory

Section I

Sr. no.	Topics/Subtopics	Learning (Hours)	Classroom learning evaluation Marks
<i>Course Outcome: MEH302-1: Apply fundamental concepts of thermodynamics to various thermodynamic systems.</i>			
1	<p>Fundamentals of Thermodynamics</p> <p>1.1 Thermodynamic system, Types of systems- Open, closed & isolated system, Extensive and Intensive properties, Process and Cycle. Thermodynamic definition of work, heat, difference between heat and work, flow work, concepts of enthalpy and entropy.</p> <p>1.2 Laws of Thermodynamics - Zeroth law, first law and second law of thermodynamics. Kelvin Planks, Clausius statements. Concept of Heat engine, Heat pump and Refrigerator.</p> <p>1.3 Application of Laws of Thermodynamics - Steady flow energy equation and its application to boiler, turbine, and condenser. (No Numerical Treatment on above)</p>	12	20
<i>Course Outcome: MEH302-2: Determine various properties of steam using a steam table.</i>			
2	<p>Ideal Gases and Steam Fundamentals</p> <p>2.1 Characteristics gas constant and universal gas constant. *Derivation of characteristics gas equation.</p> <p>2.2 Ideal gas processes – Isobaric, Isochoric, Isothermal, Isentropic, Polytropic and their representation on P-V and T-S diagrams. Determination of work, heat, internal energy, enthalpy change. (Simple numerical based on above)</p> <p>2.3 Steam fundamentals - Applications of steam, generation of steam at constant pressure with representation on T-H & T-S chart. Types of steam: Wet, dry, superheated steam. Properties of steam: Sensible, latent, total heat, specific Volume, dryness fraction. use of a steam table. (Only simple numericals based on above).</p>	12	14

Section –II

Sr. no.	Topics/Subtopics	Learning (Hours)	Classroom learning evaluation Marks
Course Outcome: MEH302-3: Use suitable strategies to maintain steam turbine, steam condenser & cooling towers efficiently.			
3	Components of Steam Power Plant 3.1 Introduction to steam power plant, Components & layout of steam power plant. Steam Boiler- Definition as per IBR, function, Classification of boilers, Introduction to high pressure boiler, Construction & working of Lamont boiler & Benson Boiler. 3.2 Steam nozzle & Steam Turbines - Function, types, applications of steam nozzles. Steam turbine - Classification, Construction and working of Impulse and Reaction turbine. 3.3 Steam condensers - Dalton's law of partial pressure Function, classification of condensers, construction and working of surface condensers. Sources of air leakage and its effect. 3.4 Cooling Towers - Classification of cooling towers, Construction and working of natural, forced and induced draught cooling tower. (No numerical Treatment for this unit)	12	18
Course Outcome: MEH302-4: Select proper heat exchanger for given application.			
4	Heat Transfer & Heat Exchangers 4.1 Modes of heat transfer - Conduction, convection and radiation. Conduction - Fourier's law, conduction through slab & composite wall. Convection - Newton's law of cooling, natural and forced convection. Radiation absorptivity, transmissivity, reflectivity, emissivity, black body, grey body, Stefan Boltzmann law. (Only simple numerical based on heat transfer by conduction through slab & composite wall.) 4.2 Heat Exchangers - Classification, construction and working of shell and tube, plate type heat exchanger and its applications	08	12
Course Outcome: MEH302-5: Identify different components of an I.C. Engine.			
5	Introduction to Internal Combustion. Engine 5.1 Power Cycles – Carnot Cycle, Otto cycle, Diesel cycle, Dual Cycle and its representation on P-V and T-S diagram. (No numerical on above) 5.2 Basics of I.C. Engine – Engine terminology, Classification and application of IC engines, Construction & working of two stroke & four stroke I.C. engines (S.I. and C.I.)	04	06

** No questions will be asked on IKS learning subtopics in any question papers.

G. LIST OF ASSIGNMENTS UNDER SLA

1. Application of Laws of Thermodynamics.
2. Simple numericals on properties of steam.
3. Steam nozzle & Steam Turbines
4. Steam condensers & cooling towers.
5. simple numerical based on heat transfer by conduction through slab & composite wall.
6. Modes of heat transfer
7. Construction & working of two stroke & four stroke I.C.

Solve any of Five assignments on following given topics

H. SPECIFICATION TABLE FOR SETTING QUESTION PAPER FOR SEMESTER END THEORY EXAMINATION

Section / Topic no.	Name of topic	Distribution of marks (level wise)			Total marks	CO
		Remember	Understand	Apply		
I / 1	Fundamentals of Thermodynamics	8	6	6	20	MEH302-1
I / 2	Ideal Gases and Steam Fundamentals	6	4	4	14	MEH302-2
II / 3	Components of Steam Power Plant	6	6	6	18	MEH302-3
II / 4	Heat Transfer & Heat Exchangers	4	4	4	12	MEH302-4
II / 5	Introduction to Internal Combustion. Engine	2	-	4	06	MEH302-5
Total Marks					70	

I. ASSESSMENT CRITERIA

i) Formative Assessment of Practical: -

Every practical shall be assessed for 25 marks as per following criteria:

Sr. no	Criteria	Marks allotted
1	Preparedness for practical	5
2	Correct figures / diagrams	5
3	Observation tables	5
4	Result Table/ Calculations / Graph	5
5	Safety / use of proper tools	5
Total		25

ii) Assessment of SLA: -

Every Self-learning assignment shall be assessed for 25 marks as per following criteria:

Sr. No.	Criteria	Marks allotted
1	Representation	05
2	Participation	05
3	Understanding	10
4	Correct figures / diagrams	05
	Total	25

J. INSTRUCTIONAL METHODS:

1. Lectures cum Demonstrations,
2. Classroom practices.
3. Use of projector and soft material for demonstration
4. Charts and working models.

K. TEACHING AND LEARNING RESOURCES:

Chalk board, LCD presentations, Demonstrative kits, Demonstrative charts.

L. Reference Books:

S. N	Name of Book	Author	Publication
1	Thermodynamics: An Engineering Approach	Cengel, Yunus A., and Michael A. Boles.	McGraw-Hill Education.
2	Fundamentals of Thermodynamics	Sonntag, Richard E., and Claus Borgnakke	Wiley.
3	Engineering Thermodynamics	P.K. Nag	McGraw-Hill Education.
4	Thermal Engineering	R.K. Rajput	Laxmi Publications
5	Thermal Engineering	Mahesh M. Rathore	McGraw-Hill Education.

M. LEARNING WEBSITE & SOFTWARE

1. <https://nptel.ac.in/courses/112105123>
2. <https://archive.nptel.ac.in/courses/112/103/112103307/>
3. <https://www.engineeringtoolbox.com/>
4. <https://www.mech4study.com/>
5. <https://onlinecourses.nptel.ac.in/noc24>

COURSE ID:

Course Name : PRODUCTION DRAWING
Course Code : MEH303
Course Abbreviation : HPDR

A. LEARNING SCHEME:

Scheme Components	Actual Contact Hours / week	Credits
Classroom Learning (CL)	02	4
Tutorial Learning (TL)	-	
Laboratory Learning (LL)	04	
Self-Learning Hours (SLH)	02	
Notional Learning (NLH)	08	

B. ASSESSMENT SCHEME:

PAPER DURATI ON IN HRS	Theory				Based on LL & TL				Based on Self Learning		Total Marks
					Practical						
	FA-TH	SA-TH	Total		FA-PR		SA-PR		SLA		
	Max	Max	Max	Min	Max	Min	Max	Min	Max	Min	
4	30	70	100	40	25	10	25@	10	25	10	175

(Total IKS Hrs for Sem: 00Hrs)

C. ABBREVIATIONS:

CL- Classroom Learning, TL- Tutorial Learning, LL-Laboratory Learning, SLH-Self Learning Hours, NLH-Notional Learning Hours, FA - Formative Assessment, SA -Summative assessment, IKS - Indian Knowledge System, SLA - Self Learning Assessment

Legends: @ Internal Assessment, # External Assessment, *# On Line Examination, @\$ Internal Online Examination

7. FA-TH represents average of two class tests of 30 marks each conducted during the semester.
8. If candidate is not securing minimum passing marks in FA-PR of any course then the candidate shall be declared as "Detained" in that semester.
9. If candidate is not securing minimum passing marks in SLA of any course, then the candidate shall be declared as fail and will have to repeat and resubmit SLA work.
10. Notional Learning hours for the semester are (CL+LL+TL+SL) hrs.* 15 Weeks
11. 1(one) credit is equivalent to 30 Notional hrs.
12. * Self learning hours shall not be reflected in the Time Table.
* Self learning includes micro project / assignment / other activities.

D. i) RATIONALE:

Production drawing is essential for communicating ideas in manufacturing industry as well as other engineering applications. Production drawings illustrate set of instructions to manufacture a product, providing information about dimensions, materials, finishes, tools required, methods of assembly and soon. Therefore, this course has been developed for interpretation and preparation of the production drawing.

ii) INDUSTRY/EMPLOYER EXPECTED OUTCOME

Prepare production drawing of a given part/component as per requirement.

E. COURSE LEVEL LEARNING OUTCOMES (CO'S)

Students will be able to achieve & demonstrate the following CO's on completion of course-based Learning.

MEH303 -1: Interpret curves of intersection for given solids.

MEH303 -2: Construct an auxiliary view of given object.

MEH303 -3: Use convention for representation of material and mechanical components.

MEH303 -4: Draw production drawing.

MEH303 -5: Prepare assembly and detail drawing using given data.

