

GUJARAT TECHNOLOGICAL UNIVERSITY

PRODUCTION ENGINEERING

ENGINEERING THERMODYNAMICS & HEAT TRANSFER

LESSON PLANNING

SUBJECT CODE: 2132502

B.E. 3RD SEMESTER, DIVISION : A

Type of course: Engineering Science

Teaching and Examination Scheme:

Teaching Scheme			Credits C	Examination Marks				Total Marks
L	T	P		Theory Marks		Practical Marks		
			ESE (E)	PA (M)	ESE Viva (V)	PA (I)		
4	2	0	6	70	30	20	30	150

Content:

Sr. No.	Topics	Teaching Hrs.	FACULTY NAME
1	BASIC CONCEPT AND FIRST LAW: Basic concepts - concept of continuum, macroscopic approach, thermodynamic systems - closed, open and isolated. Property, state, path and process, quasi-static process, work, modes of work, Zeroth law of thermodynamics – concept of temperature and heat. Concept of ideal and real gases. First law of thermodynamics – application to closed and open systems, internal energy, specific heat capacities, enthalpy, steady flow process with reference to various thermal equipments.	10	MJB
2	SECOND LAW AND ENTROPY : Second law of thermodynamics – Kelvin’s and Clausius statements of second law. Reversibility and irreversibility. Carnot theorem, Carnot cycle, reversed carnot cycle, efficiency, COP. Thermodynamic temperature scale, Clausius inequality, concept of entropy, entropy of ideal gas, principle of increase of entropy.	10	MJB
3	THERMODYNAMIC AVAILABILITY: Basics – Energy in non-flow processes : Expressions for the Exergy of a closed system-Equivalence between mechanical energy forms and Exergy – Flow of energy associated with heat flow – Exergy consumption and entropy generation. Exergy in steady flow processes : Expressions for Exergy in steady flow processes – Exergy dissipation and entropy generation.	5	MJB
4	PROPERTIES OF PURE SUBSTANCE:	5	

	Properties of pure substances – Thermodynamic properties of pure substances in solid, liquid and vapour phases, phase rule, P-V, P-T, T-V, T-S, H-S diagrams, PVT surfaces, thermodynamic properties of steam. Calculations of work done and heat transfer in non-flow and flow processes.		MJB
5	CONDUCTION: Basic Concepts – Mechanism of Heat Transfer – Conduction, Convection and Radiation – Fourier Law of Conduction - General Differential equation of Heat Conduction — Cartesian and Cylindrical Coordinates – One Dimensional Steady State Heat Conduction – Conduction through Plane Wall, Cylinders and Spherical systems – Composite Systems – Conduction with Internal Heat Generation – Extended Surfaces – Unsteady Heat Conduction – Lumped Analysis – Use of Heislers Chart.	8	MJB
6	CONVECTION: Basic Concepts –Heat Transfer Coefficients – Boundary Layer Concept – Types of Convection – Forced Convection – Dimensional Analysis – External Flow – Flow over Plates, Cylinders and Spheres – Internal Flow – Laminar and Turbulent Flow – Combined Laminar and Turbulent – Flow over Bank of tubes – Free Convection – Dimensional Analysis – Flow over Vertical Plate, Horizontal Plate, Inclined Plate, Cylinders and Spheres.	6	MJB
7	PHASE CHANGE HEAT TRANSFER AND HEAT EXCHANGERS : Nusselts theory of condensation-pool boiling, flow boiling, correlations in boiling and condensation. Types of Heat Exchangers – Heat Exchanger Analysis – LMTD Method and NTU - Effectiveness – Overall Heat Transfer Coefficient – Fouling Factors.	6	VAP
8	RADIATION : Basic Concepts, Laws of Radiation – Stefan Boltzman Law, Kirchoff's Law –Black Body Radiation –Grey body radiation - Shape Factor Algebra – Electrical Analogy – Radiation Shields –Introduction to Gas Radiation	6	VAP

SHANTILAL SHAH ENGINEERING COLLEGE
Production Engineering Department
B.E.SEMESTER– 3rd SEM, SUB CODE: 2132502
SUB: Engineering Thermodynamics and heat Transfer.

