

Scheme – 2017

Department of Mechanical Engineering G. Pulla Reddy Engineering College (Autonomous): Kurnool Accredited by NBA of AICTE and NAAC of UGC Affiliated to JNTUA, Anantapuramu

Scheme and Syllabus for II, III & IV Years of FOUR YEAR B.Tech. Degree Course in MECHANICAL ENGINEERING

(With Effect from the Batch Admitted in 2017-18)

VISION OF THE DEPARTMENT

To develop the department into a model center of education and research in the field of Mechanical Engineering and allied areas and to become a significant contributor to the development of industry and society

MISSION OF THE DEPARTMENT

- M1 To impart quality technical education in emerging fields of Mechanical Engineering through balanced academic curriculum in accordance with changing industry requirements
- **M2** To establish centers of excellence where students can strengthen their entrepreneurial skills, technical workmanship, and research proficiency
- **M3** To provide opportunities/platforms for students to nurture leadership abilities, ethical values; and to enable them learn responsibility and accountability at work

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

The educational objectives of the under-graduate programme in Mechanical Engineering at G. Pulla Reddy Engineering (Autonomous) Kurnool are to prepare graduates to possess the ability

- **PEO1** To apply a broad, fundamental-based knowledge, and up-to-date skills required in performing professional work in Mechanical Engineering and related disciplines
- **PEO2** To design works pertaining to Mechanical Engineering, incorporating the use of design standards, realistic constraints and consideration of the economic, environmental, and social impact of the design
- **PEO3** To use modern computer software tools to solve Mechanical Engineering problems and explain and defend their solutions and communicate effectively using graphic, verbal and written techniques to all audiences and
- **PEO4** To become successful entrepreneur or leaders in private/governmental organizations or enter graduate programs in Mechanical Engineering and related disciplines and to pursue lifelong learning and research

PROGRAM SPECIFIC OUTCOMES (PSOs)

Mechanical Engineering Program Students will be able to

- 1. Understand the concepts of basic Mechanical Engineering and apply their theoretical & practical knowledge to solve problems in Thermal Engineering, Machine Design, Production Engineering and Industrial Engineering.
- 2. Solve engineering design and manufacturing problems, using CAD, CAE, and CAM tools, along with analytical skills to arrive at the better solutions.

PROGRAMME OUTCOMES (POS)

Mechanical Engineering Program Students will be able to

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

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

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

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

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

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

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

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

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

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

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

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

Four Year B.Tech. Degree Course Scheme of Instruction and Examination (Effective from 2017 – 18)

III Semester

No	Subject	Cada	dits	Sc Ins perio	heme o structio ods / we	f n eek	Duration of	Scheme of Examination Maximum Marks			
S.]	Subject	Code	Cre	L	D/T	P	end exam (Hours)	End Exam	Internal Assessm ent	Total	
Ι	Theory										
1.	Numerical Methods & Complex variables	BS201	3	2	1	-	3	60	40	100	
2.	Fluid Mechanics & Machinery	ME201	3	2	1	-	3	60	40	100	
3.	Thermodynamics	ME202	3	2	1	-	3	60	40	100	
4.	Manufacturing Processes	ME203	3	3	-	-	3	60	40	100	
5.	Material Science & Metallurgy	ME204	3	3	-	I	3	60	40	100	
6.	Machine Drawing	ME205	3	-	3	-	3	60	40	100	
7.	MLC-I	ML201	-	2	-	-	-	-	-	-	
II	Practical										
8.	Electrical & Electronics Engineering Lab	EE216	1	-	-	2	3	50	50	100	
9.	Metallurgy and Welding Lab	ME206	1	-	-	2	3	50	50	100	
10. Soft Skills Lab		HU204	1	-	-	2	-	-	100	100	
	Total		21	14	6	6	-	460	440	900	

Mandatory Learning Course - I (MLC-I)

S.No	Name of the Course	Offered by Dept.
1.	Environmental Studies	H&BS

Scheme - 2017

NUMERICAL METHODS & COMPLEX VARIABLES (NMC)

III Ser	nester:	Mechanical	Engi	neeri	ng			Schem	e:2017			
Course	e Code	Category	Ηοι	ırs /	Week	Credits	Maximum Marks					
			L	т	Р	P C Internal End						
BS2	201	Foundation					Assessment	Exam	TOTAL			
			2	1	-	3	40	60	100			
Session	al Exar	n Duration : 2	Hrs				End Exa	am Duratio	n : 3 Hrs			
Course	e Outcomes : At the end of the course, students will be able to											
CO 1:	Analyze the complex functions with reference to their analyticity, integration using											
	Cauchy's Integral theorem and Cauchy's integral formula											
CO2:	Understand the Taylor's and Laurent's series expansion of complex functions and											
	evaluate real integrals using Cauchy's Residues theorem											
CO3:	Solve t	the differential	equa	tions	and ev	evaluate integrals using Beta and Gamma						
	functio	ons										
CO4 :	Apply	probability and	i stat	istics	in fie.	lds of phys	sical sciences and	engineering				
CO5 :	Compu	ute interpolatin	ng po	lynon	nial and	d Numerica	al differentiation fo	or the given	data			
CO6 :	Solve of	ordinary differe	ntial	equa	tions u	using num	erical techniques					
					UN	IT – I						
Comple	x Varia	bles & Integr	atio	1: An	alytic	function,	Cauchy-Riemann	equations,	sufficient			
conditio	n for a	nalyticity, Harr	nonic	func	ction. I	Method to	find the Conjugat	te function,	Milne –			
Thomso	mson method. Simple and Multiple Connected regions, Cauchy's Integral theorem (without											
proof), (Cauchy's	s integral form	ula (v	witho	ut proc	of), Genera	lized Integral form	ula (without	t proof)			
	UNIT – II											
Comple	x Serie	es & Contour	Inte	grati	i on: Ta	aylor's seri	ies, Maclaurin's s	eries and I	aurent's			
series. l	Residue	theorem (with	out p	roof),	Metho	od of findir	ng residues. Evalua	ation of real	integrals			
by conto	our integ	gration, Integra	tion	round	l the u	nit circle a	nd in the interval	$(-\infty,\infty)$.				

UNIT – III

Differential equations & Special functions: Cauchy's homogeneous linear equation, Legendre's linear equation. Gamma function, value of Γ (1/2). Beta function. Relation between Beta and Gamma functions

Probability & Statistics: Baye's theorem. Random variables, discrete and continuous random variables. Mean and variance of a random variable. Normal distribution, properties. Correlation coefficient, Lines of regression

$\mathbf{UNIT} - \mathbf{IV}$

Interpolation: Operators, relation between the operators. Newton's forward and backward interpolation formulae. Gauss forward and backward interpolation formulae. Lagrange's and Inverse Lagrange's interpolation formulae, Numerical differentiation

UNIT – V

Numerical Methods: Solution of first order Differential equations. Taylor's method, Picard's method, Euler's and Modified Euler's methods. Runge -Kutta methods of second and forth order. Milne's predictor - corrector method

Text Books:

1. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, New Delhi

2. T.K.V Iyengar and others, Engineering Mathematics Vol-3, S. Chand & Co. New Delhi

Reference Books:

- S.C. Gupta & V.K. Kapoor, Elements of Mathematical Statistics, S. Chand Publishers, New Delhi
- N.P. Bali and others, A Text book of Engineering Mathematics, Laxmi Publishers, New Delhi

Question Paper Pattern:

Sessional Exam: The question paper for sessional examination is for 30 marks, covering half of the syllabus for first sessional and remaining half for second sessional exam. Question No 1 which carries 6 marks contains three short answer questions of two marks each. The remaining three questions shall be EITHER/OR type questions carrying 8 marks each.