Competency, course outcomes and programme outcomes/programme specific outcomes (CP-CO-PO/PSO) matrix

[Note: Correlation levels: 1: Slight (Low), 2: Moderate (Medium), 3: Substantial (High), "0"]

Competency and Cos	Programme outcome POs and PSO's								
	PO 1 Basic and discipline specific knowledge	PO 2 Problem analysis	PO 3 Design/development of solutions	PO 4 Engineering tools, experimentation & testing	PO 5 Engineering practices for society, sustainability and environment	PO 6 project management	PO 7 Life-long learning	PSO 1 Work in Mfg & service sector	PSO 2 Start entrepreneurial activity
Competency									
MEH303-1	1	2	1	-	-	-	-	1	
MEH303-2	2	2	1	-	-	-	-	1	
MEH303-3	3	3	1	-	-	-	-	2	
MEH303-4	3	3	1	-	-	-	-	2	
MEH303-5	3	2	1	-	-	-	-	2	

F. CONTENT:

i) Practical exercises

The following practical exercises shall be conducted in the *Drawing Hall for Production drawing* in practical sessions of batches of about 20- 22 students:

Sr No	Laboratory Experiment / Practical Titles / Tutorial Titles	Number of hrs.	Relevant COs
1	Draw four different Problems in Sketch Book on intersection of solids when intersecting solids are Prism with Prism, Cylinder with cylinder. when: Axes are at 90° and bisecting. Axes are at 90° and offset.	04	MEH303 -1
2	Draw four different Problems in Sketch Book on intersection of solids when intersecting solids are Square Prism with Cylinder, Cylinder with square prism. when: Axes are at 90° and bisecting. Axes are at 90° and offset.	04	MEH303 -1
	SHEET NO - 01 - Total 04 Problems (02 Problems on Sr. No. 1 and 02 problems on Sr. No. 3)	04	

3	Draw four different Problems in Sketch Book on auxiliary view - considering given other views.	04	MEH303 -2
4	Complete at least four given partial drawings in sketch book by considering given auxiliary and other views.	04	MEH303 -2
	SHEET NO - 02 - Total 04 problems (02 problems on Sr. No. 3 and 02 problems on Sr. No. 4)	04	
5	Draw in sketch book the various conventional representations as per IS SP - 46	02	MEH303 -3
	SHEET NO – 03 (Judicial mix by Teacher)	02	
6	Draw Dimensional and Geometrical Tolerances, Welding Symbols, Surface Roughness and Machining Symbols on the given figures.	04	MEH303 -4
7	Develop at least four Production drawing of machine components showing dimensional and geometrical Tolerance, surface finish etc.	04	MEH303 -4
	SHEET NO - 04 (Judicial mix by Teacher based on Sr. No 6 and Sr. No 7)	04	
8	Draw an Assembly drawing of at least four different machine components in sketch book, from the given detailed drawing showing fits, part numbers, bill of material, assembly dimensions	08	MEH303 -5
	SHEET NO - 05 (Any one machine component)	02	
9	Draw at least four detailed drawing of machine components in sketch book, from the given assembly drawing showing Conventional Representation, Dimensional and Geometrical Tolerances and Surface Finish symbols. (Other than considered for assembly drawing)	08	MEH303 -5
	SHEET NO - 06 (Any one machine component)	02	

Note: Out of above suggestive practicals -

- All Marked Practical are mandatory.
- **All above lab experiments are to be performed.**
- Judicial mix of above practical is to be performed to achieve desired outcomes.

ii) THEORY

SECTION – I

Sr. No	Topics/ Subtopics	Learning (Hours)	Classroom learning evaluation Marks
Course Outcome MEH303-1 Interpret curves of intersection for given solids.			
1.	Intersection of Solids 1.1 Curves of intersection of surfaces - Prism with Prism (Triangular, Square), Cylinder with cylinder. 1.2 Curves of intersection of surfaces -Square Prism with Cylinder All above types for following conditions – Axes are at 90° and bisecting. Axes are at 90° and offset.	04	12
Course Outcome MEH303-2 Construct an auxiliary view of given object.			

2.	<p>Auxiliary Views Auxiliary planes and views.</p> <p>2.1 Draw Auxiliary view from the given orthographic views. 2.2 Complete the partial view from the given auxiliary and Other principal view.</p>	04	10
<i>Course Outcome MEH303-3 Use convention for representation of material and mechanical components.</i>			
3.	<p>Conventional representation</p> <p>3.1 Engineering Material Conventions 3.2 Conventional breaks in pipes, rod and shaft 3.3 Conventional representation of common features like slotted head, radial rib, knurling, serrated shaft, splined shaft, ratchet and pinion, repeated parts, square on shaft, holes on circular pitch, internal and external threads. 3.4 Conventional representation of standard parts like ball and roller bearing, gears, springs. 3.5 Pipe joints and valves 3.6 Counter sunk and counter bored holes 3.7 Tapers</p>	04	12

SECTION – II

Sr. No	Topics/ Subtopics	Learning (Hours)	Classroom learning evaluation Marks
<i>Course Outcome MEH303-4 Draw production drawing.</i>			
4.	<p>Production Drawing</p> <p>4.3 Limits, Fits and Tolerances: Definitions, introductions to ISO system of Tolerance. Dimensional tolerances: Terminology, selection and representation of dimensional Tolerance- number and grade method. Definitions concerning Tolerancing and Limits system, unilateral and bilateral tolerance, Hole and shaft basis systems, Types of fits- Clearance, transition and Interference, Selection of fit for engineering applications. Calculation of limit sizes and identification of type of fit from the given sizes like 50 H7/s6, 30 H7/d9 etc.</p> <p>4.4 Geometrical Tolerances: Types of geometrical tolerances, terminology for deviation, representation of geometrical tolerance on drawing.</p> <p>4.5 General welding symbols, length and size of weld, surface contour and finish of weld, all round and site weld, symbolic representation in Engineering practices and its interpretation.</p> <p>4.6 Machining symbol and surface texture: Indication of machining symbol showing direction of lay, sampling length, roughness grades, machining allowances, manufacturing methods. Representation of surface roughness on drawing.</p>	06	12

<i>Course Outcome MEH303-5 Prepare assembly and detail drawing using given data.</i>			
5.	Assembly and Details of Machine Components 5.1 Introduction to assembly drawing, accepted norms to be observed for assembly drawings, sequence for preparing assembly drawing, Bill of Material (BOM). a) Couplings: Oldham & Universal couplings. b) Bearing: Foot Step & Pedestal Bearing. c) Lathe: Single (pillar type) and square tool Post. d) Bench vice & Pipe Vice. e) Screw-jack f) Drill Jig 5.2 Basic principles and process of dismantling the above all from “a” to “f” assemblies into components.	12	24
Total		30	70
Summative assessment – Theory paper should be such that total marks of questions on topic are one and half times the marks allotted above but the candidates are able to attempt questions of the above allotted marks only.			

** No questions will be asked on IKS learning subtopics in any question papers.

J. SUGGESTED MICRO PROJECTS / ASSIGNMENTS/ ACTIVITIES FOR SPECIFIC LEARNING / SKILLS DEVELOPMENT (SELF LEARNING) UNDER SLA

Suggested List of Micro-projects

1. Prepare assembly drawing/detailed drawing of machine vice/ lathe tail stock/ tool post etc. by visiting Institute's workshop.
2. Prepare report on various types of welding symbols used for fabrication work by Visiting nearby fabrication workshop.
3. Any other micro-projects suggested by subject faculty on similar line.
4. Prepare detailed drawings of Various IC Engine components using proper measuring instruments by visiting Institute's Power engineering Lab or any other.
5. Students should collect Production drawings from nearby workshops/industries and establish item reference numbers on that drawing for convention or tolerance value. Prepare report showing item reference numbers and their meaning.
6. Prepare report representing conventional representation of various piping joints by visiting nearby process industries like sugar factory, chemical industries, water treatment plant, etc.

Note:

- Above is just a suggestive list of micro-projects and assignments; faculty must prepare their own bank of micro-projects, assignments, and activities in a similar way.
- The faculty must allocate judicious mix of tasks, considering the weaknesses and / strengths of the student in acquiring the desired skills.
- SLA marks shall be awarded as per the continuous assessment record.
- If the course does not have associated SLA component, above suggestive listings is applicable to Tutorials and may be considered for FA-PR evaluations.

K. SPECIFICATION TABLE FOR SETTING QUESTION PAPER FOR SEMESTER END THEORY EXAMINATION:

Section / Topic no.	Name of topic	Distribution of marks (level wise)			Total marks	CO
		Remember	Understand	Apply		
I/1	Intersection of Solids	-	-	12	12	CO1
I/2	Auxiliary Views	-	10	-	10	CO2
I/3	Conventional representation	08	04	00	12	CO3
II/4	Production Drawing	-	04	08	12	CO4
II/5	Assembly & Details of Machine Components	-	08	16	24	CO5
TOTAL		08	26	36	70	

L. ASSESSMENT CRITERIA:

i) Formative Assessment of Practical: -

Every assignment shall be assessed for 25 marks as per following criteria:

Domain	Particulars	Marks out of 25
Cognitive	Understanding	05
	Application	05
Psychomotor	Drawing / drafting skills	10
Affective	Discipline and punctuality	05
TOTAL		25

ii) Summative Assessment of Practical:

Every practical assignment shall be assessed for 25 marks as per following criteria:

Sr.no	Criteria	Marks allotted
1	Understanding	05
2	Preparedness for practical	05
3	Neat & complete Drawing	05
4	Drawing / drafting skills	10
TOTAL		25

iii) Assessment of SLA: -

Every Self-learning assignment shall be assessed for 25 marks as per following criteria:

Sr.no	Criteria	Marks allotted
1	Punctuality	05
2	Presentation (neat figures/ drawing etc.)	05
3	Drawing / drafting skills	10
4	Understanding	05
TOTAL		25

M. INSTRUCTIONAL METHODS:

- 1 Lectures cum Demonstrations,
- 2 Class room practices.
- 3 Use of projector and soft material for demonstration

N. TEACHING AND LEARNING RESOURCES:

Chalk board, charts, videos available on various web sites, Power Point presentations and Demonstrative kits.

O. REFERENCE BOOKS:

Sr. No.	Name of Book	Author	Publication
1.	Bureau of Indian Standards.	Engineering Drawing Practice for Schools and Colleges IS: SP-46	October 2003, ISBN: 81-7061-091-2
2.	Bhatt N. D.	Engineering Drawing	Charotar Publishing House, 2011, ISBN: 978-93-80358-17-8
3.	Bhatt N. D. Panchal V. M	Machine Drawing	Charotar Publishing House, 2011, ISBN: 978-93-80358-11-6
4.	Narayan, K. L. Kannaiah, P. Venkata Reddy, K.	Production Drawing	New Age International Publications, 2011, ISBN: 978-81-224-2288-7
5.	Sidheswar N. Kannaiah, P. Sastry V.V.S.	Machine Drawing	Tata McGraw Hill Education Private Ltd, New Delhi, 2011, ISBN-13: 978-0-07-460337-6

N. LEARNING WEBSITE & SOFTWARE: -

1. <https://youtu.be/rerGFp3V6W8>
2. <https://youtu.be/599ThWCvMVA>
3. <https://youtu.be/5Pj7vkcolXk>
4. <https://youtu.be/FqzplEaE4Z0>
5. <https://youtu.be/VRi2LMm6jHU>

COURSE ID: ME

Course Name : MECHANICS OF MATERIALS

Course Code : MEH305

Course Abbreviation : HMOM

A. LEARNING SCHEME:

Pre-requisite Course(s): Nil

Scheme component	Actual Contact Hours / week	Credits
Classroom Learning (CL)	04	3
Tutorial Learning (TL)	00	
Laboratory Learning (LL)	02	
Self-Learning Hours (SLH)	00	
Notional Learning (NLH)	06	

B. ASSESSMENT SCHEME:

PAPER DURATION IN HRS	Theory				Based on LL & TL				Based on Self Learning		Total Marks
					Practical				SLA		
03	FA-TH	SA-TH	Total		FA-PR		SA-PR		SLA		125
	Max	Max	Max	Min	Max	Min	Max	Min	Max	Min	
	30	70	100	40	25	10	-	-	-	-	

(Total IKS Hrs for Sem: 4 Hrs)

C. ABBREVIATIONS: CL- Classroom Learning, TL- Tutorial Learning, LL-Laboratory Learning, SLH-Self Learning Hours, NLH-Notional Learning Hours, FA - Formative Assessment, SA -Summative assessment, IKS - Indian Knowledge System, SLA - Self Learning Assessment

Legends: @ Internal Assessment, # External Assessment, *# On Line Examination, @\$ Internal Online Examination

1. FA-TH represents average of two class tests of 30 marks each conducted during the semester.
2. If candidate is not securing minimum passing marks in FA-PR of any course then the candidate shall be declared as "Detained" in that semester.
3. If candidate is not securing minimum passing marks in SLA of any course, then the candidate shall be declared as fail and will have to repeat and resubmit SLA work.
4. Notional Learning hours for the semester are (CL+LL+TL+SL) hrs.* 15 Weeks
5. 1(one) credit is equivalent to 30 Notional hrs.
6. * Self learning hours shall not be reflected in the Time Table.