Tutorial :1

Tutorial 1: To study about basic concepts of thermodynamics.

- Q-1 : Define the term thermodynamics, also explain concept of continuum.
- Q-2 : Explain In brief following terms.
1) Thermodynamic system 2) surrounding 3) Boundary 4) universe
5) State 6) process 7) cycle.
- Q-3 : Compare microscopic and macroscopic approach of thermodynamics.
- Q-4 : Explain different type of thermodynamic systems with neat
With neat sketches and examples.
- Q-5 : Distinguish between extensive and intensive properties.
- Q-6 : Explain Thermodynamic Equilibrium.
- Q-7 : Explain Quasi Static process with P-V Diagram.
- Q-8 : Discuss Different modes of work.
- Q-9 : Explain Zeroth law of thermodynamics with Example.
- Q-10 : Define Temperature and heat and also compare same.
- Q-11 : Give the difference between work and heat.
- Q-12 : Explain point function and path function
- Q-13 : Give the first law of thermodynamics and also explain following
terms.
1. Internal energy
 2. Specific energy
 3. Heat capacity
 4. Enthalpy
 5. Entropy

Tutorial :2

Tutorial 2: To study about first law and second law of thermodynamics.

- Q-1: Discuss joule's experiment and first law of thermodynamics.
- Q-2: Explain Following concepts.
1) Internal Energy 2) Enthalpy 3) Entropy 4) perpetual motion machine of
the first kind – PMM 1
- Q-3: Explain Steady flow Energy equation (SFEE) with its engineering
application.

Q-4: Write a limitation of first law of thermodynamics and also explain second law of thermodynamics.

Q-5: prove the equivalence of clausius and kelvin statement.

Q-6: Discuss the perpetual motion of machine of second kind

Q-7: State and prove Carnot theorem.

Q-8: Explain thermodynamic temperature scale.

Q-9: State and prove the clausius theorem and explain concept of entropy.

Q-10: Explain reversibility and irreversibility.

Q-11: Explain principle of increase of entropy.

Tutorial :3

Tutorial 3: To study about Thermodynamic Availability.

Q-1 Explain Energy in non-flow processes, Expressions for the Exergy of a closed system.

Q-2 Explain Exergy consumption and entropy generation.

Q-3 Explain Exergy dissipation and entropy generation.

Q-4: Define following terms

1) Available energy 2) unavailable energy 3) dead state.

Q-5: write comparison of first law and second law of thermodynamic.

Tutorial :4

Tutorial : 4 To Study About Properties Of Pure Substance.

Q-1 Thermodynamic properties of pure substances in solid, liquid and vapour phases.

Q-2 Explain Calculations of work done and heat transfer in non-flow and flow processes.

Q-3 Explain thermodynamic properties of steam.

Q-4 Explain Concept of Pure Substance. Q-5 Discuss vapour - liquid-solid phase in pure substance. Q-6 Explain Concept of Critical and triple point of pure substance

Tutorial :5

Tutorial : 5 To Study about Conduction, Convection, and Radiation.

Q-1 Explain terms Conduction, Convection, and Radiation. Q-2 Explain Mechanism of Heat Transfer in Conduction, Convection, and Radiation.

Q-3 Explain One Dimensional Steady State Heat Conduction, Conduction through Plane Wall, Cylinders and Spherical systems.

Q-4 Explain Boundary Layer Concept, Types of Convection and Forced Convection.

Q-5 Explain Combined Laminar and Turbulent, Flow over Bank of tubes and Free Convection.

Q-6 Explain Stefan Boltzman Law, Kirchhoff's Law.

Q-7 Explain Black Body Radiation and Grey body radiation.

Tutorial :6

Tutorial: 6 To study about Phase Change Heat Transfer And Heat Exchangers.

Q-1 Explain Nusselts theory of condensation-pool boiling, flow boiling.

Q-2 Explain various Types of Heat Exchangers and Heat Exchanger Analysis.

Q-3 Explain Overall Heat Transfer Coefficient and Fouling Factors.