FLUID MECHANICS & MACHINERY (FMM)

III Se	mester:	Mechanical	Engin	eering	g			Schem	le : 2017	
Course	e Code	Category	Hou	Hours / Week			Maxin			
ME	201	Core	L T P		С	Continuous Internal Assessment	End Exam	TOTAL		
			2	1	-	3	40	60	100	
Session	nal Exam	Duration : 2	2 Hrs	•			End Ex	am Duratio	n : 3 Hrs	
Course	Outcom	es : At the er	nd of th	e cour	rse, st	udents wi	ll be able to			
CO1 :	Unders	tand the pro	perties	of flu	ids aı	nd manom	etry			
CO2:	Solve fl	uid flow probl	lems in	close	d pipe	es using Be	ernoulli equation			
CO3:	Evaluat	e friction fact	or and	losses	s of flu	uid flow				
CO4 :	O4: Analyze characteristics of Pelton wheel , Francis turbine and Kaplan Turb									
CO5 :	CO5: Analyze characteristics of centrifugal pumps									
	•				UNI	T – I				

Fluid Properties: Definition of a Fluid, Density, Sp. Weight, Sp. Gravity, Sp. Volume, Ideal Fluid, Real Fluid, Vapour Pressure, Compressibility, Surface Tension, Capillarity, Viscosity. Classification of fluids, velocity gradient, Newtonian and non-Newtonian fluids

Fluid Statics: Pressure head, Absolute Gauge and Atmospheric Pressure, Pressure measurement and manometers, Hydro-static Forces on Vertical, Inclined Planes and Curved Surfaces

UNIT – II

Fluid Kinematics: Types of Fluid Flow, Continuity Equation, Continuity Equation In Differential form for Three-Dimensional Flow, Velocity, Acceleration, Velocity Potential and Stream Function

Fluid Dynamics: Euler's Equation of Motion, Bernoulli's Equation From Euler's Equation, Practical Applications of Bernoulli's Equation, Venturi Meter, Orifice Meter

UNIT – III

Momentum equation: Impulse Momentum Equation and its Applications

Flow Through Pipes: Regimes of Flow, Reynolds Number, Hagen Poiseuille Equation, Darcy Weisbach Equation, Friction Factor, Minor Energy Losses, Energy Gradient and Hydraulic Gradient Line

$\mathbf{UNIT} - \mathbf{IV}$

Impact of Jets: Hydrodynamic Force of Jets on Stationary, Vertical and Inclined Flat Plates, Curved Vanes; Moving, Vertical and Inclined Flat Plates, Curved Vanes

Hydraulic Turbines: General Layout of Hydroelectric Power Plant, Definition of Heads and Efficiencies of a Turbine ; Classification of Hydraulic Turbines : Pelton Wheel , Francis Turbine and Kaplan Turbine

UNIT – V

Centrifugal pumps: Components, Work Done, Definitions of Heads and Efficiencies, Priming, Cavitation, Performance Characteristics

Text Books:

- 1. R.K. Bansal, Fluid Mechanics And Hydraulic Machines, Laxmi Publications (P) Ltd., New Delhi
- 2. P.N. Modi and S.M. Seth, Hydraulics and Fluid Mechanics, Standard Book House, New Delhi
- 3. Victor L. Streeter, E. Benjamin Wylie, Fluid Mechanics, McGraw Hill Publication, New York
- 4. Frank .M. White, Fluid Mechanics, McGraw Hill Publishing Company Ltd, New Delhi

Reference Books:

- **1.** J.A. Roberson and C.T. Crowe, Engineering Fluid Mechanics, Jaico Publication, New Delhi
- 2. S.W. Yuan, Foundation of Fluid Mechanics, PHI Publishers, New Delhi
- 3. S.C. Gupta, Fluid Mechanics and Hydraulic Machines, Pearson Publications, New Delhi
- **4.** Yunus A. Cenegal, and John M. Cimbala, Fluid Mechanics, Mc Graw Hill Education Pvt. Ltd,

Question Paper Pattern:

Sessional Exam: The question paper for sessional examination is for 30 marks, covering half of the syllabus for first sessional and remaining half for second sessional exam. Question No 1 which carries 6 marks contains three short answer questions of two marks each. The remaining three questions shall be EITHER/OR type questions carrying 8 marks each.

THERMODYNAMICS (TD)

Course Code Category Hours / Week Credits Maximum Marks										
Continuous	Course Code Category Hours / Week Credits Maximum Marks									
L T P C Internal End ME202 Core										
Assessment Exam	TOTAL									
	100									
Sessional Exam Duration : 2 Hrs End Exam Duration	1 : 3 Hrs									
Course Outcomes : At the end of the course students will be able to										
CO1: Solve problems related to work and heat transfer using thermodynamic princi	oles									
CO2: Understand Zeroth, first and second laws of thermodynamics										
CO3: Solve problems using first and second laws of thermodynamics and their applications										
on open and closed systems										
CO5: Evaluate changes in properties of pure substances. Cases and Cas minimums										
CU5: Evaluate changes in properties of pure substances, Gases and Gas mixtures										
UNIT – I Regio Concepto and Definitional Thermodynamic contents. Descention Otate Descenter and										
Cycles Thermodynamic Equilibrium Quasi-static process Zeroth law of Thermodynamic										
Work and Heat Transfer: Work Transfer, Path and point functions, Displacement	work in									
various processes, Shaft work, Flow work, Heat transfer, Specific and Laten	Heats,									
Comparison of Work and Heat transfer										
UNIT – II										
First Law of Thermodynamics: First Law for a closed system undergoing a Cy	cle and									
Process, Concept of total energy, E ; Demonstration that E is a property, Various f	orms of									
Stored Energy, Internal Energy and Enthalpy, Specific Heat at constant volume and c	onstant									
pressure, PMM1										
First Law For Flow Processes: Control volume, Steady Flow Process, Mass and	Energy									
Balance, Applications of steady flow processes, Problems										
UNIT - III Second Low of Thermodynamics, Heat Engine, Kelvin, Dienels and Clausius, sta	omonto									
Befrigereter and Heat Dump. Beverpible and irreverpible processes. Cornet evelo	Cornet's									
theorem Absolute Temperature Scale Efficiency of a Deversible Heat Engine DMM2										
11001011110001010110101010101010101010										
Entropy: Clausius inequality, Definition of entropy, Demonstration that entropy is a property										
Evaluation of Entropy for solids, liquids and ideal gases undergoing various processes	Entropy									
principle and its applications	- F J									
Availability: Available energy, Maximum work in a Reversible process, Availability in	Non-flow									
and Flow processes, Gibbs and Helmholtz Functions										

UNIT – V

Properties of Pure Substances: Phase change processes, P-V, P-T and T-S Diagrams for a pure substance, Mollier's chart, Quality steam, Steam Tables

Properties of Gases and Gas Mixtures: Avogadro's Law, Equation of State of a Gas, Ideal Gas, Specific Heats, Internal Energy, Enthalpy and Entropy of an Ideal Gas, Law of Reversible Adiabatic Expansion for an Ideal Gas, Van Der Waals Equation, Mixtures of Gases – Mass and mole fractions, Dalton's Law of Partial Pressures, Specific Heats, Internal Energy and Enthalpy of Ideal Gas Mixtures

Text Books:

1. Nag, P. K., Engineering Thermodynamics, TMH Publishers, New Delhi

2. Rajput, R. K., Thermal Engineering, Lakshmi Publications, New Delhi

Reference Books:

- Joel Rayner, Basic Engineering Thermodynamics, Addison Wesley Publication, Massachusetts
- **2.** Sonntag, R.E., Borgnakke, C. and Van Wylen, G.J., 6th Edition, Fundamentals of Thermodynamics, John Wiley and Sons, Singapore
- 3. Jones, J. B. and Duggan, R.E. Engineering Thermodynamics, Prentice-Hall of India
- **4.** Moran, M.J. and Shapiro, H. N., Fundamentals of Engineering Thermodynamics, John Wiley and Sons

Data Hand Book:

Sreenivasa Reddy, B. and Hemachandra Reddy, K., Thermal Data Handbook, IK International Publishers, Bangalore

Question Paper Pattern:

Sessional Exam: The question paper for sessional examination is for 30 marks, covering half of the syllabus for first sessional and remaining half for second sessional exam. Question No 1 which carries 6 marks contains three short answer questions of two marks each. The remaining three questions shall be EITHER/OR type questions carrying 8 marks each.