* Self learning includes micro project / assignment / other activities. (Provide list of all 5 assignments here in tabular format)

D. i) RATIONALE: -

With the preliminary understanding of forces and force systems acting on the engineering structures and their components. The focus now shifts on various actions and the corresponding strength evaluation of engineering materials under these specified actions to ascertain the suitability of materials, their size requirements. Simultaneously analytical approaches are dealt with behaviour of the materials in focus, understanding the engineering parameters of loading on these members namely shear force and bending moments for various configurations of members, support conditions and loading.

ii) INDUSTRY / EMPLOYER EXPECTED OUTCOME

Analyse the stresses & strains in the given structural elements using relevant methods.

E. COURSE LEVEL LEARNING OUTCOMES (CO’S)

MEH305-1 Structural systems, actions and their types. Simple actions on a linear member causing deformations in the member.

MEH305-2 Elastic constants and their relation, strain energy for various forms of load application.

MEH305-3 Theorem of moments, M.I of single and built-up sections rectangular and circular used in Engineering applications.

MEH305-4 Engineering analysis of beams carrying transverse loading, constructing SFD and BMD for s/s and cantilever beams.

MEH305-5 Understanding pure and ordinary bending governing flexural behaviour.

MEH305-6 Understanding polar moment of inertia, torque and design of circular shafts and corner columns.

Competency, course outcomes and programme outcomes/programme specific outcomes (CP-CO-PO/PSO) matrix

[Note: Correlation levels: 1: Slight (Low), 2: Moderate (Medium), 3: Substantial (High), “0”]

Competency and Cos	Programme outcome POs and PSO's								
	PO 1 Basic and discipline specific knowledge	PO 2 Problem analysis	PO 3 Design/ development of solutions	PO 4 Engineering tools, experimentation & testing	PO 5 Engineering practices for society, sustainability and environment	PO 6 project management	PO 7 Life-long learning	PSO 1 Work in Mfg & service sector	Ps 2 Start entrepreneurial activity
Competency	3	2	2	2	3	1	2	2	2
MEH305-1	3	2	-	2	-	1	2	2	1
MEH305-2	3	2	1	2	-	1	2	3	1
MEH305-3	3	2	1	2	-	1	2	3	1
MEH305-4	3	2	1	3	2	1	2	2	2
MEH305-5	2	1	1	2	-	1	2	1	1
MEH305-6	2	2	1	2	-	1	2	2	2

Note: typical matrix assessment based on previous records—for continuous analysis and improvement to identify gap areas and further improvement.

F. CONTENT:

i) Practical exercises

The following exercises shall be conducted as practical work as detailed in laboratory manual for Mechanics of Materials developed by the institute in practical sessions of batches of about 20- 22 students.

Sr No	Title Of Practical Exercise	Course Outcome
1	Study of Universal Testing machine and Compression testing machine	MEH305-1
2	Tension test on mild steel rod (Fe250)	MEH305-1
3	Tension test on TOR steel or HYSD bar	MEH305-2
4	Compression test on metals –Mild steel, Aluminum and timber	MEH305-2
5	Flexure test on metal	MEH305-2
6	Shear test on metal	MEH305-2
7	Impact test on metal	MEH305-3
8	Rockwell Hardness test on metal	MEH305-4
9	Shear force and BM diagram –problems on standard cases and, cantilever and s/s beams.	MEH305-4
10	Brinell’s Hardness Test	MEH305-4
11	Flexure test on timber specimen	MEH305-4
12	Torsion test on circular shaft	MEH305-5

In the list, Expt. No.1 to7 exercises are compulsory and from 8 to 12, any three exercises shall be conducted. in all 10 experiments are mandatory.

ii) THEORY

SECTION – I

Sr. No	Topics/ Subtopics	Learning (Hours)	Classroom learning evaluation Marks
<i>Course Outcome MEH305-1 Structural systems, actions and their types. Simple actions on a linear member causing deformations in the member.</i>			
1	Engineering systems, actions and simple behaviour 1.1 Engineering systems –buildings, machines, water tanks, chimney, bridges, retaining walls. 1.2 Various actions and their effect – axial tension, axial compression, flexure, torsion 1.3 Material behaviour –Elasticity, plasticity, ductility, malleability, toughness, hardness, brittleness-physical properties governing engineering design 1.3 Force characteristics, definition, force and force system-principles and laws 1.4 Simple stresses and strains- Hooke’s law, linear stress, strain. 1.5 Compound bar subjected to axial loading.	8	12

<i>Course Outcome MEH305-2 Elastic constants and their relation, strain energy for various forms of load application.</i>			
2	Elastic Constants and strain energy 2.1 Elastic constants E, G, μ and K definition, sketches and explanation. 2.2, Relation among elastic constants. 2.3 Forms of loading and instantaneous stress produced in each form of loading –gradual, sudden and impact. 2.4 Composite section carrying load and its analysis 2.5 Temperature stress and its computation in a rigid member having single material and made of two materials.	12	12
<i>Course Outcome MEH305-3 Theorem of moments, M.I of single and built-up sections rectangular and circular used in Engineering applications.</i>			
3	M.I. and its Engineering applications 3.1 M. I definition; Area and mass moment of inertia. 3.2 Theorem on Moments –parallel and perpendicular axes theorems. 3.3 M. I of standard sections-square, rectangular, triangular, circle and rhombus 3.4 M. I. of built up sections – I, T and L sections.	10	10

SECTION – II

Sr. No	Topics/ Subtopics	Learning (Hours)	Classroom learning evaluation Marks
<i>Course Outcome MEH305-4 Engineering analysis of beams carrying transverse loading, constructing SFD and BMD for s/s and cantilever beams.</i>			
4	Shear force and Bending Moment Diagrams 4.1 Definition of shear force and BM at any section of a beam carrying transverse loading 4.2 Sign convention and construction of SFD and BMD for standard cases of loading on cantilevers and s/s beams (point load and UDL only). 4.3 Plotting SFD and BMD for s/s beams with overhangs carrying point load, UDL and couple.	12 hours	14 marks
<i>Course Outcome MEH305-5 Understanding pure and ordinary bending governing flexural behaviour leading to design of beams.</i>			
5	Bending theory of beams 5.1 Theory of Pure bending 5.2 Theory of ordinary bending 5.3. Flexure formula and assumptions made in its derivation. 5.4 Bending stress, section modulus and design of rectangular beams.	10 hours	12 marks

	5.5 Shearing stress across any section –shear stress distribution and meaning of each term involved. 4.75.6. Shearing stress across a rectangular and a circular section.		
<i>Course Outcome MEH305-6 Understanding polar moment of inertia, torque and design of circular shafts and corner columns.</i>			
6	Torsion on Circular shafts 6.1 Polar MI for circular section 6.2 Torsion formula for twist in a circular shaft subjected to pure torque. 6.3 Torsional section modulus and design of circular shaft from. strength criteria and twist criteria 6.4 Power transmitted by circular shaft.	8 hours	10 marks
Total		30	70
Summative assessment – Theory paper should be such that total marks of questions on each topic are one and half times the marks allotted above but the candidates are able to attempt questions of the above allotted marks only.			

** No questions will be asked on IKS learning subtopics in any question papers.

G. SUGGESTED MICRO PROJECTS / ASSIGNMENTS/ ACTIVITIES FOR SPECIFIC LEARNING / SKILLS DEVELOPMENT (SELF LEARNING) UNDER SLA

- NA

H. SPECIFICATION TABLE FOR SETTING QUESTION PAPER FOR SEMESTER END THEORY EXAMINATION

Section / Topic no.	Name of topic	Distribution of marks (level wise)			Total marks	CO
		Remember	Understand	Apply		
I / 1	Engineering systems, actions and simple behaviour	4	4	4	12	MEH305-1
I / 2	Elastic Constants and strain energy	4	4	4	12	MEH305-2
I / 3	M.I. and its Engineering applications	4	2	4	10	MEH305-3
II / 4	Shear force and Bending Moment Diagrams	4	2	8	14	MEH305-4
II / 5	Bending theory of beams	4	4	4	12	MEH305-5
II / 6	Torsion on Circular shafts	4	2	4	10	MEH305-6
Total Marks					70	

I. ASSESSMENT CRITERIA

i) Formative Assessment of Practical: -

Every assignment shall be assessed for 25 marks as per following criteria:

Domain	Particulars	Marks out of 25
Cognitive	Understanding	05
	Application	05
Psychomotor	Operating Skills	05
	Drawing / drafting skills	05
Affective	Discipline and punctuality	05
TOTAL		25

ii) Summative Assessment of Practical:

Every practical assignment shall be assessed for 25 marks as per following criteria:

Sr.no	Criteria	Marks allotted
1	Understanding	05
2	Preparedness for practical	05
3	Neat & complete Drawing	05
4	Drawing / drafting skills	05
5	Drawing / drafting skills	05
TOTAL		25

J. INSTRUCTIONAL METHODS:

1. Lectures cum Demonstrations,
2. Class room practices.
3. Use of projector and soft material for demonstration

K. TEACHING AND LEARNING RESOURCES:

1. Chalk board
2. LCD presentations
3. Simulation labs
4. Infographics charts/Virtual labs –NITK etc.

L. REFERENCE BOOKS:

Sr. No.	Name of Book	Author	Publication
1	Elements of Strength of Materials	Timoshenko, S.P. and Young, D.H.	Affiliated East West Press Pvt. Ltd., Delhi
2	Mechanics of Materials	Adarsh Swaroop	New Age International
3	Strength of materials.	Bhavikatti, S.S.	Vikas publishing house pvt Ltd.
4	Strength of Materials	Khurmi, R.S.	S. Chand & Co., Delhi
5	Strength of Materials	Singer, F.L.	Harpe Collins Publishers India Delhi
6	Strength of materials	S Ramamurtham & Narayan	Danpat Rai
7	Mechanics of Materials, 4 th Edition	Beer and Johnson	McGraw-Hill Education 2020