Subject Coordinator

H.O.D

Prof.M.J.Bhatt

Prof.(Dr.) A.V.Gohil

Shantilal Shah Engineering College, Bhavnagar
Production Engineering Department

LECTURE PLAN & LAB/TUTORIAL PLAN

Course Code :	2132501	Year/Semester :	BE II Year/ 3 rd Semester
Course Name :	MACHINING PROCESSES	Academic Year :	2018/2019/ Odd
L -T- P :	4-0-2	Credit :	6
Course Detail :	Theory and Practical	Term Start Date :	18/06/2018
Course Coordinator :	Prof. B. J. Chudasama	Term End Date :	17/10/2018
Team of Instructors :	-	Class Test 1 :	
Faculty Name:	Prof. B. J. Chudasama	Class Test 2 :	
	Prof. N. P. Nirmal	Mid Term Exam :	

Shantilal Shah Engineering College, Bhavnagar
Production Engineering Department

Lesson Plan

Academic Year : 2018 Odd Term

Sem. : 3th sem

Name of Teacher : Prof. B. J. Chudasama & Prof. N P Nirmal

Name of Department : Production Engineering

Subject : MACHINING PROCESSES [2132501]

Hrs./Week : 4

Theory/Tutorial : Theory

Sr. No	Topic	No. of Hours	Faculty	Planned Date	Actual Date	Teaching Aid Code	Remarks
1	Unit 1: Introduction of Machine Tools	2					
A	Basic concepts of Machining and Machine Tools, Classification of Machine Tools	1	BJC	18/6/2018			
B	Working and auxiliary motions in machine tools, Primary cutting motions in machines tools, CNC machining.	1	BJC	19/6/2018			
2	Unit 2: Turning operations	20					
A	Introduction , Lathe ,Types of lathes	2	BJC	25/6/2018			
B	Size of a lathe ,Work holding devices	2	BJC	2/7/2018			
C	Principal unit arrangements	2	BJC	9/7/2018			
D	Mechanisms to obtain speed, feed and depth of cut	2	BJC	16/7/2018			
E	Lathe operations	2	BJC	23/7/2018			
F	Metal removal rate and machining time calculations	2	BJC	30/7/2018			
G	Turrets and Automats	2	BJC	6/8/2018			
H	Micro turning	2	BJC	13/8/2018			
I	CNC turning	2	BJC	20/8/2018			
J	Alignment test for lathe	2	BJC	27/8/2018			
3	Unit 3: Drilling and allied operations	8					
A	Introduction , Drilling machines	1	NPN				
B	Types of Drilling Machine	1	NPN				
C	Mechanism deployed for speed, feed and depth of cut	1	NPN				
D	Drills, Drilling machine operations- Boring, Reaming and other operations	1	NPN				
E	Material removal rate and time calculations for drilling	1	NPN				
F	Methods of drilling, deep hole drilling, micro drilling, multiple drilling	1	NPN				
G	CNC drilling, Alignment test for drilling	1	NPN				
H	Boring machine-Types.	1	NPN				
4	Unit 4 : Milling operations:	10					
A	Introduction, Milling machines	1	NPN				
B	Mechanism deployed for speed and feed	1	NPN				
C	Types of Milling machines	1	NPN				
D	Milling cutters, Milling process	1	NPN				
E	Work holding devices, attachments	1	NPN				
F	Milling machine operations	1	NPN				
G	Alignment test for milling machine-	1	NPN				
H	Micro milling, horizontal and vertical CNC centres	1	NPN				
I	Material removal rate	1	NPN				
J	time calculations for milling.	1	NPN				
5	Unit 5: Shapers, Planers and Slotters	6					
A	Classification of Planers, Speed, feed and depth of cut of Planers,	1	NPN				