MANUFACTURING PROCESSES (MFP)

III Sem	ester:	Mechanical	Engi	neeri	ng			Schem	e:2017
Course	Code	Category	Hours / Week			Credits	Maxim	um Marks	
ME20	03	Core	L	Т	Р	С	Continuous Internal Assessment	End Exam	TOTAL
			3	-	-	3	40	60	100
Sessiona	l Exar	n Duration : 2	e Hrs				End Exa	am Duration	n : 3 Hrs
Course (Dutcon	nes : At the en	.d of t	he co	ourse, s	students w	vill be able to		
	Unde	rstand the pr	incip	le an	d term	s of casti	ng process, speci	al casting p	rocesses
CO1 :	inclu const	ding CO_2 motruction and optimized	ulding perat	g, die ion of	e castir meltin	ng, centrif Ig furnaces	ugal casting and s and design of gat	investment	casting,
CO2:	Unde princ	rstand the de iples, rolling p	forma roces	ation s, its	mecha classif	nism in r ication an	netals, hot workir d load estimation	ng and cold	working
CO3:	Unde extru	rstand the p sion and draw	orinci ring p	ples, roces	opera [.] ses	tions, typ	es and load est	imation in	forging,
CO4 :	Unde techr	Understand types of plastics (thermosetting and thermoplastic), processing techniques of plastics and their applications							
CO5:	Unde weldi electr	rstand the p ng, arc weldi on beam weld	rincip ng, 1 ing, s	oles a resista solder	and ap ance v ing, br	plications velding,ti azing and	of welding proce hermit welding, l braze welding	esses, inclue aser beam	ding gas welding,
					UN	IT – I		2	
Casting	Proce	ss: Casting,	casti	ng te	erms,	pattern n	naterials, types o	of patterns,	pattern
system	es, mo Design	of riser and ga	ting	sanus	s, mou	ung maci	lines, chaplets, ch	illis, fiser af	ia gating
Special	Castin	g Processes:	CO_2	moul	ding. d	lie casting	z. centrifugal cast	ing, shell m	noulding.
investme	nt cast	ing; casting d	efects	s, cau	ises an	d remedie	s. Furnaces used :	in foundry –	· Cupola,
Pit furna	ce, Ele	ctric arc furna	ces					5	1
					UNI	T – II			
Forming	Proce	esses: Stress	– St	rain i	in elas	tic and p	lastic deformatior	n, hot work	ing, cold
working	proces	s and relative a	advar	ntages	s and d	isadvanta	ges.		
Rolling:	Princi	ple of rolling,	type	es of	rolling	mill, Tw	o high, three hig	h and clus	ter mill,
Planetary	y mill a	nd Sendzmir r	nill, I	load e	estimat	ion in Rol	ling		
					UNI	T – III			
Forging:	Princi	ple of forging,	forg	ing o	peratio	ns, forgin	g types – smith fo	orging, drop	forging,
press for	ging, n	nachine forging	g. Loa	ıd est	imation	n in Forgir	ng.		
Extrusio	n and	drawing Pro	ocess	es: F	Principl	e of extr	usion, forward ar	nd back wa	rd, cold
extrusion forging, tube extrusion, hydro static extrusion and impact extrusion. Principle of									
drawing,	wire d	rawing and tu	be dr	awing	5				

UNIT – IV

Processing of Plastics: Classification of plastics, thermoplastics, thermosetting plastics and applications, injection, compression and blow moulding, extrusion, calendaring and thermoforming. Welding of plastic materials

UNIT – V

Welding: classification of welding processes, joints and their characteristics.

Gas welding: equipment, oxyacetylene welding, types of flames, techniques of welding and oxyacetylene cutting.

Arc Welding: Arc welding equipment, Metal arc welding – functions of electrode coating, TIG welding, MIG welding, Shielded metal arc welding and Submerged arc welding process(SAW)

Resistance welding: Principles of resistance welding, spot, projection, seam, butt, upset and flash welding process.

Soldering, brazing and braze welding. Thermit welding, Laser beam welding and Electron beam welding

Text Books:

1. P. N. Rao, Manufacturing Technology: Foundry, Forming and Welding, TMH Publishers, New Delhi

2. P. C. Sharma, A Text of production Technology, S Chand and Company, New Delhi

Reference Books:

- 1. R. K. Jain, Production Technology, Khanna Publication, New Delhi
- 2. Kalpak Jian, Schmid, Manufacturing processes for Engineering Materials. Pearson, New Delhi
- 3. Roy A. Lindberg, Processes and Materials of Manufacture, PHI Publishers, New Delhi

Question Paper Pattern:

Sessional Exam: The question paper for sessional examination is for 30 marks, covering half of the syllabus for first sessional and remaining half for second sessional exam. Question No 1 which carries 6 marks contains three short answer questions of two marks each. The remaining three questions shall be EITHER/OR type questions carrying 8 marks each.

MATERIAL SCIENCE AND METALLURGY (MSM)

III Seme	ester:	Mechanical	Engi	neeri	ng			Schem	e : 2017				
Course (Code	Category	Ηοι	ırs /	Week	Credits	Maxim	Maximum Marks					
ME20)4	Core	L	Т	Р	С	C Internal End Assessment Exam TOTA						
			3	-	-	3	3 40 60 100						
Sessiona	l Exan	n Duration : 2	Hrs				End Exa	m Duration	1 : 3 Hrs				
	· · · · · ·												
Course O	Outcon	nes : At the en	d of t	he co	ourse, s	students w	rill be able to						
	Unde	rstand concept	ts of	crysta	al struc	ctures, cha	racteristics of crys	tal structure	es, Miller				
CO1 :	Indice	es for Direction	ns, Pl	anes	and cr	ystal impe	erfections of Mater	ials, The Ela	astic and				
Plastic deformation processes of metals													
C02.	Understand the concept of pure metals, alloys and solid solutions. Select Alloys for												
002.	Engineering Applications using Phase Diagrams												
	Unde	rstand the Iro	on –I	ron (Carbide	e Phase D	iagram and Ider	ntify Heat tr	reatment				
CO3:	proce	esses to impr	ove	Mech	anical	propertie	s of materials fo	or applica	tions in				
	Engir	neering Indust	ries										
C04·	Ident	ify Ferrous a	and	Non-	Ferrou	s metals	and their applie	cations in	view of				
	Envir	onment and S	afety										
C05.	Unde	rstand the me	thod	s of r	netal P	owder Pro	duction, Powder M	Metallurgy P	rocesses				
000.	and t	heir Applicatio	ons										
					UN	IT – I							
Introduc	tion:	Introduction t	o Ma	iterial	l Scien	ice and m	etallurgy, classific	cation of Ma	aterials.				
Crystal S	Structu	ares Unit cell	, Spa	ace 1	attice,	different	crystal structures	s, Bravies	lattices,				
coordinat	tion nu	umber, effectiv	ve nu	ımber	of at	oms, aton	nic packing factor	, Miller ind	ices for				
Crystallog	Crystallographic directions and planes for cubic systems, Crystal Imperfections - Point												
imperfect	ions(p	oint defect), lir	ne im	perfe	ctions	and Disloc	cations, dislocation	n types and	surface				
imperfect	ions.												
Deforma	tion	Processes :	Clas	sific	ation	Types of	deformations F	Elastic and	nlastic				

Deformation Processes : Classification, Types of deformations, Elastic and plastic deformations, Mechanisms of plastic deformations-Slip and Twinning, Hot working and cold working, recovery, recrystallization and grain growth, Creep, Stages of creep, Factors influencing creep

UNIT – II

Pure metal, alloy and Solid solutions: Notion of pure metal and alloy, types of solid solutions, Substitutional and Interstitial solid solutions, Hume Rothery's rules.

Phase Diagrams: Introduction, Interpretation of Binary equilibrium Diagrams. Lever Rule, Phase rule. Binary Isomorphous, Binary Eutectic, Eutectoid, Peritectic, Peritectoid Binary systems. Simple problems on Equilibrium Diagrams

UNIT – III

Iron Carbon Equilibrium Diagram: Cooling curve of pure iron, construction and interpretation of Fe-Fe₃C diagram, Effect of alloying elements on Fe-Fe₃C diagram.

Heat Treatment of Steels: Purpose of heat treatment, different heat treatment processes, Annealing, Normalising, Hardening, and Tempering, TTT diagrams, Hardenability, factors affecting hardenability, determination of hardenability

$\mathbf{UNIT}-\mathbf{IV}$

Alloy Steels and Cast Irons: Purpose of alloying, classification of steels- Stainless steels, Heat resistance steels, High speed steels. Properties and uses of various types of Cast irons viz White cast iron, Grey cast iron, Malleable cast iron & S.G. cast iron and their applications.