M. LEARNING WEBSITE & SOFTWARE: -

1. www.nptel.com/iitm/
2. www.howstuffworks.com/
3. www.vlab.com
4. [https:// en.wikipedia.org/wiki/strength of materials](https://en.wikipedia.org/wiki/strength_of_materials)

* * *

COURSE ID:

Course Name : FLUID MECHANICS AND MACHINERY (ME)
Course Code : MEH306
Course Abbreviation : HFMM

A. LEARNING SCHEME:

Scheme component	Actual Contact Hours / week	Credits
Classroom Learning (CL)	04	03
Tutorial Learning (TL)	-	
Laboratory Learning (LL)	02	
Self-Learning Hours (SLH)	-	
Notional Learning (NLH)	06	

B. ASSESSMENT SCHEME:

PAPER DURATION IN HRS	Theory				Based on LL & TL				Based on Self Learning		Total Marks
					Practical				SLA		
	FA-TH	SA-TH	Total		FA-PR		SA-PR				
	Max	Max	Max	Min	Max	Min	Max	Min	Max	Min	
03	30	70	100	40	25	10	25#	10	-	-	150

(Total IKS Hrs. for Sem: 0Hrs)

C. ABBREVIATIONS:

CL- Classroom Learning, TL- Tutorial Learning, LL-Laboratory Learning, SLH-Self Learning Hours, NLH-Notional Learning Hours, FA - Formative Assessment, SA -Summative assessment, IKS - Indian Knowledge System, SLA - Self Learning Assessment

Legends: @ Internal Assessment, # External Assessment, *# On Line Examination, @\$ Internal Online Examination

1. FA-TH represents average of two class tests of 30 marks each conducted during the semester.
2. If candidate is not securing minimum passing marks in FA-PR of any course then the candidate shall be declared as "Detained" in that semester.
3. If candidate is not securing minimum passing marks in SLA of any course, then the candidate shall be declared as fail and will have to repeat and resubmit SLA work.
4. Notional Learning hours for the semester are (CL+LL+TL+SL) hrs.* 15 Weeks
5. 1(one) credit is equivalent to 30 Notional hrs.
6. * Self learning hours shall not be reflected in the Time Table.

* Self learning includes micro project / assignment / other activities. (Provide list of all 5 assignments here in tabular format)

D. i) RATIONALE:

The knowledge of fluid properties, fluid flow & fluid machinery is essential in many fields of engineering like in power generation, irrigation, water supply, etc. This course aims to develop the skills that will enable the students to select appropriate hydraulic devices and machines like pressure gauges, flow measuring devices, pipes, pumps, turbines, etc. for a particular application.

ii) INDUSTRY/EMPLOYER EXPECTED OUTCOME

This course will enable the students to select appropriate hydraulic machine(s) based on its application for efficient functioning

E. COURSE LEVEL LEARNING OUTCOMES (CO'S)

MEH306-1 - Solve numerical related to properties of fluid and pressure measurements

MEH306-2 - Apply Bernoulli's theorem to various flow measuring devices like Venturimeter, orifice meter and pitot tube, etc.

MEH306-3 - Calculate the various losses in flow through pipes

MEH306-4 - Select suitable hydraulic turbine and pump for the given application

MEH306-5 - Evaluate the performance of hydraulic turbines and pumps

Competency, course outcomes and programme outcomes/programme specific outcomes (CP-CO-PO/PSO) matrix

[Note: Correlation levels: 1: Slight (Low), 2: Moderate (Medium), 3: Substantial (High), "0"]

Competency and Cos	Programme outcome POs and PSO's								
	PO 1 Basic and discipline specific knowledge	PO 2 Problem analysis	PO 3 Design/ development of solutions	PO 4 Engineering tools, experimentation & testing	PO 5 Engineering practices for society, sustainability and environment	PO 6 project management	PO 7 Life-long learning	PSO 1 Work in Mfg & service sector	PSO 2 Start entrepreneurial activity
Competency									
MEH306-1	3	1	1	1	-	-	1	1	-
MEH306-2	3	1	1	1	-	-	1		
MEH306-3	3	2	1	1	-	-	1		
MEH306-4	3	2	2	-	1	-	2		
MEH306-5	3	3	2	2	-	-	2		

F. CONTENT:

i) Practical exercises

The following practical exercises shall be conducted in the *FMM LAB* for practical sessions of batches of about 20- 22 students:

Sr No	Laboratory Experiment / Practical Titles / Tutorial Titles	Number of hrs.	Relevant COs
1	*Measurement of water pressure by using Bourdon tube pressure gauge and U-tube Manometer	02	CO1
2	Measurement of discharge of water by using a measuring tank and stopwatch (or rotameter/ flow meter).	02	CO2
3	Measurement of total energy available at different sections of a pipe layout to verify Bernoulli's theorem	02	CO2
4	*Measurement of discharge through pipe using Venturimeter/ Orifice meter	02	CO2

5	Measurement of discharge through a pipe provided with sharp edged circular orifice	02	CO2
6	Measurement of the discharge of water in open channel using Triangular/ Rectangular notch.	02	CO2
7	Interpretation of the type of flow using Reynolds apparatus	02	CO2
8	*Calculation of Darcy's friction factor 'f' in pipes of different diameters for different discharges	02	CO3
9	*Determination of minor frictional losses in sudden expansion and sudden contraction in a pipe	02	CO3
10	Determination of minor frictional losses in elbow and bend in a pipe	02	CO3
11	Determination of the force exerted and work done by a jet on flat plate	02	CO5
12	*Determination of overall efficiency of Pelton turbine using Pelton wheel test rig.	02	CO5
13	*Dismantling and Assembly of a Centrifugal pump	02	CO4
14	*Determination of overall efficiency of Centrifugal pump using Centrifugal pump test rig	02	CO5
15	Dismantling and Assembly of a Reciprocating pump	02	CO4
16	*Determination of overall efficiency and percentage slip of Reciprocating pump using Reciprocating pump test rig	02	CO5

Note: '*' Marked Practicals Are mandatory. Minimum 80% of above list of lab experiment are to be performed.

ii) THEORY

SECTION – I

Sr. No	Topics/ Subtopics	Learning (Hours)	Classroom learning evaluation Marks
<i>Course Outcome MEH306-1 - Solve numerical related to properties of fluid and pressure measurements</i>			
1.	<p>Properties of Fluid and Fluid Pressure Measurement</p> <p>1.3. Properties of Fluid: Density, Specific gravity, Specific volume, Specific Weight, Dynamic viscosity, Kinematic viscosity, Surface tension, Capillarity, Vapor Pressure, Compressibility, Types of fluids, Simple numerical on properties of fluids.</p> <p>1.4. Fluid Pressure: Fluid pressure, Pressure head, Pressure intensity, Pascal's law, Concept of absolute vacuum, gauge pressure, atmospheric pressure, absolute pressure, Different units of pressure and their inter-relation, Simple numerical.</p> <p>1.5. Fluid Pressure Measurement Devices: Construction and working principle of piezometer, simple and differential manometers, Micromanometers, Numerical on above</p>	14	14

	manometers, Construction and working principle of Bourdon tube pressure gauge. 1.6. Hydrostatics: Total pressure, center of pressure regular surface forces on immersed bodies in liquid in horizontal and vertical position, Simple Numerical.		
Course Outcome MEH306-2 - Apply Bernoulli's theorem to various flow measuring devices like venturimeter, orifice meter and pitottube, etc.			
2	Fundamentals of Fluid Flow and Flow Measurement 2.5. Types of Fluid Flows: Laminar, turbulent, steady, unsteady, uniform, non uniform, rotational, irrotational, 1-D, 2-D and 3-D flows. 2.6. Continuity equation, Bernoulli's theorem. 2.7. Construction and working principle of Venturimeter, Derivation for discharge through venturimeter and numerical on it. 2.8. Construction and working principle of Orifice meter, Derivation for discharge through Orifice meter and numerical on it. 2.9. Hydraulic coefficients (Cd, Cc, Cv). 2.10. Construction and working principle of Pitot Tube and numerical on it	10	12
Course Outcome MEH306-3 - Calculate the various losses in flow through pipes			
3.	Flow through Pipes 3.2 Laws of fluid friction for laminar and turbulent flow 3.3 Darcy's equation and Chezy's equation for calculation of frictional losses, Numerical on above equations. 3.4 Minor losses in fittings and valves (No numerical) 3.5 Hydraulic gradient line and total energy line 3.6 Hydraulic power transmission through pipes, Simple numerical 3.7 Water hammer phenomenon in pipes, causes and remedial measures	10	08

SECTION – II

Sr. No	Topics/ Subtopics	Learning (Hours)	Classroom learning evaluation Marks
Course Outcome MEH306-4 - Select suitable hydraulic turbine and pump for the given application			
4.	Hydraulic Turbines 4.8 Impact of jet on fixed vertical flat plate, moving vertical flat plate, curved vanes with special reference to turbines and pumps, Numerical on above conditions. 4.9 Layout of hydroelectric power plant and function of each component, Water Storage systems used in Ancient India (IKS). 4.10 Classification of hydraulic turbines.	14	20

	<p>4.11 Construction, working principle, velocity diagram and applications of Pelton wheel, Kaplan turbine and Francis turbine.</p> <p>4.12 Draft tubes: Types and constructional details, Concept of cavitation in turbines.</p> <p>4.13 Calculation of Work done, Power output, efficiency of Pelton turbine only.</p> <p>4.14 Criteria for selection of hydraulic turbines and performance characteristics.</p>			
Course Outcome MEH306-5 - Evaluate the performance of hydraulic turbines and pumps				
5.	<p>Centrifugal and Reciprocating Pumps</p> <p>5.3 Centrifugal Pumps: Water lifting devices used in Ancient India (IKS).</p> <p>5.4 Classification, Construction and working principle of Centrifugal pump, Priming methods.</p> <p>5.5 Types of casings and impellers.</p> <p>5.6 Static head, Manometric head, NPSH, Work done, Manometric efficiency, Overall efficiency, Numerical on above parameters.</p> <p>5.7 Performance Characteristics of Centrifugal pumps.</p> <p>5.8 Troubleshooting, Construction, working and applications of multistage pump.</p> <p>5.9 Reciprocating Pump: Construction, working principle and applications of single and double acting reciprocating pumps, Slip, Negative slip, Cavitation and Separation, Use of air vessels.</p> <p>5.10 Indicator diagram with effect of acceleration head & frictional head, Pump selection criteria based on head and discharge (No numerical on reciprocating pumps)</p>	12	16	
Total			60	70
Summative assessment – Theory paper should be such that total marks of questions on each topic are one and half times the marks allotted above but the candidates are able to attempt questions of the above allotted marks only.				