B	Material removal rate and time calculations for Planers, drive and feed mechanisms of Planers	1	NPN				
C	Classification of Shapers, Speed, feed and depth of cut of Shapers	1	NPN				
D	Material removal rate and time calculations for Shapers, drive and feed mechanisms of Shapers	1	NPN				
E	Classification of Slotters, Speed, feed and depth of cut of Slotters	1	NPN				
F	Material removal rate and time calculations for Slotters, drive and feed mechanisms of Slotters	1	NPN				
6	Unit 6: Broaching Operations:	4					
A	Principles of broaching machines	1	BJC	27/8/2018			
B	Types of broaching machines-	1	BJC	10/9/2018			
C	Aadvantage limitations of broaching.	1	BJC	17/9/2018			
D	Applications of broaching	1	BJC	24/9/2018			
7	Unit 7: Abrasive Processes:	6					
A	Basic principle, purpose and application of grinding	1	NPN				
B	Selection of grinding wheels and their conditioning	1	NPN				
C	Classification of grinding machines and their uses	1	NPN				
D	Micro grinding	1	NPN				
E	Alignment test for grinding machine-	1	NPN				
F	Material removal rate and time calculations for grinding.	1	NPN				
	Total	56					

Teaching Aid Code:		Prof. B J Chudasama Prof. N P Nirmal Sign of Teacher	Sign of H.O.D
1	O.H.P		
2	L.C.D PROJECTER		
3	MODEL		
4	CHART		
5	OTHER (VIDEO)		
<i>* Remark column should cover any slippages and remedial action planned</i>			
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Reference Books:

1. Hajra Choudhary S.K. and Hajra Choudhary A.K ., “Workshop Technology”, Media Promotors and Publishers,1992.
2. Workshop Technology Vol. I &II & III by Chapman.1972
3. Production Technology by R. K. Jain. Khanna Publishers, 2001
4. Processes and Materials of Manufacture; Lindberg Roy A.; Prentice-Hall India 1998
5. Kalpakjain S. and Schmid Steven R., “Manufacturing Processes for Engineering Materials ”, Pearson Publication, 2007.
6. Bawa H.S., “Workshop Technology”, Tata McGraw Hill, 1995.

Shantilal Shah Engineering College, Bhavnagar
Production Engineering Department

LECTURE PLAN & LAB/TUTORIAL PLAN

Course Code :	2132501	Year/Semester :	BE II Year/ 3 rd Semester
Course Name :	MACHINING PROCESSES	Academic Year :	2018/2019/ Odd
L -T- P :	4-0-2	Credit :	6
Course Detail :	Theory and Practical	Term Start Date :	18/06/2018
Course Coordinator :	Prof. B. J. Chudasama	Term End Date :	17/10/2018
Team of Instructors :	-	Class Test 1 :	
Faculty Name:	Prof. B. J. Chudasama	Class Test 2 :	
	Prof. N. P. Nirmal	Mid Term Exam :	

SHANTILAL SHAH ENGINEERING COLLEGE BHAVNAGAR
Department of Mechanical Engineering

Practical Plan

Academic Year : 2018 Odd Term			Sem. : 3rd Sem			
Name of Teacher : Prof. B. J. Chudasama & Prof. N P Nirmal			Name of Department : Production Engineering			
Subject : MACHINING PROCESSES [2132501]			Hrs./Week : 2			
Theory/Tutorial : Practical			Days :			
Sr. No.	Name of Unit/Topics	Hrs. Allotted	Planned Date	Actual Date	Teaching Aid Code	Remarks
1.	Lathe job (individual job)	6				
2.	Study of different cutting tools like Single point cutting tool, Tap, Drill, Reamer, Boring tool, Saws, Milling cutters, Grinding wheels	2				
3.	Capstan lathe demonstration (Group)	2				
4.	Drilling & Allied Operations (Group job)	2				
5.	Shaper, Planer, Slotter machine demonstration (Group job)	4				
6.	Milling and Indexing spur gear tooth cutting (Group job)	4				
7.	Grinding machine demonstration (Group job)	2				
8.	Work holding and tool holding devices on lathe, Shaper, Planer, Slotter, Drilling M/C, and Milling M/C.	2				
9.	Study of attachment on lathe, Milling and Grinding machine	4				
Teaching Aid Code:			Prof. B J Chudasama Prof. N P Nirmal Sign of Teacher Sign of H.O.D			
1	O.H.P					
2	L.C.D PROJECTER					
3	MODEL					
4	CHART					
5	OTHER (VIDEO)					
* <i>Remark column should cover any slippages and remedial action planned</i>						
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SHANTILAL SHAH ENGINEERING COLLEGE BHAVNAGAR