Non Ferrous Metals and Alloys: Properties and uses of important non ferrous metals and alloys like Copper, Aluminum, Nickel, Lead and Tin

UNIT – V

Powder Metallurgy: Introduction, advantages of Powder Metallurgy, Preparation of metal powders- Mixing, Blending, Compacting, Sintering & Hot-pressing; applications of powder metallurgy, examples of typical components produced

Text Books:

1. William D Callister, Material science and Engineering adopted by R. Bala Subramaniam Wiley India Pvt Ltd New Delhi

2. V. Raghavan, Material Science and Engineering, PHI Publishers, New Delhi

3. Sidney H. Avner, Introduction to Physical Metallurgy. TMH Publications, New Delhi

Reference Books:

- 1. William F. Smith, Foundations of Material Science and Engineering, McGraw Hill, New York
- 2. Donald R. Askel Pradeep P. Fulay, Essentials of Material Science Engineering, CENGAGE Learning
- **3.** Dr. V.D. Kodgire, S.V. Kodgire, Material Science and Metallurgy, Everest Publications, New Delhi

Question Paper Pattern:

Sessional Exam: The question paper for sessional examination is for 30 marks, covering half of the syllabus for first sessional and remaining half for second sessional exam. Question No 1 which carries 6 marks contains three short answer questions of two marks each. The remaining three questions shall be EITHER/OR type questions carrying 8 marks each.

MACHINE DRAWING (MD)

III Seme	ester:	Mechanical	Engi	neerin	g			Schem	e:2017			
Course	Code	Category	Но	urs / V	Week	Credits	Maxim	um Marks				
							Continuous					
ME20)5	Core	L	D/T	Р	С	Internal	End				
milizi							Assessment	Exam	TOTAL			
			-	3	-	3	40	60	100			
Sessiona	1 Exar	n Duration : 2	2 Hrs	6			End Exa	m Duration	n : 3 Hrs			
Course C	Jutcon	nes : At the en	nd of	the cou	arse st	udents wi	Il be able to					
	Draw	v sectional vie	ews	of thre	ead pr	ofiles (V-s	sharp, whit-worth	i, Buttress,	square,			
CO1 :	bearings											
	beari	ngs										
CO2 :	CO2: Draw riveted joints & shaft couplings											
CO3 :	Draw	assembly of	Engi	ne pa	rts, Ma	achine too	ol parts & accesso	ories, Misce	llaneous			
	parts	s (screw jack, s	wive	bearin	ng, pip	e vice)						
UNIT – I												
Screwed Variable t	Faste:	nings :	atom	thenaa	da Dia	ht and laf	thend threads. So	and h	orro go e o 1			
various t	nread	Accomply of h	stari		us, Rig	nt and ler	t nand threads, So	luare and n	exagonal			
Looling of	rrong	Assembly of L	on, i	undoti	a wasi		ons, cap screws a		e screws.			
LOCKING &		and Pin Join	s, ru te •	unuan		.5						
Different	types	of keys in ass	semb	lv cott	er ioin	t with slee	eve cotter joint wi	th socket ar	nd spigot			
ends, cot	ter joir	nt with gib, knu	ıckle	ioint	or join		Joint wi		14 591800			
Bearings	:			5								
Solid and	l bushe	ed journal bear	ring,	Pedest	al bear	ing, and F	ootstep bearing					
					UNI	T – II						
Riveted	Joint	s: Different ty	pes	of rive	t head	ls, Single	riveted lap joint,	double rivet	ed chain			
and zig za	ag lap a	and butt joints	i									
Shaft Co	oupling	gs: Muff cou	pling	s, Flar	nged c	oupling, C	Compression coup	ling, Claw o	coupling,			
Universal	l coupl	ing and Oldhar	n cou	ıpling								
					UNI	Γ – III						
Assembly	y Drav	ving : Assembl	ly dra	awings	of the	following:						
Engine Parts : Stuffing box and eccentric												
Machine Tool Parts and Accessories: Square tool post, Lathe Tail Stock and Shaper tool												
post												
Miscella	neous	Parts: Screw	Jack	, Swive	el bear	ing and P	ipe vice					
Part Dra	wing:	Petrol engine	Conn	ecting	rod, D	orill jig and	d Revolving center					
Introduc	tion	to Geometric	: Mo	delling	g (Not	for End	Examination): 7	Types of mo	odelling,			
introduct	tion to	Modelling Pa	ckage	es CAT	IA, CF	EO						

Text Books:

1. K.L. Narayana, K. Venkata Reddy, Machine Drawing, NAI Publication, New Delhi

2. P.S. Gill, Machine Drawing, Kataria Publication, New Delhi

Reference Books:

1. N.Sidheswar, P. Kannaiah, Machine Drawing, TMH Publishers, New Delhi

2. K.R. Gopalakrishna, Machine Drawing, Subhash Publication, New Delhi

3. K.L. Narayana, K. Venkata Reddy, Production Drawing, NAI Publication, New Delhi

4. N.D. Junnarkar, Machine Drawing, Pearson Publication, New Delhi

Question Paper Pattern:

Sessional Exam: The question paper for Sessional examination is for 30 marks, covering half of the syllabus for first Sessional and remaining half for second Sessional exam. Question paper contains two units, first unit is either or type question (10 marks) and second unit is one compulsory question (20 Marks).

End Exam: The question paper shall consist of **THREE** units with **TWO** questions (each 15 Marks) in first two units and **ONE** question (30 Marks) in unit-3. The student shall answer **ONE** question in each unit

ENVIRONMENTAL STUDIES (ES)

III Seme	ester:	Common for	CE,	ME 8	L EEE			Schen	ne:2017	
Course	Code	Category	Hours / Week			Credits	Maxim	um Marks		
		Mandatory					Continuous			
ML.20	11	Learning	L	Т	Р	С	Internal	End		
WIL20	,1	Course					Assessment	Exam	TOTAL	
		Course	2	-	-	-	-	-	-	
									•	
Course C)utcon	nes : At the en	d of t	the co	ourse, s	students w	ill be able to			
CO1.	Apply the knowledge of environmental issues in his area of work. Appreciate the									
	need for the conservation of Natural resources for sustainable development									
CO2 :	Understand the importance of Ecosystem and conservation of biodiversity									
CO2.	Understand the problems due to environmental pollution with remedial measures									
003.	and i	ssues related t	o en	vironr	nent					
CO4 :	Pract	ice the disaste	r ma	nager	nent in	preventio	n of loss of life and	d property		
CO5 :	Pract	ice the use of I	IT & :	relate	d techr	nology to c	onserve environme	ent & huma	n health	
					UN	IT – I				
Introduc	tion	to Environn	ienta	ıl st	udies	and Nat	tural resources:	Definition	, scope,	
importan	ce and	multidisciplin	nary 1	nature	e of En	vironment	al studies. Need f	or public av	vareness.	
Energy r	resourc	es-Growing e	nergy	7 nee	ds, no	n-renewat	ole and renewabl	e energy re	esources:	
Hydroeleo	ctric,	solar, wind a	nd 1	nuclea	ar ene	rgy resou	rces. Water resor	urces-Use	and over	
exploitati	exploitation of surface and ground water. Dams and their effects on forest and tribal people.									
Forest re	Forest resources- uses of forest, deforestation causes and effects. Food resources- changes									
caused by	y agric	ulture and ove	er gra	zing.	Moder	n agricultu	are and its effects.	Role of ind	ividual in	
conservat	tion of	natural resour	rces.							

UNIT – II

Concepts of ecosystem: Structure and function of an ecosystem. Energy flow in an ecosystem (single channel energy flow model). Ecological succession. Food chains, food webs and ecological pyramids. Introduction, types, characteristic features and functions of grasslands, desert, pond and ocean ecosystems.

UNIT – III

Biodiversity and its conservation: Definition, levels of biodiversity. Values of biodiversityconsumptive, productive, social, ethical and ecological services. Hot spots of biodiversity. Biogeographical classification of India. Endangered and endemic species of India. Threats to biodiversity-Habitat loss, poaching of wild life and man-wild life conflict. Conservation strategies- In situ and ex situ conservation.

UNIT – IV

Environmental pollution: Definition, causes, effects and control measures of air, soil, water and noise pollution. Disaster management- Floods, Earth quake, cyclone and landslides. Global warming, acid rains, ozone layer depletion. Waste management-Municipal solid waste.