G. SUGGESTED MICRO PROJECTS / ASSIGNMENTS/ ACTIVITIES FOR SPECIFIC LEARNING / SKILLS DEVELOPMENT (SELF LEARNING) UNDER SLA

-NA

H. SPECIFICATION TABLE FOR SETTING QUESTION PAPER FOR SEMESTER END THEORY EXAMINATION:

Section / Topic no.	Name of topic	Distribution of marks (level wise)			Total marks	CO
		Remember	Understand	Apply		
I/1	Properties of Fluid and Fluid Pressure Measurement	2	4	8	14	CO1
I/2	Fundamentals of Fluid Flow and Flow Measurement	4	4	4	12	CO2

I/3	Flow through Pipes	2	2	4	08	CO3
II/4	Hydraulic Turbines	6	6	8	20	CO4, CO5
II/5	Centrifugal and Reciprocating Pumps	4	4	8	16	CO4, CO5
TOTAL		18	20	32	70	

I. ASSESSMENT CRITERIA:

i) Formative Assessment of Practical: -

Every assignment shall be assessed for 25 marks as per following criteria:

Domain	Particulars	Marks out of 25
Cognitive	Understanding	05
	Application	05
Psychomotor	Drawing / drafting skills	10
Affective	Discipline and punctuality	05
TOTAL		25

J. INSTRUCTIONAL METHODS:

- 4 Lectures cum Demonstrations,
- 5 Class room practices.
- 6 Use of projector and soft material for demonstration

K. TEACHING AND LEARNING RESOURCES:

Chalk board, Power Point presentations and Demonstrative Models.

L. REFERENCE BOOKS:

Sr. No.	Name of Book	Author	Publication
1.	Dr. R.K. Rajput	A Textbook of Fluid Mechanics and Hydraulic Machines	S. Chand and Company Pvt.Ltd., New Delhi ISBN: 9789385401374
2.	Dr. R.K. Bansal	Fluid Mechanics and Hydraulic Machines	Laxmi Publications Pvt. Ltd., New Delhi ISBN: 9788131808153
3.	Dr. P.N. Modi, Dr. S.M. Seth	Hydraulics and Fluid Mechanics including Hydraulic Machines	Standard Book House, New Delhi ISBN: 13: 9788189401269
4.	S. Ramamurtham	Hydraulic, Fluid Mechanics and Fluid Machines	Dhanpat Rai Publishing Company (P) Ltd. ISBN: 9789384378271
5.	Victor Streeter, K.W. Bedford, E. Benjamin Wylie	Fluid Mechanics	McGraw-Hill Education ISBN: 9780070701403
6.	K. Subramanya	Fluid Mechanics and hydraulic Machines: Problems and Solutions	Tata McGraw-Hill Co. Ltd., New Delhi ISBN: 9789353163426

7.	R.S. Khurmi, N. Khurmi	A Textbook of Hydraulics, Fluid Mechanics and Hydraulic Machines	S. Chand and Company Pvt. Ltd., New Delhi ISBN: 9788121901628
8.	Som S.K., Biswas G.	Introduction to Fluid Mechanics and Fluid Machines	Tata McGraw-Hill Co. Ltd., New Delhi ISBN: 9780071329194
9.	Dr. Jagdish Lal	Fluid Mechanics and Hydraulic Machines	Metropolitan ISBN: 9788120004221
10	C.S.P. Ojha, P.N. Chandramouli, and R. Berndtsson	Fluid Mechanics and Machinery	Oxford University Press, New Delhi ISBN: 9780195699630
11	Raikar R.V.	Laboratory Manual Hydraulics and Hydraulic Machines	PHI Learning Pvt. Ltd., New Delhi ISBN: 9788120346642

M. LEARNING WEBSITES & PORTALS: -

1. <http://www.aboutmech.com/2016/08/total-pressure-and-centre-of-pressure.html>
2. <https://www.youtube.com/watch?v=UJ3-Zm1wbIQ>
3. <https://www.youtube.com/watch?v=bfcdRhY7Rw>
4. <https://www.youtube.com/watch?v=iRdJHPFVHwM>
5. <https://www.youtube.com/watch?v=3zEdtkuNYLU>
6. <https://www.youtube.com/watch?v=Rw11mu0TJmE>
7. https://www.youtube.com/watch?v=FHTVmkdSLk&list=PLdoIhVhbPQV5z6g7aT_LpC8mJb31hNiBx&index=2
8. https://www.youtube.com/watch?v=tOoBx4-ieyU&list=PLdoIhVhbPQV5z6g7aT_LpC8mJb31hNiBx&index=3
9. https://www.youtube.com/watch?v=cpM6hF23eeQ&list=PLdoIhVhbPQV5z6g7aT_LpC8mJb31hNiBx&index=11
10. <https://www.youtube.com/watch?v=Jd5BN7SPkqI>
11. <https://www.youtube.com/watch?v=0p03UTgpnDU>
12. <https://www.youtube.com/watch?v=3BCiFeykRzo>
13. <https://www.youtube.com/watch?v=IiE8skW8btE>
14. https://www.youtube.com/watch?v=41vb6T42_Tk
15. <https://www.youtube.com/watch?v=xqGyPdxLIRg>
16. <https://www.energy.gov/eere/water/types-hydropower-turbines>
17. <https://www.realpars.com/blog/manometer#:~:text=Measuring%20pressure.The%20tube%20is&text=When%20the%20pressures%20are%20equal,side%20because%20P1%20equals%20P2>
18. <https://tameson.com/pages/bourdon-tube-pressure-gauge>
19. <http://ecoursesonline.iasri.res.in/mod/page/view.php?id=1086>
20. <http://ecoursesonline.iasri.res.in/course/view.php?id=27>
21. <https://theconstructor.org/fluid-mechanics/types-fluid-flow-pipe/38078/>
22. <https://www.chaitanyaproducts.com/blog/ancient-indian-water-conservation-techniques-part-1>
23. <https://www.youtube.com/watch?v=hQr5Op4S5q4&t=83s>
24. <https://www.youtube.com/watch?v=uTrajIJ79ME&t=49s>

COURSE ID:
COURSE NAME : **BASIC ELECTRICAL & ELECTRONICS**
COURSE CODE : **MEH309**
COURSE ABBREVIATION : **HBEE**

A. LEARNING SCHEME:

Scheme component		Hours	Credits
Actual Contact Hours / week	Classroom Learning	04	4
	Tutorial Learning	-	
	Laboratory Learning	02	
	SLH-Self Learning	02	
	NLH-Notional Learning	08	

B. ASSESSMENT SCHEME: -

PAPER DURATION IN HRS	THEORY			BASED ON LL & TL				BASED ON SLA		TOTAL	
	FA-TH	SA-TH	TOTAL	FA -PR		SA-PR		MAX	MIN		
03	MAX	MAX	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	175
	30	70	100	40	25	10	25@	10	25	10	

(Total IKS Hrs for Sem.: 00 Hrs)

C. ABBREVIATIONS: CL-Class Room Learning, TL-Tutorial Learning, LL-Laboratory Learning, SLH-Self Learning Hours, NLH-Notional Learning Hours, FA - Formative Assessment, SA -Summative assessment, IKS - Indian Knowledge System, SLA -Self Learning Assessment

Legends: @Internal Assessment, #External Assessment, *#OnLine Examination, @\$Internal Online Examination Note:

1. FA-TH represents average of two class tests of 30 marks each conducted during the semester.
2. If candidate is not securing minimum passing marks in FA-PR of any course then the candidate shall be declared as "Detained" in that semester.
3. If candidate is not securing minimum passing marks in SLA of any course, then the candidate shall be declared as fail and will have to repeat and resubmit SLA work.
4. Notional Learning hours for the semester are (CL+LL+TL+SL) hrs.*15Weeks
5. 1(one)credit is equivalent to 30 Notional hrs.
6. *Selflearning hours shall not be reflected in the Time Table.

*Self learning includes microproject/assignment/other activities. (Provide list of all assignments here in tabular format At least 6 to 8 assignments to be given)

D. i) RATIONALE: -

The basics of Electrical and Electronic engineering are in the study of simple preliminary circuits provided with AC and D.C supplies. Students should deal with the electro-magnetic devices work on the principle of magnetism and electromagnetism. This course aims to empower mechanical engineering students with basic knowledge of electricity and its field applications related to industries. Also, it is therefore necessary for them to apply the principles of electrical and electronics engineering. This Course will make them conversant with electrical and electronic engineering aspects of manufacturing, production, fabrication, automobile and mechanical engineering-based processes in industries.

ii) INDUSTRY/EMPLOYER EXPECTED OUTCOME

The aim of this course is to help the student to attain the following industry identified outcomes through various teaching learning experiences: Use Electrical and Electronics equipment safely in mechanical engineering applications

E. COURSE LEVEL LEARNING OUTCOMES(COS)

MEH309-1 Operate different types DC generators.

MEH309-2 Determine practically the performance characteristics of DC machines

MEH309-3 Identify the different parts along with materials of single-phase transformer

MEH309-4 Identify electronic component in electronic circuits

MEH309-5 Identify and handle semiconductor diodes and BJT.

MEH307-6 Identification and testing of logic gates.

Competency, course outcomes and programme outcomes/programme specific outcomes (cp-co-po/ps) matrix

[Note: Correlation levels: 1: Slight (Low), 2: Moderate (Medium), 3: Substantial (High), “0”]

Competency and Cos	Programme Outcomes POs and PSOs								
	PO 1 Basic and Discipline specific knowledge	PO 2 Problem Analysis	PO 3 Design / Development of solutions	PO 4 Engineering Tools, Experimentation and Testing	PO 5 Engineering Practices for society, sustainability and Environment	PO 6 Project Management	PO 7 Life-long Learning	PSO 1 Work in Mfg & service sector	PSO2 Start entrepreneurial activity
MEH309-1 Operate different types DC generators	3	-	-	1	1	-	2	1	1
MEH309-2 Determine practically the performance characteristics of DC machines	3	-	-	1	1	-	2	1	1
MEH309-3 Identify the different parts along with materials of single-phase transformer	3	-	-	1	2	-	2		
MEH309-4 Identify electronic component in electronic circuits	3	-	-	2		1		1	1
MEH309-5 Identify and handle semiconductor diodes and BJT.	3	-	-	2		1	2	1	1

Competency and Cos	Programme Outcomes POs and PSOs								
	PO 1 Basic and Discipline specific knowledge	PO 2 Problem Analysis	PO 3 Design / Development of solutions	PO 4 Engineering Tools, Experimentation and Testing	PO 5 Engineering Practices for society, sustainability and Environment	PO 6 Project Management	PO 7 Life-long Learning	PSO 1 Work in Mfg & service sector	PSO2 Start entrepreneurial activity
MEH309-6 Identification and testing of logic gates.	3	-	-	2		1	2	1	1