PRODUCTION ENGINEERING

Machining Processes

Odd Term - 18/06/2018 To 17/10/2018

Group No.	ROLL NO.	ENROLMENT NO.	NAME OF STUDENTS	PPT Topics
1	5001	170430125001	BELADIYA KRUNAL CHHAGANBHAI	Chapter - 1 Introduction of Machine Tools
	5002	170430125002	BERA KASHYAP MAHESHBHAI	
	5003	170430125003	BHALALA SIDDHARTHKUMAR MUKESHBHAI	
	5004	170430125004	CHAUHAN MAHENDRA GHANSHYAMBHAI	
	5005	170430125005	DABHI SANJAYKUMAR GORDHANBHAI	
2	5006	170430125006	DHAKECHA YASHKUMAR MAHESHBHAI	Chapter - 2 Turning operations.
	5007	170430125007	GOHIL PRAVINSINH NARUBHAI	
	5008	170430125009	GONDALIYA RENISH JAYNTIBHAI	
	5009	170430125010	GONDALIYA VISHAL ARVINDBHAI	
	5010	170430125011	GORASIYA RAHUL MANSUKHBHAI	
3	5011	170430125012	GUNA VARUN BHARATBHAI	Chapter - 3 Drilling and allied operations
	5012	170430125013	JADAV JAYESHBHAI CHHAGANBHAI	
	5013	170430125015	JETANI MITUL DINESHBHAI	
	5014	170430125016	JOSHI DIVYESH ANILKUMAR	
	5015	170430125017	JOSHI VISHNUBHAI MAHESHBHAI	
4	5016	170430125018	KANANI DHAVAL HASMUKHBHAI	Chapter - 4 Milling operations
	5017	170430125020	KATHESHIYA DARSHANKUMAR DINESHKUMAR	
	5018	170430125021	KAVA VISHALBHAI GUNVANTBHAI	
	5019	170430125025	MANDANKA MITUL ASHVINBHAI	
	5020	170430125027	MORADIYA HARDIKKUMAR NARANBHAI	
5	5021	170430125028	NAKRANI HARMISHABEN JAGDISHBHAI	Chapter - 5 Shapers, Planers and Slotters
	5022	170430125029	NAVADIYA VIVEKKUMAR BHUPATBHAI	
	5023	170430125030	PADAYA KALPESH VINODBHAI	
	5024	170430125031	PADHIYAR PRATIK NAVINBHAI	
	5025	170430125032	PARMAR JAYKUMAR DIPAKKUMAR	
6	5026	170430125033	PARMAR VISHAL NANABHAI	Chapter - 6 Broaching Operations
	5027	170430125035	PUROHIT ROHIT SAMJIBHAI	
	5028	170430125037	RATHOD RUPESH MINESHBHAI	
	5029	170430125038	RAYAJADA KRIPALSINH JAYENDRASINH	
	5030	170430125040	SAKARIYA JASMIN HARESHBHAI	
7	5031	170430125042	SARVAIYA AAKASH RAJESHBHAI	Chapter - 7 Abrasive Processes
	5032	170430125044	SAVANI FENIL DHANJIBHAI	
	5033	170430125046	SHIROYA ASHISH BALUBHAI	
	5034	170430125047	SHUKLA MAHARSHI JATINBHAI	
	5035	170430125048	SOLANKI JIGAR GHANSHYAMBHAI	
8	5036	170430125049	SOLANKI SIDDHARTH HARESHBHAI	Chapter - 2 Turning operations.
	5037	170430125050	SONDAGAR BHARGAVKUMAR KISHORBHAI	
	5038	170430125051	SURANI PARESHBHAI HIRABHAI	
	5039	170430125052	TILAVA BRIJESHKUMAR SURESHKUMAR	
	5040	170430125053	TRIPATHI ABHILASH UDAYBHAN	
	5041	170430125054	VAGHASIYA JAYDIP JENTIBHAI	