Role of an individual in prevention of pollution.

UNIT – V

Social issues and the environment: Consumerism and waste products. From unsustainable development to sustainable development. Salient features of Air Act, water Act and Forest conservation Act. Process involved in the enforcement of environmental legislation. Role of Information Technology in environment and human health.

Text Books:

- C.P. Kaushik and Anubha Kaushik, Environmental Studies, New Age International(p) Ltd., New Delhi
- 2. R. Rajagopalan, Environmental Studies, Oxford University press, Chennai
- 3. Y. Anjaneyulu, Introduction to Environmental sciences, BS Publications, Hyderabad

Reference Books:

- 1. Benny Joseph. Environmental Studies , Tata McGraw Hill, New Delhi
- 2. Barucha Erach, Environmental studies, Universities press

ELECTRICAL & ELECTRONICS ENGINEERING LAB (EEE (P))

III Semester: Mechanical Engineering Scheme : 2017											
Cours	e Code	Но	urs / We	ek	Credits	Maximun	n Marks				
EE	216	L	Т	Р	С	Continuous Internal Assessment	End Exam	TOTAL			
		0	0	2	1	50	50	100			
End Ex	am Dura	tion:3	Hrs		1		I				
Course	Outcom	es : At th	e end of t	he cours	se, studen	s will be able to					
CO1:	Underst	and the	working p	rinciples	s of genera	tor, motor, transforme	r and alter	nator			
CO2:	Analyze	the perfe	ormance c	of DC an	d AC elect	ric machines by condu	icting suita	ble tests			
CO3:	Verify th	ne charac	teristics o	of pn jur	nction diod	e, zener diode and BJ	Г				
CO4 :	Underst	and the	operation	and app	olications of	of CRO					
CO5 :	Verify th	ne operat	ion of logi	c gates							
				LIST OF	EXPERI	MENTS					
1. 5	Swinburn	e's test									
2. 1	Brake tes	t on D.C.	Shunt M	otor							
3. (OCC of D.	.C. Shun	t Generate	or							
4. (D.C and S	S.C tests	on single	– phase	transform	er					
5. I	Brake tes	t on 3 – p	hase squ	irrel – ca	age inducti	on motor					
6.]	Determina	ation of v	voltage reg	gulation	of $3 - pha$	ase alternator by sync	hronous in	npedance			
1	nethod		0		1			-			
7. 3	Study of C	CRO									
8. 1	Verificatio	on of Logi	c Gates a	nd half a	adder						
9 . \	V-I charad	cteristics	of PN Die	ode and	Zener dio	le					
10.	10 . Performance factors of Half Wave rectifier and full wave Rectifier										
11. Input and output characteristics of BJT in CE Configuration											
12 Frequency response of CE Amplifier											
14,	12. Frequency response of CE Amplifier										
Note: St	udent has	s to perfor	rm at least	10 expe	eriments fro	om the above list					

METALLURGY AND WELDING LAB (MTW(P))

III Sea	mester:	Mechai	nical Eng	ineering	g	Scheme : 201					
Cours	e Code	Ho	ours / We	ek	Credits	Maximun	n Marks				
						Continuous					
		L	Т	Р	С	Internal	End				
ME	206					Assessment	Exam	TOTAL			
		0	0	2	1	50	50	100			
End Ex	am Dura	tion:3	Hrs								
Course	Outcom	es : At th	e end of t	he cours	se student	s will be able to					
	Prepare	the spec	cimen and	l recogn	ize the mi	cro structures of meta	als and all	oys using			
CO1 :	metallu	rgical mi	croscope	U				5 0			
CO2:	Conduc	t the Jon	ninv –end	quench	test for de	termination of harden	ability of m	etal			
Measure GFN, permeability, clay content, moisture content, shear and compressive											
CO3: strength of the moulding sand											
CO4 :	CO4: Prepare welded joints using Metal Arc. MIG and TIG welding process										
	1			LIST OF	EXPERI	MENTS					
1.	Specimen	preparat	tion								
2.	Study of	Metallur	gical micr	oscope	and study	of some structures of	of ferrous	and non-			
1	ferrous sp	pecimens									
3.	Experime	nt to find	GFN on S	Sieve Sh	aker						
4.	Experime	nt to find	percenta	ge of cla	y and perc	entage of moisture in	the mouldi	ng sand			
5.	Permeabil	lity test o	n mouldii	ng sand	·						
6.	Shear tes	t & Com	pression te	est on sa	and mould						
7.	Determini	ing hardr	ness of ma	aterial af	ter various	s heat treatment proce	sses				
8.	Determini	ing harde	nahility 1	ising Joi	minv end (Duench Apparatus					
9	Experime	nt on Arc	welding	Arc cutt	ing and Fi	re cracker welding					
10		ling and	Testing of	The cut	acks by di	a papetront test					
10.		f thin an		by Sno	t molding	e penetrant test					
11.			$\frac{1}{1}$								
12.	Joining t	nin meta	l plates b	y Gas W							
13.	Making o	of pet bot	tle and ca	p using	Blow mou	lding and Injection mo	ulding				
Note: St	udent has	s to perfor	rm at least	: 10 expe	eriments fro	om the above list					

SOFT SKILLS LAB (SSP)

III/IV	Semeste	r: Con	nmon for	all Bra	nches	Scheme : 2017						
Cours	e Code	Ho	ours / We	ek	Credits	Maximum Marks						
HU	204	L	Т	Р	С	Continuous Internal Assessment	TOTAL					
		0	0	2	1	100	100					
Course	Outcom	es : At th	e end of t	he cours	se, studen	ts will be able to						
CO1 :	CO1: Communicate effectively and enhance their interpersonal relationship building skills with renewed self confidence											
CO2: Work together in teams and accomplish objectives in a cordial atmosphere												
CO3 :	Face inte	erviews, (GDs and g	ive prese	entations	-						
CO4 :	CO4: Understand and develop the etiquette necessary to present themselves in a professional setting											
CO5 :	Learn th	e Princip	les of Pers	onal effe	ctiveness							
				LIST OI	F EXPERI	MENTS						
1. I	ce breakin	ng Activiti	ies, Princi	ples of Ti	ime and St	ress Management						
2. <i>A</i>	Art of spea	aking -1	(Prepared)									
3. <i>A</i>	Art of spea	aking -2 (l	Extempore	e)								
4. <i>A</i>	Art of writi	ing - Essa	ay / Pictur	re / Stor	у							
5. I	Business e	etiquette -	- Telephor	e and er	nail							
6. I	Presentati	on Skills	- Power po	oint mak	ing							
7. (Group Dis	cussion –	Objective	s and Sl	cills tested	in a GD, types of GD, Dos and don	'ts					
8. (Group Dis	cussion -	Practice									
9. 1	ſeam worł	s - Drama	a / Skit / 1	Role play	7							
10.	Paper / P	oster Pre	sentation									
11.	Problem S	Solving by	/ lateral th	inking p	ouzzles							
12.	Know you	ır Genera	1 Awarene	ss / Kno	wledge - Q	uiz						
13.	Principles	s of Perso	nal excelle	ence								
Deferen	Real-a											
1.	Stephen	R. Covey	"The Sev	en Hahit	s of Highly	Effective People" Pocket Books P	ublishers					
London												
2.	Priyadars 3ooks	hani Pat	naik, "Gr	oup Dise	cussion an	d Interview Skills with VCD", Fo	oundation					
3.	Sangeeta PHI Learni	Sharma ing Privat	& Binod e Limited	Mishra,	"Communi	cation Skills for Engineers and Se	cientists",					
4.	Shiv Kher	ra, "You C	Can Win",	MacMilla	an India Pu	blishers, New Delhi						
5.	Campus http://car	Connect	t Portals nect.infosy	- TC s.com/	S - http:	os://campuscommune.tcs.com; I	nfosys -					

Four Year B.Tech. Degree Course Scheme of Instruction and Examination (Effective from 2017 – 18)