F. CONTENT: -

i) Practical exercises

Sr. no	Laboratory experiences	Hrs.	CO
1	Introduction to electrical laboratory.	02	MEH309-1
2	To verify Ohms Law.	02	MEH309-1
3	Verify the relation for current and voltage/s in series resistances	02	MEH309-1
4	Verify the relation for current and voltage/s in parallel resistances	02	MEH309-1
5	Verify the Faradays law of Electromagnetic Induction	02	MEH309-1
6	Measurement of power by using ammeter, voltmeter & wattmeter	02	MEH309-2
7	Verification of relationship between line and phase values of voltage & current in STAR connection	02	MEH309-2
8	Verification of relationship between line and phase values of voltage & current in DELTA connection	02	MEH309-2
9	Identify parts of single phase Transformer.	02	MEH309-3
10	Identify parts of single phase induction motor.	02	MEH309-3
<i>(Any Six from above)</i>			
11	Test different types of resistors, capacitors, inductors. - Identify different types of resistors, capacitors, inductors. - Find value of different types of resistors, capacitors, inductors.	02	MEH309-4
12	V-I characteristics of PN junction diode. - Build and test the circuit as per experimental set-up - Plot V-I characteristics	02	MEH309-5
13	Half wave rectifier - Build and test the circuit as per experimental set-up - Plot the input and output waveforms on graph.	02	MEH309-5
14	Full wave bridge rectifier - Build and test the circuit as per experimental set-up - Plot the input and output waveforms on graph.	02	MEH309-5
15	Full wave bridge rectifier with LC filter - Build and test the circuit as per experimental set-up - Plot the input and output waveforms on graph.	02	MEH309-5
16	Input and Output characteristics of BJT in common emitter configuration. - Build and test the circuit as per experimental set-up. - Plot graph of input parameters vs output parameters.	02	MEH309-5

Sr. no	Laboratory experiences	Hrs.	CO
17	Test the functionality of AND, NOT & OR logic gates using breadboard.	02	MEH309-6
18	Test the functionality of NAND & NOR logic gates using breadboard.	02	MEH309-6
<i>(Any Six from above)</i>			

Note: Out of above suggestive practicals –

- Minimum 80% of above list of lab experiment are to be performed.
- Judicial mix of Practicals are to be performed to achieve desired outcomes.

ii. Theory

Section I

Sr. no.	Topics/Subtopics	Learning (Hours)	Classroom learning evaluation Marks
<i>Course Outcome MEH309-1: Use electric and magnetic principles to solve electrical problems</i>			
1	Introduction to elements of electric networks 1.1 Definitions-Electric Current, Electric Potential, Potential difference, Resistance 1.2 Ohm's law 1.3 Equivalent resistance of series, parallel and combination resistance systems. 1.4 Simple numerical problems based on the above. B] Introduction to Magnetic Circuit. 1.5 Definition of magnetic flux, MMF, Magnetic force, permeability, reluctance. 1.6 Analogy between electric and magnetic circuit 1.7 Faradays laws of electromagnetic induction 1.8 Lenz law	8	10
<i>Course Outcome MEH309-2: Measurement of electrical quantities.</i>			
2	2.1 Use of Ammeter, Voltmeter, Wattmeter, Digital Energy meter, Digital Multi meter 2.2 Single phase Alternator. 2.3 A.C. Signal terms: Cycle, Frequency, Periodic time, Amplitude, RMS value, Average value, impedance, phase angle, and power factor. 2.4 Three-Phase Supply Systems 2.4 1 Phase sequence and its advantages. 2.4 2 Voltage, Current and Power relation in STAR connection. (Circuit Diagram and relation statement only) 2.4.3 Voltage, Current and Power Relation in DELTA connection. (Circuit Diagram and relation statement only) 2.5 Necessity of Earthing. 2.6 IS electrical standards for safety and appliances.	10	12

Sr. no.	Topics/Subtopics	Learning (Hours)	Classroom learning evaluation Marks
<i>Course Outcome MEH309-3: Use of different electrical machine and transformer in Industry.</i>			
3	<p>A] Single Phase Transformer 3.1 Principle of working 3.2 Construction of single-phase transformer. 3.3 Types of transformers- 3.3.1 According construction- core and shell type 3.3.2 According application-power transformer and distribution transformer.</p> <p>B] Electrical Motors: A.C. Motors 3.4 Basic Principle of three phase induction motor 3.5 Squirrel cage and Slip ring induction rotor (Only diagram and constructional features) 3.6 Application of Squirrel cage and Slip ring induction motor 3.7 Construction of single-phase induction motor 3.8 Working of single-phase induction motor 3.9 Types of Single-phase AC motor- split phase, capacitor start, capacitor start capacitor run (Only diagram and constructional features) and its applications</p>	10	12

Section –II

Sr. no.	Topics/Subtopics	Learning (Hours)	Classroom learning evaluation Marks
<i>Course Outcome: MEH309-4 Identify electronic component in electronic circuits</i>			
4	<p>Electronic Components and Signals 4.1 Electronic Components: Passive and Active components: Resistor, Capacitor, Inductor (symbols and their types) color codes (for resistor only), specifications: Maximum Voltage rating, Power rating, Tolerance and Ohmic range-For Resistor, Capacitance, Capacitor Working voltage, Insulation resistance, Power Factor (Dissipation Factor)-For Capacitor and Inductance of coil, Inductive reactance, Self Inductance and Mutual Inductance-For Inductor. 4.2 Voltage and current sources, signals: Waveform (Sinusoidal, triangular and square). 4.3 Time and frequency domain representation of signals. Amplitude, frequency, phase, wavelength.</p>	08	8
<i>Course Outcome: MEH309-5 Identify and handle semiconductor diodes and BJT.</i>			
5	<p>Diodes and Bipolar Junction Transistor 5.1 Diodes and its Applications: P-N junction diode: symbol, construction working, V-I characteristic, and applications, Zener diode: working, symbol, V-I characteristic, voltage regulator.</p>	16	18

	5.2 Rectifiers: Half wave, Full wave Bridge rectifier Performance parameters: PIV, ripple factor, efficiency. 5.3 Filter: 5.3.1 Need of filter 5.3.2 Types of filters- Shunt capacitor, Series inductor, LC Filter and CLC filter 5.4 BJT Symbol, construction, working principle (NPN only), Transistor as switch and amplifier. 5.5 Input and Output characteristics: CE configurations, Operating regions: Cut-off, saturation Active Region		
Course Outcome: MEH309-6 Identification and testing of logic gates.			
6	Digital IC 6.1 Number system: Decimal number system, Binary Number system, Hexadecimal number system. Conversion of Decimal to Binary and Binary to Decimal. Binary addition and Subtraction (using 1's complement only). 6.2 Gates (AND, OR, INVERTER, NAND, NOR): Pin diagram, truth table.	08	10

** No questions will be asked on IKS learning subtopics in any question papers.

G. LIST OF ASSIGNMENTS UNDER SLA

1. Prepare a simple model of single-phase transformer.
2. Collect photographs with details of various power/ distribution transformer and identify the parts (Specification, application, cost, features, manufacturers)
3. Prepare a simple model of three phase Induction motor.
4. Prepare a simple model of single-phase Induction motor.
5. Write procedure to measure AC and DC Amplitude, time period and frequency using CRO and function generator.
6. Tabulate important characteristics of commonly available semiconductor diodes.
7. Draw a chart showing circuit diagrams of half wave and full wave rectifiers with waveforms and equations.
8. Small Hobby project using Digital IC.

H. SPECIFICATION TABLE FOR SETTING QUESTION PAPER FOR SEMESTER END THEORY EXAMINATION

Section / Topic no.	Name of topic	Distribution of marks (level wise)			Total marks	CO
		Remember	Understand	Apply		
I / 1	Use electric and magnetic principles to solve electrical problems	4	2	2	10	MEH309-1
I / 2	Measurement of electrical quantities	4	4	4	12	MEH309-2
I / 3	Use of different electrical machine and transformer in Industry	4	4	4	12	MEH309-3
II / 4	Identify electronic component in electronic circuits	4	4	-	8	MEH309-4

II / 5	Identify and handle semiconductor diodes and BJT.	4	4	10	18	MEH309-5
II / 6	Identification and testing of logic gates.	4	2	4	10	MEH309-6
Total Marks					70	

I. ASSESSMENT CRITERIA

i) Formative Assessment of Practical: -

Every assignment shall be assessed for 25 marks as per following criteria:

Domain	Particulars	Marks out of 25
Cognitive	Understanding	05
	Application	05
Psychomotor	Operating Skills	05
	Drawing / drafting skills	05
Affective	Attendance/Discipline and punctuality	05
TOTAL		25

ii) Summative Assessment of Practical:

At the time of Practical Examination assessed for 25 marks as per following criteria:

Sr.no	Criteria	Marks allotted
1	Knowledge about the course	05
2	Preparedness for practical /Oral	05
3	Neat& complete Diagram/write up	05
4	Observations/Handling of instrument/ Communication/Presentation	05
5	Oral Based on Lab work and completion of task	05
TOTAL		25

J. INSTRUCTIONAL METHODS:

7. Lectures cum Demonstrations,
8. Classroom practices.
9. Use of projector and soft material for demonstration

K. TEACHING AND LEARNING RESOURCES:

Chalk board, LCD presentations, Demonstrative kits, Demonstrative charts.

L. REFERENCE BOOKS:

S.N.	Name of Book	Author	Publication
1	Electrical Technology Vol-I	Theraja B.L.	S. Chand, New Delhi, 2012 or latest
2	Basic Electrical Engineering	S Chand & Company	S Chand & Company
3	Applied Electronics	Dr R S Sedha	S Chand Technical
4	Principle of Electronics	V K Mehata	S. Chand
5	Modern Digital Electronics	R P Jain	Mc Graw Hill

M. LEARNING WEBSITE & SOFTWARE

1. www.nptel.com/iitm/
2. www.circuitglobe.com/
3. www.virtual lab.com
4. www.electric4u.com

COURSE ID:
Course Name

: COMPUTER AIDED DRAFTING

Course Code : MEH315
Course Abbreviation : HCAD

A. LEARNING SCHEME:

Scheme component	Actual Contact Hours / week	Credits
Classroom Learning (CL)	-	2
Tutorial Learning (TL)	-	
Laboratory Learning (LL)	04	
Self-Learning Hours (SLH)	-	
Notional Learning (NLH)	04	

B. ASSESSMENT SCHEME:

PAPER DURATI ON IN HRS	Theory				Based on LL & TL				Based on Self Learning		Total Marks
					Practical				SLA		
	FA-TH	SA-TH	Total		FA-PR		SA-PR		Max	Min	
	Max	Max	Max	Min	Max	Min	Ma x	Min	Max	Min	
-	-	-	-	-	25	10	25#	10	-	-	50

(Total IKS Hrs for Sem: - 00 Hrs)

C. ABBREVIATIONS:

CL- Classroom Learning, TL- Tutorial Learning, LL-Laboratory Learning, SLH-Self Learning Hours, NLH-Notional Learning Hours, FA - Formative Assessment, SA -Summative assessment, IKS - Indian Knowledge System, SLA - Self Learning Assessment

Legends: @ Internal Assessment, # External Assessment, *# On Line Examination, @\$ Internal Online Examination

1. FA-TH represents average of two class tests of 30 marks each conducted during the semester.
2. If candidate is not securing minimum passing marks in FA-PR of any course then the candidate shall be declared as "Detained" in that semester.
3. If candidate is not securing minimum passing marks in SLA of any course, then the candidate shall be declared as fail and will have to repeat and resubmit SLA work.
4. Notional Learning hours for the semester are (CL+LL+TL+SL) hrs.* 15 Weeks
5. 1(one) credit is equivalent to 30 Notional hrs.
6. * Self learning hours shall not be reflected in the Time Table.