1. All students are required to submit ACTIVE LEARNING ASSIGNMENT(ALA)component CD/DVD mentioning on it

Instructions:

- (1) GROUP NUMBER
- (2) TOPIC NAME
- (3) SEM. 3rd PRODUCTION ENGG.
- (4) SUBJECT CODE:-2152507, SUBJECT NAME:- Machining Processes
- (5) STUDENT ENROLMENT NUMBERS AND NAMES with Permanent Marker in legible writing.

2. ACTIVE LEARNING ASSIGNMENTS: Preparation of power-point slides, which include videos, animations, pictures, graphics for better understanding of theory.

3. All students who are on roll at present are instructed to submit ALA - CD/DVD on 31/07/2018 without fail to Prof. B. J. Chudasama

SHANTILAL SHAH ENGINEERING COLLEGE

Department of Production Engineering

LECTURE PLAN & LAB/TUTORIAL PLAN

Course Code :	2131904	Year/Semester :	BE 3 rd Semester A
Course Name :	Material Science and Metallurgy	Academic Year :	2018-19/ EVEN
L -T- P :	3-0-2	Credit :	5
Course Detail :	Theory and Practical	Term Start Date :	18/6/2017
Course Coordinator :	Prof. H. H. Thakar	Term End Date :	17/10/2018
Team of Instructors :	-	Class Test 1 :	-
Faculty Name:	Prof. H. H. Thakar Prof. M. J.Bhatt	Class Test 2 :	-
		Mid Term Exam :	-

SHANTILAL SHAH ENGINEERING COLLEGE, BHAVNAGAR

Department of Production Engineering

Lesson Plan

Academic Year : 2018-19			Sem. : 3rd sem - A				
Name of Teacher : Prof. H. H. Thakar			Name of Department : Production Engineering				
Subject : Material Science and Metallurgy			Hrs./Week : 4				
Theory/Tutorial : Theory			Days :				
Sr. No.	Name of Unit/Topics	Hrs. Allotted	Planned Date	Actual Date	Teaching Aid Code	Faculty	Remarks
1	Unit 1: Introduction to Material Science Metallurgy	3					
A	Classification of Engineering Materials, Engineering requirements of materials, Criterion for selection of materials	1	18/6/2018			HHT	
B	for selection of materials for engineering applications through Structure- Properties- Performance correlation ship	1	19/6/2018			HHT	
C	Introduction to levels of internal structure like macro, micro, crystal and atomic and their correlated properties; Methods/Tools to reveal the different levels of structure.	1	25/6/2018			HHT	
2	Unit 2: Crystal geometry and Crystal Imperfections	5					
A	Unit Cell, Crystal structure, Bravais lattice, atomic packing, coordination number,	1	26/6/2018			HHT	
B	Crystal directions and planes, Miller indices	1	2/7/2018			HHT	
C	Polymorphism or Allotropy, diffusion process	1	3/7/2018			HHT	
D	Mechanism of crystallization – nucleation and growth, factors influencing nucleation and growth	1	9/7/2018			HHT	
E	Imperfections in crystals and their effect on properties, Solute strengthening	1	10/7/2018			HHT	