IV Semester

IV S	Semester								Scheme -	- 2017
No	Subject	Codo	dits	Scheme of Instruction periods / week			Duration of	Scheme of Examination Maximum Marks		
S.	Subject	Code	Cree	L	D/T	Р	end exam (Hours)	End Exam	Internal Assessm ent	Total
Ι	Theory									
1.	Mechanics of Solids	ME207	3	2	1	-	3	60	40	100
2.	Engineering Metrology	ME208	3	3	-	-	3	60	40	100
3.	Production Economics & Financial Management	ME209	3	3	-	-	3	60	40	100
4.	Applied Thermodynamics	ME210	3	2	1	-	3	60	40	100
5.	Manufacturing Technology	ME211	3	3	-	-	3	60	40	100
6.	Kinematics of Machines	ME212	3	2	1	-	3	60	40	100
II	Practical									
7.	Mechanics of Solids and Fluids Lab	CE216	1	-	-	2	3	50	50	100
8.	Machine Tools lab	ME213	1	-	-	2	3	50	50	100
9.	Computer Aided Drafting Lab	ME214	1	-	-	2	3	50	50	100
10.	Advanced Communication skills lab	HU203	1	-	-	2	-	-	100	100
	Total		22	15	3	8	-	510	490	1000

IV Semester:		Mechanical	Engi	neeri	ng	Scheme : 2017							
Course Code		Category	Ηοι	ırs /	Week	Credits	Maxim	um Marks					
ME207		Core	L	Т	Р	С	Continuous Internal Assessment	End Exam	TOTAL				
			2	1	-	3	40	60	100				
Sessiona	Sessional Exam Duration : 2 HrsEnd Exam Duration : 3 Hrs												
Course Outcomes : At the end of the course, students will be able to													
CO1 :	Construct shear force and bending moment diagrams for simply supported beam, cantilever beam and overhanging beam under point load, uniformly distributed and uniformly varying load												
CO2:	Calcu	late the bendi	ng st	ress a	and sh	ear stresse	es in a beam						
CO3:	Compute the shear stress and twist of a shaft under torsional loading and principal stresses under combined loading using analytical and graphical (Mohr's circle) method												
CO4:	Calculate deflection for simply supported beam, cantilever beam and overhanging beam under point load, Uniformly distributed and uniformly varying loads using Macaulay's method and double integration method												
	Deter	mine stresses	in tł	nin cy	linders	s, thick cyl	linders, compound	d cylinders,	buckling				
CO5 :	load i	for a column, o	core o	of rect	tangula	ar and circ	ular section, stres	s distributio	on due to				
	comb	oined bending a	and a	ixial l	oads								
		. 1.01			UN	IT – I							
Bending	Mome	ent and Shear	Forc	e: 13	vpes of	determina	ate beams, loads, l	bending mot	ment and				
shear for	ce and	d their relatio	n wit	h loa	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	ntilever an	id simply support	ted beams	with and				
without c	overhai	ngs for all type	s of l	oads,	shear	force and	bending moment of	diagram					
					UNI	T – II		~					
Bending	and S	hear Stresses	:The	eory o	of simp	ole bending	g, distribution of I	ilexural stre	sses and				
shear str	esses												
					UNI	T – III		<u> </u>					
Torsion:	The	ory of pure to	rsion	in so	olid and	d hollow c	arcular shafts, tra	insmission	of power,				
Analysis	of men	nbers subjecte	d to c	combi	ned to:	rsion and	bending	6					
Principa	l Stres	ses: Principal	plane	es and	d Princ	ipal stress	es, Mohr's circle o	of stress					
					UNI	T – IV							
Deflection: Relationship between curvature, slope and deflection. Slope and deflection of								ection of					
cantileve	r and	simply supp	orted	bear	ms by	successiv	ve integration me	ethod & M	acaulay's				
method													

MECHANICS OF SOLIDS (MS)

UNIT – V

Cylindrical Pressure Vessels : Thin cylinders subjected to internal fluid pressure, thick cylinders under internal and external pressures, compound thick cylinders, shrink fit

Columns: Slenderness ratio, Axially loaded columns, Euler's theory, Various end conditions, Rankine's theory.

Combined Direct and Bending Stresses: Core of section- circular and rectangular sections (solid and hollow), stress distribution due to combined bending and axial loads

Text Books:

- 1. B.C. Punmia, Ashok. K. Jain and Arun. K. Jain, "Mechanics of Materials", Lakshmi Publishers, New Delhi
- 2. S.S. Rattan, Strength of materials, Tata Mc Graw Hill Publishing Company Ltd., New Delhi
- S.S. Bhavikatti , Strength of materials, Third Edition, Vikas Publishing House Pvt. Ltd., New Delhi

4. R.Subramanian, Strength of Materials, Oxford University press, New Delhi

Reference Books:

1. Sadhu Singh, Strength of Materials, Khanna Publishers, New Delhi

- 2. Timoshenko and Young, Elements of Strength of Materials, CBS Publications, New Delhi
- **3.** P.N. Singh and P.K. Jha, Elementary Mechanics of Solids, Wiley Easten Publication, New Delhi

Question Paper Pattern

Sessional Exam: The question paper for sessional examination is for 30 marks, covering half of the syllabus for first sessional and remaining half for second sessional exam. Question No 1 which carries 6 marks contains three short answer questions of two marks each. The remaining three questions shall be EITHER/OR type questions carrying 8 marks each.

ENGINEERING METROLOGY (EMT)											
IV Semester:		Mechanical	Engineering				Scheme : 201				
Course Code		Category	Hours / Week		Credits	Maximum Marks					
							Continuous				
MEOC	18	Core	L	Т	Р	С	Internal	End			
MIDZC	0	Core					Assessment	Exam	TOTAL		
			3	-	-	3	40	60	100		
Sessiona	l Exan	n Duration : 2	Hrs				End Exa	m Duration	ı:3 Hrs		
I											
Course O	utcon	nes : At the en	d of t	the cou	arse st	tudents wi	ll be able to				
CO1.	Unde	rstand the Lin	e, En	ıd, Wa	ve Ler	ngth stand	ards, Principles of	Limits, Fits,	, Gauges		
001.	and d	lesign the limi [.]	t gau	ges							
CO2:	Ident	ify the method	s and	1 devic	es for	linear and	l angular measure	ment			
	Unde	rstand the Te	rmin	ology	of Scr	ew thread	ls, gears and mea	asurement o	f Minor,		
CO3 :	major	r, Effective di	amet	ers, t	ooth	thickness,	pitch, profile, a	nd test gea	ar using		
	Parki	nson gear test	er								
CO4 :	Unde	rstand the ter	rmino	ology (of Sur	face Roug	hness, working o	f Tomlinson	surface		
	meter	r, Taylor – Hob	son -	- Talys	surf ar	nd Interfere	ometry				
CO5:	Identify the alignment tests to be conducted on lathe and understand the working of										
	Coord	linate Measuri	ing M	lachin	es and	l Nano-me	trology				
Ston dond			. T :			IT – I	danda and Wanalan				
Standard	IS OI IM	d Courses To		e stan	daras, imita	end Fita	Dards and waveler	igth standar	as		
Selective	assem	hlies System	s of	limits	and f	its as exe	mulified in Britis	h Internatio	able allu		
Indian st	andard	ls for Plain wo	rk. L	imit ga	auging	-Plug. rin	g and snap gauges	. Tavlor's pri	inciple of		
limit gaug	ges. Pro	blems on limi	ts, fit	s and	design	n of GO an	d NOGO gauges	,			
	,		,		UNI	T – II	0.0				
Precisior	n Mea	surement: Co	nstru	action	and	typical us	es of Dial indica	tors, Compa	arators –		
Mikrocato	or com	parator, Sigm	ia co	mpara	itor, o	ptical con	nparator, Electrica	al comparato	or, Solex		
pneumati	c comp	parator and Too	ol Ma	kers n	nicroso	cope and it	s applications				
Angular	Measu	rement: Beve	l pro	tracto	r, Clin	ometer, a	ngle dekkor, Sine	bar, Spirit le	vel, Auto		
collimator	collimator, Applications of Slip gauges, rollers and balls in testing of tapers										
					UNI	T – III					
Screw T	hread	Measurement	: Ter	minol	ogy of	screw the	reads, effect of pit	ch errors a	nd angle		
errors, c	oncept	of virtual e	ffecti	ve dia	ameter	r, Measuro	ement of major,	minor and	effective		
diameter	diameter										
Measure	Measurement of Gears: Terminology of gear tooth, tooth to tooth pitch measurement, profile										
checking, tooth thickness measurement and Parkinson gear tester											