* Self learning includes micro project / assignment / other activities. (Provide list of all 5 assignments here in tabular format)

D. i) RATIONALE:

With the advent of technology, the process of drafting and design has transitioned from manual techniques to digital methods. The study of Computer Aided Drawing and Drafting (CADD) is representing the forefront of this evolution, providing designers with powerful tools to streamline the creation, modification, and visualization of technical drawings.

ii) INDUSTRY/EMPLOYER EXPECTED OUTCOME

The aim of this course is to help the student to attain the following industry identified outcome through various learning experiences:

- 1) Create technical drawings using CADD software accurately and efficiently according to industry standards in multidisciplinary teams

E. COURSE LEVEL LEARNING OUTCOMES (CO'S)

MEH315-1 Use basic commands in CADD software.

MEH315-2 Draw complex 2D drawings in CADD software using draw and modify tools.

MEH315-3 Draw isometric drawings using CADD software.

MEH315-4 Use software to dimension and write text on 2D geometric entities.

MEH315-5 Plot given 2D entities using proper plotting parameters in CADD.

Competency, course outcomes and programme outcomes/programme specific outcomes (CP-CO-PO/PSO) matrix

[Note: Correlation levels: 1: Slight (Low), 2: Moderate (Medium), 3: Substantial (High), "0"]

Competency and Cos	Programme outcome POs and PSO's								
	PO 1 Basic and discipline specific knowledge	PO 2 Problem analysis	PO 3 Design/ development of solutions	PO 4 Engineering tools, experimentation & testing	PO 5 Engineering practices for society, sustainability and environment	PO 6 project management	PO 7 Life-long learning	PSO 1 Work in Mfg& service sector	Ps 2 Start entrepreneurial activity
Competency									
MEH315-1	2	-	-	1	-	-	1	1	
MEH315-2	2	1	1	-	-	-	1	1	
MEH315-3	2	1	1	-	-	-	1	1	
MEH315-4	2	-	-	-	-	-	1	1	
MEH315-5	1	-	-	1	1	1	1	1	

F. CONTENT:

i) Practical exercises

The following practical exercises shall be conducted in the CADD Laboratory in practical sessions of batches of about 20- 22 students:

Sr No	Laboratory Experiment / Practical Titles / Tutorial Titles	Number of hrs.	Relevant COs
1	*Drawing 2-D entities like Line, Polyline, Circle, Rectangle, Polygon and Ellipse by using CADD software.	4	CO1 CO2
2	Drawing simple 2-D objects using any combination of 2 or more commands, like polygon + circle, line + circle, etc.	4	CO1 CO2
3	Drawing complex 2-D objects like pulley/gear.	4	CO1 CO2
4	*Drawing complex 2-D object like coupling/joints.	4	CO1 CO2 CO4

5	* Drawing any two problems of orthographic projections using first angle method of projection.	4	CO1 CO2 CO4
6	Drawing any two problems of orthographic projections using third angle method of projection.	4	CO1 CO2 CO4
7	* Drawing any two problems of sectional orthographic projections using First angle method of projection.	4	CO1 CO2 CO4
8	Drawing any two problems of sectional orthographic projections using third angle method of projection.	4	CO1 CO2 CO4
9	Drawing any two problems of development of solids.	4	CO1 CO2 CO4
10	Drawing any two problems on Auxiliary views.	4	CO1 CO2 CO4
11	*Drawing an assembly drawing from the given detailed drawing showing assembly dimensions, part number and bill of Material.	8	CO1 CO2 CO4
12	Drawing working drawings from given assembly drawing showing conventional representation, dimensions, geometrical tolerances and machining symbols.	8	CO1 CO2 CO4
13	Drawing isometric views of given two objects containing lines, arcs, circles, holes, ribs and slots.	8	CO1 CO3
14	*Drawing Isometric drawings from given Isometric views and dimension it.	8	CO1 CO3 CO4
15	*Prepare a template for your institute of predefined paper size with title block and institute logo.	4	CO1 CO4
16	*Plot the drawings from Sr. 3 to 13 on Paper with title block and institute logo	4	CO1 CO5
	<p>Note: Out of above suggestive Practicals- '*' Marked Practicals Are mandatory. Minimum 80% of above list of lab experiment are to be performed. Judicial mix of Practicals are to be performed to achieve desired outcomes.</p>		

ii) THEORY

SECTION – I

Sr. No	Topics/ Subtopics	Learning (Hours)	Classroom learning evaluation Marks
<i>Course Outcome MEH315-1</i> Use basic commands in CADD software			
1.	Unit-I Fundamentals of CAD Drawing 1.1 Fundamentals of Computer Aided Drafting and its applications, Various Software for Computer Aided Drafting. 1.2 CADD Interface: Application Menu, Quick Access Toolbar, Ribbons, Info Center, Command Window, Graphical Area, Status Bar 1.3 CADD initial setting commands: Snap, grid, Ortho, Osnap, Dynamic input, Limits, Units, Lt scale, Object tracking. 1.4 Co-ordinate System- Cartesian and Polar, Absolute and Relative mode, Direct Distance Entry, UCS, WCS. 1.5 Object Selection methods- picking, window, crossing, fence, last and previous. 1.6 Opening, saving and closing a new and existing drawing.	-	-
<i>Course Outcome MEH315-2</i> Draw complex 2D drawings in CADD software using draw and modify tools.			
2.	Unit - II Zoom, Draw, Formatting and Enquiry Commands 2.1 Zoom Commands – all, previous, out, in, extent, Realtime, dynamic, window, pan. 2.2 Draw Command - Line, Polyline, arc, circle, rectangle, polygon, ellipse, spline, block, hatch. 2.3 Formatting commands - Layers, block, line type, line weight, color 2.4 Enquiry commands–distance, area.	-	-

SECTION – II

Sr. No	Topics/ Subtopics	Learning (Hours)	Classroom learning evaluation Marks
<i>Course Outcome MEH315-3</i> Draw isometric drawings using CADD software.			
3.	Unit-III Modify and Edit Commands 3.1 Modify Command - Erase, trim, extend, copy, move, mirror, offset, fillet, chamfer, array, rotate, scale, lengthen, stretch, measure, break, divide, explode, align. 3.2 Editing Objects by Using Grips-Moving, Rotating, Scaling, Mirroring and Stretching.	-	-
<i>Course Outcome MEH315-4</i> Use software to dimension and write text on 2D geometric entities.			
4.	Unit - IV Isometric Drawings, Layers, and Blocks 4.1 Isometric drafting- Isometric grid & snap, Isometric axis & plane, Polyline, Isocircle. 4.2 Dimensioning Isometric drawings. 4.3 Text writing on Isometric drawing. 4.4 Layer, Layer properties and applications. 4.5 Blocks: create, modify and use in same file and in another file.	-	-
<i>Course Outcome MEH315-5</i> Plot given 2D entities using proper plotting parameters in CADD.			

5.	Unit –V Dimensioning, Text and Plot Commands 5.1 Dimensioning commands - Dimension styles, Dimensional Tolerances and Geometrical Tolerances, Modify dimension style. 5.2 Text commands-dtext, mtext command. 5.3 Insert table–table, table style command. 5.4 Template Drawing- Standard template, loading template, create new template. 5.5 Plotting a drawing – adding plotter/printer, page setup, plot style commands.	-	-
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** No questions will be asked on IKS learning subtopics in any question papers.

G. SUGGESTED MICRO PROJECTS / ASSIGNMENTS/ ACTIVITIES FOR SPECIFIC LEARNING / SKILLS DEVELOPMENT (SELF LEARNING) UNDER SLA

-Not Applicable

H. SPECIFICATION TABLE FOR SETTING QUESTION PAPER FOR SEMESTER END THEORY EXAMINATION:

-Not Applicable

I. ASSESSMENT CRITERIA:

i) Formative Assessment of Practical: -

Every assignment shall be assessed for 25 marks as per following criteria:

Domain	Particulars	Marks out of 25
Cognitive	Understanding	05
	Application	05
Psychomotor	Drawing / drafting skills	10
Affective	Discipline and punctuality	05
TOTAL		25

ii) Summative Assessment of Practical:

Every practical assignment shall be assessed for 25 marks as per following criteria:

Sr.no	Criteria	Marks allotted
1	Understanding	05
2	Preparedness for practical	05
3	Neat & complete Drawing	05
4	Drawing / drafting skills	10
TOTAL		25

J. INSTRUCTIONAL METHODS:

- 1 Practical cum Demonstrations,
- 2 Use of projector and soft material for demonstration

K. TEACHING AND LEARNING RESOURCES:

Chalk board, Power Point presentations and Demonstrative kits.

L. REFERENCE BOOKS:

Sr.No.	Name of Book	Author	Publication
1.	AutoCAD 2021 for Engineers & Designers, Basic & Intermediate	Prof. Sham Tickoo	Publisher: BPB Publications, 21 February 2021, ISBN-10:9389898986, ISBN-13:978-9389898989
2.	AutoCAD 2014 for Engineers Volume 1	Sankar Prasad Dey	Publisher: Vikas, 21 December 2021, ISBN-13:978- 9325983373
3.	AutoCAD 2024: A Problem- Solving Approach, Basic and Intermediate	Prof. Sham Tickoo	Dreamtech Press publication, August 20, 2023, ISBN-101640571779, ISBN-13978-1640571778
4.	Engineering Graphics with AutoCAD	Kulkarni D.M	Publisher: Prentice Hall India Learning Private Limited, 1 January 2010, ISBN-10: 8120337832, ISBN-13:978-8120337831
5.	AutoCAD2021 For Beginners	Cad folks	Publication: Kishore, 5 May 2020, ISBN-10 819419539X ISBN-13:978-8194195399
6.	AutoCAD 2024 Tutorial First Level 2D Fundamentals	Luke Jumper, Randy H. Shih	SDC Publication, June 27, 2023, ISBN-10 1630575852, ISBN:978-1-63057-585-4
7.	Engineering Graphics, AICTE Prescribed Textbook	Sharad K. Pradhan, KK Jain	Khanna Book Publishing; First Edition, 1 January 2023, ISBN-10 9391505503, ISBN-13 978-9391505509