3	Unit 3: Plastic Deformation:	3					
A	Deformation by slip, Mechanism of slip, Slip in different lattice structures, Deformation by twinning	1	16/7/2018			HHT	
B	Strain hardening, Effect of strain hardening on properties	1	17/7/2018			HHT	
C	Recovery, Recrystallization and Grain Growth and their effect on properties of ductile metals	1	23/7/2018			HHT	
5	Unit 5: Solidification of metals and an alloy	4					
A	Nucleation and Growth during freezing of pure metal and alloy ingot/a casting and resultant microstructure	1	24/7/2018			HHT	
B	Effects of Structure on Mechanical Properties	1	30/7/2018			HHT	
C	Methods to control the grain structure resulting from solidification,	1	31/7/2018			HHT	
D	Solidification defects like porosity and shrinkage and remedies.	1	6/8/2018			HHT	
	Revision and doubt solving		7/8/2018			HHT	
6	Unit 6: Phase and Phase equilibrium:	3					
A	Phase and Phase equilibrium: Unary and Binary equilibrium phase, diagrams, Gibb's free energy for thermodynamic stability of phases,	1	6/8/2018			HHT	
B	Gibb's phase rule, solid solutions and compounds, Hume-Rothery rules;	1	13/8/2018			HHT	
C	cooling curves, lever rule, Different reactions like eutectic, eutectoid, peritectic and peritectoid; Non-equilibrium cooling;	1	14/8/2018			HHT	
7	Unit 7 : Allotropy of Iron	5					
A	Iron-Iron-Carbide equilibrium system-phases and their properties of the Iron-Iron Carbide equilibrium diagram	1	20/8/2018			HHT	
B	Different reactions of the Iron-Iron	1	21/8/2018			HHT	

	Carbide equilibrium system,					
C	Alloy groups (Wrought Irons, Steels and Cast Irons) of Iron-Iron Carbide equilibrium system and their characteristics in general,	1	27/8/2018			HHT
D	Equilibrium cooling of eutectoid, hypoeutectoid and hypereutectoid steels, their resultant microstructures and hence correlated properties and applications	1	28/8/2018			HHT
E	IS and ISO Codification, Different specifications and designations of steels	1	4/9/2018			HHT
	Revision and doubt solving		10/9/2018			HHT
8	Unit 8: Heat Treatment of Steels:	5				
A	Time-Temperature-Transformation Diagram Isothermal and continuous transformations	1	11/9/2018			HHT
B	Austenitic grain size control/grain refinement, study of effects like temper-brittleness, overheating and burning of steels	1	17/9/2018			HHT
C	Study of Annealing, Normalizing, hardening and tempering	1	18/9/2018			HHT
D	Full hardening and case hardening methods;	1	24/9/2018			HHT
E	Applications of above processes for the industrial practices.	1	25/9/2018			HHT
	Revision and doubt solving		1/10/2018			HHT
9	Unit 9: Alloy steels:	2				MJB
A	Purpose of alloying; General effect of alloying elements on ferrite, carbide, transformation temperature, hardenability and tempering	1	23/8/2018			MJB
B	Types: Chromium, Manganese, Molybdenum and Manganese steels. IS Codification. Tool Steels: Classification, properties, applications and IS and ISO Codification.	1	30/8/2018			MJB

	Revision and doubt solving		6/9/2018			MJB	
10	Unit 10: Cast Iron:	3					
A	Transformations resulting into White Cast Iron, Grey Cast Iron, , Their microstructures and correlated properties and applications. IS Codification.	1	8/10/2018			HHT	
B	S. G. Iron and Malleable Cast Iron and Their microstructures and correlated properties and applications. IS Codification.	1	9/10/2018			HHT	
C	Alloy Cast Iron and Their microstructures and correlated properties and applications. IS Codification.	1	15/10/2018			HHT	
12	Unit 12: Non-ferrous alloys:	3					
A	alloys of copper, aluminium, magnesium titanium	1	20/9/2018			MJB	
B	Other alloys of lead, tin, zinc, nickel	1	27/9/2018			MJB	
C	manganese, white metals and bearing alloys	1	4/10/2018			MJB	
	Revision and doubt solving		11/10/2018			MJB	
13	Unit 13: Powder Metallurgy:	3				MJB	
	Application and advantages, Production of powder	1	26/7/2018			MJB	
	Compacting, Sintering,	1	2/8/2018			MJB	
	Equipment and process capability	1	9/8/2018			MJB	
	Revision and doubt solving		16/8/2018			MJB	
14	Unit 14 : Non Destructive testing	4					
	Non Destructive testing of materials such as, Dye Penetration Testing	1	21/6/2018			MJB	
	Ultrasonic Testing.	1	28/6/2018			MJB	
	Radiography Testing	1	5/7/2018			MJB	
	Magnetic Particle Testing and Eddy current testing	1	12/7/2018			MJB	
	Revision and doubt solving		19/7/2018			MJB	