UNIT – IV

Measurement of Surface Finish: Significance of surface finish, order of geometrical errors occurring during machining, magnitude, sample length, methods of measuring surface finish-stylus probe instruments, Tomlinson surface meter and Taylor – Hobson Talysurf

Interferometry: Interference of light, optical flat and its uses, Michelson interferometer, NPL flatness interferometer, NPL gauge interferometer

UNIT – V

Alignment Tests on Lathe: Levelling of the machine, True running of locating cylinder of main spindle, True running of headstock center, Parallelism of the main spindle to saddle movement, True running of taper socket in main spindle, Parallelism of tail stock guide ways with the movement of carriage, Parallelism of tailstock sleeve taper socket to saddle movement, Alignment of both the centers in vertical plane, Axial slip of lead screw

Coordinate Measuring Machines: CMM construction, Possible sources of error in CMM, Accuracy specifications of coordinate measuring machines, Advantages of CMM

Text Books:

1. R.K. Jain, Engineering Metrology, Khanna Publishers, New Delhi

Reference Books:

1. ASME, Hand Book of Industrial Metrology, PHI Publication, New Delhi

2. P.C. Sharma, A textbook of Production Engineering, S. Chand Publishers, New Delhi

Question Paper Pattern

Sessional Exam: The question paper for sessional examination is for 30 marks, covering half of the syllabus for first sessional and remaining half for second sessional exam. Question No 1 which carries 6 marks contains three short answer questions of two marks each. The remaining three questions shall be EITHER/OR type questions carrying 8 marks each.

PRODUCTION ECONOMICS AND FINANCIAL MANAGEMENT (PEFM)

IV Semester:	Mechanical	Engi	neerin	ıg			Schen	ne: 2017	
Course Code	Category	Hours / Week			Credits	Maximum Marks			
ME209	Core	L T P		С	Continuous Internal Assessment	End Exam	TOTAL		
		3	-	-	3	40	60	100	
Sessional Exam	n Duration : 2			End Exa	am Duratio	n : 3 Hrs			

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

CO1 :	Understand the Economic Theories and their application for Managerial Decisions										
CO2:	Understand elements of costs and depreciation used in industry practices to manufacture the product										
CO3 :	Understand the tools of financial analysis and management										
CO4 :	Apply financial management skills for making financial decisions in practical business Situations										
CO5 :	Understand the capital budgeting and evaluation techniques										

UNIT – I

Introduction to Economics : Definition, Demand analysis, Types of demand, Factors determining demand, law of demand- Assumptions & exceptions, law of diminishing marginal utility, Elasticity of demand, Factors governing elasticity of demand

UNIT – II

Elements of Cost: Elements of cost - Material cost, Labour cost, Overheads (Factory overheads, Administrative overheads, Selling and distribution overheads), Methods of allocation of overheads

Depreciation: Definition, Causes of depreciation, Methods of calculating depreciation -Straight line method of depreciation, Diminishing balance method of depreciation, Sinking fund method of depreciation, Annuity charging method

UNIT – III

Accountancy: Introduction, Double entry Book keeping, preparation of Journal, Ledger, Trail balance

Accountancy, Final Accounts: Preparation of Trading, Profit & loss account, Balance sheet with simple adjustments pertaining to closing stock, depreciation, income & expenses

UNIT – IV

Financial Management : Objectives, functions, time value of money, Present value of - single cash flow, multiple cash flows and Annuity, Future value of - single cash flow, multiple cash flows and Annuity

Financial Statement Analysis: Ratio analysis, Liquidity ratios (current ratio, & quick ratio), Activity ratios (Inventory turnover ratio, Debtors turnover ratio), Capital structure ratios (Dept-Equity ratio, Interest coverage ratio) & Profitability ratios (Gross profit ratio, Net profit ratio, Operating ratio, P/E ratio & EPS)

UNIT – V

Capital budgeting : Capital budgeting & its significance, capital budgeting evaluation techniques- Payback period method, Accounting rate of return (ARR) method, Net present value (NPV) method, Profitability index method, Internal Rate of Return (IRR) method- (Simple problems)

Text Books:

1. K.K. Dewatt, Modern Economic Theory, Shyamlal Charitable Trust, New Delhi

2. Prasanna Chandra, Fundamentals of Financial Management, TMH Publishers, New Delhi

3. S.P. Jain and K.L. Narang, Financial Accounting, Kalyani Publications, Ludhiana

4. Banga and Sharma, Mechanical Estimation and Costing, Khanna Publishers, New Delhi

Reference Books:

1. M.Y Khan and P.K Jain, Financial Management, TMH Publishers, New Delhi

Question Paper Pattern

Sessional Exam: The question paper for sessional examination is for 30 marks, covering half of the syllabus for first sessional and remaining half for second sessional exam. Question No 1 which carries 6 marks contains three short answer questions of two marks each. The remaining three questions shall be EITHER/OR type questions carrying 8 marks each.

IV Semester:		Mechanical	Engiı	neerin	g	Scheme : 2017						
Course (Code	Category	Ηοι	urs / V	Veek	Credits	Maximum Marks					
ME210		Core	L	Т	Р	С	Continuous Internal Assessment	End Exam	TOTAL			
			2	1	-	3	40	60	100			
Sessional Exam Duration : 2 Hrs End Exam Duration : 3 Hr												
Course Outcomes : At the end of the course, students will be able to												
CO1 :	Unde	nderstand the theory of power cycles and their applications										
CO2:	Analy	ze energy conv	versio	on in I	C Eng	gines and	Reciprocating com	pressors				
CO3 :	Unde	rstand flow th	rougł	n stear	n nozz	zles						
CO4 :	Solve	the problems	on in	npulse	and r	eaction tu	rbines using veloc	triangles	i			
CO5 :	Unde	rstand Vapour	com	pressi	on ref	rigeration	cycle and psychon	netric prope	rties			
	I				UN	[T – I						
Air Stand	dard C	ycles: Stirling	cycle	e, Eric	sson o	cycle, Bray	zton cycle. Analysi	s of Otto, Di	iesel and			
Dual cycl	es, Co	mparison of O	tto, D	iesel a	and D	ual cycles						
Vapour I	Power	Cycles: Rank	ine o	cycle,	Comp	arison of	Rankine and Car	not cycles,	Modified			
Rankine	cycle, I	Methods of inc	reasi	ing the	e effici	ency of R	ankine cycle: Rehe	eat and Reg	enerative			
Rankine o	cycles											
					UNI	T – II						
Basics of	f I.C. E	Engines: Engin	ie coi	npone	ents, V	Vorking pr	inciple of engines-	two stroke	and four			
stroke en	gines,	SI and CI Eng	ines.	First l	aw an	alysis of e	ngine cycle	c .	1			
Reciproc	ating	Compressors	: Me	chani	cal de	tails and	working principl	e of a sing	gle stage			
reciproca	ting co	ompressor, equ	latior	1 for w	vork; e	efficiencies	s, two-stage compr	ression, and	effect of			
inter cool	ing, co	matuon for mil	himu	m wor	K	T III						
Steem N	1o-	. Icontronio fl		h	h Nor		site and Dischars	a of stoom	through			
Steam N	ozzies	s Isentropic II	ow t	nroug.	n Noz	zies, veio	city and Discharg	e oi steam	through			
INOZZIE, C		on for maxim	um c	uscna:	rge th	rougn No	zzle, Critical pres	sure ratio,	Effect of			
	I NOZZI	e, Enclency of	. NOZ2		TINI	T – IV						
Basics of	f Stear	m Turhines. I	mnul	se tvr	Pri	$\frac{1}{1}$	operation of imput	lse turbine	De-laval			
Turbine -	– its f	eatures, comp	ound	ling o	f imp	ulse turbi	ne. Velocity diagr	am for sing	ele stage			
impulse t	urbine	es, Effect of frid	ction.	powe	r deve	loped, axia	al thrust, diagram	efficiency, o	condition			
for maxir	num e	efficiency. Rea	ction	Type	- Prin	ciple of o	peration, Velocity	diagram, D	Degree of			
reaction,	Parsor	n's reaction tur	bine	– its f	eature	s, Compa	rison of reaction a	nd impulse	turbines			
					UNI	T – V						
Refrigera	Refrigeration Cycles: Reversed Carnot cycle, Vapour compression refrigeration cycle,											
Performa	nce of	a vapour com	press	ion pl	ant, P	-H and T-	S diagrams, simpl	e vapour at	osorption			