M.LEARNING WEBSITE & SOFTWARE: -

1. <https://www.autodesk.com/learn>
2. <https://www.cadtutor.net/>
3. <https://www.cadin360.com/>
4. <https://ocw.mit.edu/courses/mechanical-engineering/>
5. <https://www.engineering.com/LearningCenter/CAD.aspx>
6. <https://www.youtube.com/watch?v=cmR9cfWJRUU>
7. <https://www.youtube.com/watch?v=QuR-VKis3jU>
8. <https://www.youtube.com/watch?v=IWYKfzx-M1E>
9. <https://www.youtube.com/watch?v=RA0O6AZewTc>
10. <https://www.youtube.com/playlist?list=PLYEkKxSL5Gt1hR6Jg0ZiQSlc7vn-HTd7h>
11. <https://www.youtube.com/watch?v=PHSmwXQriIc>

COURSE ID:

Course Name : FUNDAMENTALS OF PYTHON PROGRAMMING
Course Code : MEH320
Course Abbreviation : HFPP

A. LEARNING SCHEME:

Scheme component	Actual Contact Hours / week	Credits
Classroom Learning (CL)	-	1
Tutorial Learning (TL)	-	
Laboratory Learning (LL)	02	
Self-Learning Hours (SLH)	-	
Notional Learning (NLH)	02	

B. ASSESSMENT SCHEME:

PAPER DURATI ON IN HRS	Theory				Based on LL & TL				Based on Self Learning		Total Marks
					Practical						
	FA-TH	SA-TH	Total		FA-PR		SA-PR		SLA		
	Max	Max	Max	Min	Max	Min	Max	Min	Max	Min	
-	-	-	-	-	25	10	25@	10	-	-	50

(Total IKS Hrs for Sem: 00 Hrs)

C. ABBREVIATIONS:

CL- Classroom Learning, TL- Tutorial Learning, LL-Laboratory Learning, SLH-Self Learning Hours, NLH-Notional Learning Hours, FA - Formative Assessment, SA -Summative assessment, IKS - Indian Knowledge System, SLA - Self Learning Assessment

Legends: @ Internal Assessment, # External Assessment, *# On Line Examination, @\$ Internal Online Examination

1. FA-TH represents average of two class tests of 30 marks each conducted during the semester.
2. If candidate is not securing minimum passing marks in FA-PR of any course then the candidate shall be declared as "Detained" in that semester.
3. If candidate is not securing minimum passing marks in SLA of any course, then the candidate shall be declared as fail and will have to repeat and resubmit SLA work.
4. Notional Learning hours for the semester are (CL+LL+TL+SL) hrs.* 15 Weeks
5. 1(one) credit is equivalent to 30 Notional hrs.
6. * Self learning hours shall not be reflected in the Time Table.

* Self learning includes micro project / assignment / other activities. (Provide list of all 5 assignments here in tabular format)

D. i) RATIONALE:

Comprehension of programming languages is crucial for diploma engineering graduates, especially as they engage with various software applications in the mechanical engineering domain. Python, being easy to code, potent, and stands out as an ideal language for introducing computing and problem-solving concepts to beginners. This course enables students to write Python programs and utilize various built-in functions/methods of Python modules/libraries to solve specific problems.

ii) INDUSTRY / EMPLOYER EXPECTED OUTCOME

An ability to prepare python programs for solving simple engineering problems.

E. COURSE LEVEL LEARNING OUTCOMES (CO'S)

MEH320-1 Use program designing tools and IDE for python.

MEH320-2 Employ python building blocks and data types in the programming.

MEH320-3 Implement conditional and looping statements in the python programming.

MEH320-4 Implement built in functions and modules in the python programming.

MEH320-5 Use NumPy for performing operations on list and array.

Competency, course outcomes and programme outcomes/programme specific outcomes (CP-CO-PO/PSO) matrix

[Note: Correlation levels: 1: Slight (Low), 2: Moderate (Medium), 3: Substantial (High), "0"]

Competency and Cos	Programme outcome POs and PSO's								
	PO 1 Basic and discipline specific knowledge	PO 2 Problem analysis	PO 3 Design/ development of solutions	PO 4 Engineering tools, experimentation & testing	PO 5 Engineering practices for society, sustainability and environment	PO 6 project management	PO 7 Life-long learning	PSO 1 Work in Mfg & service sector	Ps 2 Start entrepreneurial activity
Competency									
MEH320-1	2	2	2	3	-	-	2	-	-
MEH320-2	2	2	2	3	-	-	2	-	-
MEH320-3	2	2	2	3	-	-	2	-	-
MEH320-4	2	2	2	3	-	-	2	-	-
MEH320-5	2	2	2	3	-	-	2	-	-

F. CONTENT:

i) Practical exercises

The following practical exercises shall be conducted in the *Computer Laboratory for Python Programming* in practical sessions of batches of about 20- 22 students:

Sr No	Laboratory Experiment / Practical Titles / Tutorial Titles	Number of hrs.	Relevant COs
1	Install Python IDE.	02	CO1
2	*Prepare a flow chart and algorithm for simple problem.	02	CO1
3	Write a simple program to display a simple message.(Ex: "Welcome to Python programming")	02	CO2
4	Write a simple Python program by taking user's input to - - find the area of rectangle - find the area or circle.	02	CO2
5	*Write a program to accept value of Celsius and convert it to Fahrenheit.	02	CO2
6	Write a python program to find whether the given number is even or odd using if - else statement.	02	CO3
7	*Write a python program to check whether a input number is positive, negative or zero using if – elif- else statement.	02	CO3

8	Write a program to accept the three sides of a triangle to check whether the triangle is isosceles, equilateral, right angled triangle.	02	CO3
9	Write a program that allows the user to input numbers until they choose to stop, and then displays the count of positive, negative, and zero numbers entered (Use while loop).	02	CO3
10	*Write a python program for printing multiplication table of a given number using for loop. (Ex. 12x1=12 12x2=24.... 12x10=120)	02	CO3
11	*Write a Python program to demonstrate the use of different mathematical functions (Ex. ceiling, floor etc.).	02	CO4
12	*Write a python program to find mean, mode, median and standard deviation using statistics module.	02	CO4
13	Write a python program utilizing a list to display the name of a month based on a given month number.	02	CO5
14	Write a python program to add or subtract two matrices using multidimensional list.	02	CO5
15	*Write a python program to multiply two matrices using multidimensional list.	02	CO5
16	*Write a python program to multiply two matrices using NumPy.	02	CO5
<p>Note: Out of above suggestive Practicals- *' Marked Practicals Are mandatory. Minimum 80% of above list of lab experiment are to be performed. .Judicial mix of Practicals are to be performed to achieve desired outcomes.</p>			

ii) THEORY

SECTION – I

Sr. No	Topics/ Subtopics	Learning (Hours)	Classroom learning evaluation Marks
<i>Course Outcome MEH320-1 Use program designing tools and IDE for python.</i>			
1.	<p>Introduction to Python Programming</p> <p>1.1 Revision of Computer Components (CPU, I/O devices)</p> <p>1.2 Applications of computer and programming languages in Mechanical engineering domain.</p> <p>1.3 Program Designing Tools: Algorithm, FlowChart.</p> <p>1.4 Introduction and Features of Python: Open source, Interactive, Interpreted, Object-oriented, Platform independent etc., Installation & working of IDEs.</p>	08	16
<i>Course Outcome: MEH320-2 Employ python building blocks and data types in the programming.</i>			
2.	<p>Python building blocks & data types</p> <p>2.1 Python building blocks: Identifiers, Indentation, Comments, Variables, Arithmetic and assignment operators and Expressions.</p> <p>2.2 Data Types: Integers, float, complex, string and their declaration, data type conversion.</p> <p>2.3 Accepting input from user: I/O functions</p>	08	18

	2.4 Container Types: List, tuple, set and their declaration. 2.5 Write simple python program to display 2.6 “Welcome” message.		
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SECTION – II

Sr. No	Topics/ Subtopics	Learning (Hours)	Classroom learning evaluation Marks
<i>Course Outcome: MEH320-3 Implement conditional and looping statements in the python programming.</i>			
3.	Python operators and Control flow 3.1 Relational and Logical operators. 3.2 Decision making statements: if, if-else, if- elif -else statements. 3.3 Looping statements: while loop, for loop, Nested loops. 3.4 Loop manipulation using continue, pass, break 3.5 statements.	06	14
<i>Course Outcome: MEH320-4 Implement built in functions and modules in the python programming.</i>			
4.	Python functions and modules 4.1 Functions: Use of built-in functions, data conversion functions, abs, pow, min, max, round, ceil, floor etc. 4.2 Modules: Use of built-in modules- math cmath, random and statistics. 4.3 User-defined function: Function definition, 4.4 function calling, function arguments and parameter passing, Return statement, scope of variables.	06	12
<i>Course Outcome: MEH320-5 Use NumPy for performing operations on list and array.</i>			
5.	List and arrays in python 5.1 List: define list (one and multi-dimension), accessing, deleting and updating values in list. 5.2 Basic list operations: slicing, repeating, concatenation and iteration. 5.3 NumPy array: Generate NumPy arrays and 5.4 construct multidimensional arrays.	02	10
Total		30	70
Summative assessment – Theory paper should be such that total marks of questions on each topic are one and half times the marks allotted above but the candidates are able to attempt questions of the above allotted marks only.			

** No questions will be asked on IKS learning subtopics in any question papers.

G. SUGGESTED MICRO PROJECTS / ASSIGNMENTS/ ACTIVITIES FOR SPECIFIC LEARNING / SKILLS DEVELOPMENT (SELF LEARNING) UNDER SLA

- Not Applicable

H. SPECIFICATION TABLE FOR SETTING QUESTION PAPER FOR SEMESTER END THEORY EXAMINATION:

- Not Applicable

I. ASSESSMENT CRITERIA:

i) Formative Assessment of Practical: -

Every assignment shall be assessed for 25 marks as per following criteria:

Domain	Particulars	Marks out of 25
Cognitive	Understanding	05
	Application	05
Psychomotor	Observations & computer handling skill	10
Affective	Discipline and punctuality	05
TOTAL		25

ii) Summative Assessment of Practical:

Every practical assignment shall be assessed for 25 marks as per following criteria:

Sr.no	Criteria	Marks allotted
1	Understanding	05
2	Preparedness for practical	05
3	Observations & computer handling skill	10
4	Oral Based on Lab work and completion of task	05
TOTAL		25

J. INSTRUCTIONAL METHODS:

- 1 Lectures cum Demonstrations,
- 2 Class room practices.
- 3 Use of projector and soft material for demonstration

K. TEACHING AND LEARNING RESOURCES:

Chalk board, Power Point presentations and Demonstrative kits.

L. REFERENCE BOOKS:

Sr. No.	Name of Book	Author	Publication
1.	Fundamentals of Python: First Programs, 2E	Kenneth A. Lambert	Cengage Learning India Private Limited, ISBN: 9789353502898
2.	Let Us Python - 6th Edition	Yashavant Kanetkar, Aditya Kanetkar	BPB Publications, ISBN: 9789355515414

M. LEARNING WEBSITE & SOFTWARE: -

1. <https://www.w3schools.com/python/>
2. <https://www.tutorialspoint.com/python/index.htm>
3. <https://www.python.org/>
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