Teaching Aid Code:		Sign of Teacher : _____
1	O.H.P	
2	L.C.D PROJECTER	
3	MODEL	
4	CHART	
5	OTHER (VIDEO)	Sign of H.O.D : _____
<i>* Remark column should cover any slippages and remedial action planned</i>		
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Reference Books:

1. Callister's Material Science and Engineering, 2/e R. Balasubramaniam, Wiley India.
2. Elements of Material Science and Engineering, 6/e, Lawrence H. Van Vlack, Pearson Education.
3. The Science and Engineering of Materials 6/e, Donald R. Askeland and Pradeep P. Phule, Cengage Learning.
4. Principles of Materials Science and Engineering, W F Smith, McGraw Hill.
5. Materials Science and Metallurgy, K. I. Parashivamurthy, Pearson Education.
6. Physical Metallurgy, Sydney H. Avner, Tata McGraw-Hill.
7. Practical Non-Destructive Testing, Baldev Raj, T. Jayakumar and M. Thavasimuthu, Narosa Pub. House.
8. ASM Handbook Vol. 9: Metallography and Microstructure, Ed. George F. Vander Voort, ASM International 2004.
9. Material science and metallurgy by O. P. Khanna, Dhanpatrai Publications.

SHANTILAL SHAH ENGINEERING COLLEGE

Department of Production Engineering

LECTURE PLAN & LAB/TUTORIAL PLAN

Course Code :	2131904	Year/Semester :	BE 3 rd Semester A
Course Name :	Material Science and Metallurgy	Academic Year :	2018-19/ EVEN
L -T- P :	3-0-2	Credit :	5
Course Detail :	Theory and Practical	Term Start Date :	18/6/2017
Course Coordinator :	Prof. H. H. Thakar	Term End Date :	17/10/2018
Team of Instructors :	-	Class Test 1 :	-
Faculty Name:	Prof. H. H. Thakar Prof. M. J.Bhatt	Class Test 2 :	-
		Mid Term Exam :	-

SHANTILAL SHAH ENGINEERING COLLEGE BHAVNAGAR
Department of Production Engineering

Lesson Plan

Academic Year : 2018-19			Sem. : 3rd sem			
Name of Teacher : Prof. H. H. Thakar			Name of Department : Production Engineering			
Subject : Material science and Metallurgy			Hrs./Week : 2			
Theory/Tutorial/Practical : Practical			Days :			
Sr. No.	Name of Experiment	Hrs. Allotted	Planned Date	Actual Date	Teaching Aid Code	Remarks
1.	To get acquainted with the operation, construction, use and capabilities of a metallographic microscope	2				
2.	To study procedure of specimen preparation for microscopic examination and to carry out a specimen preparation.	2				
3.	To understand what is micro examination, importance of micro examination and to study various ferrous, non-ferrous microstructures.	2				
4.	To identify the different types of material available for design, manufacturing and processing of various components based on structure-property-performance-processing relationships.	2				
5.	To show the effect of different quenching media (Oil, Water and Brine) on the hardness of medium carbon steel.	2				
6.	To understand the concept of hardenability and its relevance to heat treatment procedure to be adopted in practice.	2				
7.	To find out the effect of varying section size on hardenability of steel and obtain hardness distribution curves of hardened steel cross-section.	2				
8.	Study of different heat treatment processes- annealing, normalizing, hardening and tempering, surface and casehardening to improve properties of steel during processes and applications.	2				
9.	To understand the procedure of testing, nature of indication, the capability and sensitivity of the liquid penetrant test and the magnetic particle test.	2				
10.	To understand the procedure of testing, nature of indication, the capability and sensitivity of the Eddy current test and the Ultrasound test.	2				
Teaching Aid Code:			Sign of Teacher : _____ Sign of H.O.D : _____			
1	O.H.P					
2	L.C.D PROJECTER					
3	MODEL					
4	CHART					
5	OTHER (VIDEO)					
* Remark column should cover any slippages and remedial action planned						
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