APPLIED THERMODYNAMICS (ATD)

refrigeration cycle

Psychrometry: Properties of atmospheric air, Psychometric chart, Psychometric processes, Simple air flow diagram for an Air-Conditioning system (Theoretical concepts only)

Text Books:

1. Rajput, R. K., Thermal Engineering, Lakshmi Publications, New Delhi.

2. Nag, P. K., Engineering Thermodynamics, TMH Publishers, New Delhi

3. Ganeshan, V., Internal Combustion Engines, TMH Publishers, New Delhi

4. Arora, S. C., and Domkundwar, S, Refrigeration and Air-conditioning, Dhanpat Rai and Sons Publications, New Delhi

5. Rajput, R.K., Applied Thermodynamics, Lakshmi Publications, New Delhi.

Reference Books:

1. Ballaney, P. L. Thermal Engineering, Khanna Publishers, New Delhi

2. Mahesh. M. Rathore, Thermal Engineering, McGraw Hill Pubishers, New Delhi

3. Arora, C. P, Refrigeration and Air Conditioning, TMH Publishers, New Delhi

4. Vasandhani, V. P. and Kumar, D. S. Heat Engineering, Metropolitan Books, New Delhi

5. Gupta, S. C, Thermal Engineering, Pearson Education, New Delhi

Data Hand Book:

Sreenivasa Reddy, B. and Hemachandra Reddy, K, Thermal Data Handbook, IK International Publishers, Bangalore

Question Paper Pattern

Sessional Exam: The question paper for sessional examination is for 30 marks, covering half of the syllabus for first sessional and remaining half for second sessional exam. Question No 1 which carries 6 marks contains three short answer questions of two marks each. The remaining three questions shall be EITHER/OR type questions carrying 8 marks each.

-													
IV Semester:		Mechanical	Engi	neerir	ng		Scheme : 2017						
Course Code		Category	Hours / Week			Credits	Maxim	5					
ME211		Core	L	т	Р	С	Continuous Internal Assessment	End Exam	TOTAL				
			3	-	-	3	40	60	100				
Sessiona	l Exan	n Duration : 2	2 Hrs			End Exam Duration : 3 Hrs							
Course C	Outcon	nes : At the er	nd of	the co	urse st	udents will	be able to						
CO1.	Understand the concept of metal cutting and the forces in chip formation, construction												
	and operations performed on Lathe machines												
CO2:	Unde	rstand the con	struc	tion ar	nd oper	ations perfo	rmed on Drilling a	nd Boring r	nachines				
CO2.	Understand the construction and operations performed on machine tools including												
003.	Shaper, Planner and Slotter machine												
CO4·	Understand the construction and operations performed on Milling machine and solve the												
	probl	ems on indexir	ng										
	Unde	rstand the cor	nstruc	ction a	ind op	erations per	formed on Grindi	ng, Honing	, Lapping				
	and t	he working of	mode	rn mao	chining	g process inc	cluding Electrical I	Discharge M	Machining				
CO5 :	(EDM	i), Electro Cher	nical	Machi	ning (E	CM), Laser H	Beam Machining (I	LBM), Elect	ron Beam				
	Mach	ining (EBM),	Plasr	na Are	c Mac	hining (PAM	I), Ultrasonic Ma	chining (U	JSM) and				
Abrasive Jet Machining (AJM)													

MANUFACTURING TECHNOLOGY (MFT)

Introduction to Machining : Classification of metal cutting operations, Nomenclature of Single point cutting tool, mechanics of metal cutting, mechanism of chip formation, types of chips, oblique and orthogonal cutting - Merchant's Theory of metal cutting, Merchant's circle diagram for forces. Simple problems on Force calculations.

Lathe : Introduction, types of lathes, size of lathe, parts of a lathe, Lathe accessories and Lathe attachments, lathe operations

UNIT – II

Drilling : Introduction, Types of Drilling machines, upright drilling machine parts, radial drilling machine parts, drilling machine operations.

Boring: Introduction, Types of Boring machines, Principal parts of Horizontal boring machine, vertical boring machine and Jig boring machine

UNIT – III

Shaper, Planner, Slotter : Introduction, Types of shapers, principal parts of a shaper, shaper size, shaper mechanisms, Crank and slotted link mechanism, Whitworth quick return mechanism, Hydraulic shaper mechanism, Shaper Operations. Introduction to planner, types of planning machines, parts of a planning machine, table drive mechanism, open and cross belt drive. Planer operations. Introduction to Slotter, Slotter size, parts of a Slotting machine. Slotter operations

UNIT – IV

Milling Machines : Introduction, Types of Milling machines, principal parts of a milling machine, milling machine operations (Plain milling, face milling, side milling, straddle milling, angular milling, gang milling, form milling, profile milling, end milling, milling keyways, grooves and slots and gear cutting). Dividing heads – Plain or Simple dividing head, Universal dividing head. Indexing methods, Direct or Rapid indexing, Plain or simple indexing, Compound indexing, Differential indexing

UNIT – V

Grinding and surface finishing Machines: Introduction, Kinds of Grinding, Types of Grinding machines, Grinding wheel specifications, Glazing and loading in wheels, Dressing and trueing of grinding wheels. Honing, Honing machines, Lapping ,Lapping machines and super finishing

Unconventional Manufacturing Methods : Electrical Discharge Machining (EDM), Electro Chemical Machining (ECM), Laser Beam Machining (LBM), Electron Beam Machining (EBM), Plasma Arc Machining (PAM), Ultrasonic Machining (USM), and Abrasive Jet Machining (AJM)

Text Books:

1. S.K. Hajra Choudhury & A.K. Hajra Choudhury, Nirjhar Roy, Work shop technology Volume II, Media Promoters & Publishers, New Delhi

2. P. C. Sharma, Production Technology, S. Chand Publishers, New Delhi

3. B.S.Raghuvanshi, Workshop technology, Volume - 2, Dhanpat Rai & Co

Reference Books:

1. R.K.Jain, Production Technology, Khanna Publishers, New Delhi

- 2. Amitabha Ghose and Asok Kumar Malik, Manufacturing Science, EWP Publishers, New Delhi.
- **3.** P.N. Rao, Manufacturing Technology, Metal cutting and Machine tools, TMH Publishers, New Delhi

Question Paper Pattern

Sessional Exam: The question paper for sessional examination is for 30 marks, covering half of the syllabus for first sessional and remaining half for second sessional exam. Question No 1 which carries 6 marks contains three short answer questions of two marks each. The remaining three questions shall be EITHER/OR type questions carrying 8 marks each.

Scheme : 2017 **IV Semester**: **Mechanical Engineering Course Code** Hours / Week **Maximum Marks** Category Credits Continuous Т L Ρ С Internal End **ME212** Core TOTAL Assessment Exam 40 2 1 3 60 100 -**Sessional Exam Duration : 2 Hrs End Exam Duration : 3 Hrs Course Outcomes :** At the end of the course, students will be able to Understand four bar mechanism, single slider crank mechanism, double slider crank **CO1**: mechanism and their inversions, principles of steering gear mechanisms and Hooke's joint Determine Velocity and acceleration of points in - four bar mechanism, single slider **CO2**: crank mechanism and quick return motion mechanism, by drawing velocity and acceleration diagrams **CO3**: Solve problems on gears and gear trains Understand working of brakes, clutches and absorption and transmission **CO4**: dynamometers Understand the working principle of watt, porter, proell and hartnell governors and to **CO5**: solve their related problems UNIT – I

Definitions And Basic Concepts : Introduction, planar mechanisms, link or element, types of links, kinematic pair, types of kinematic pairs, kinematic chain, mechanism, machine, degrees of freedom or mobility, inversion of mechanism

Mechanisms With Lower Pairs: Quadric cycle chain and its inversions, single and double slider crank chain and its inversions, applications, quick return motion mechanisms, Hooke's joint, double hook's joint. Davis and Ackermann steering gear mechanisms

UNIT – II

Velocity Analysis : Absolute and Relative Motions, motion of a link, velocity of rubbing, velocity diagrams for four bar mechanism, single slider mechanism and quick return motion mechanisms, Instantaneous Center, Kennedy's theorem, Instantaneous center four bar and single slider mechanisms

Acceleration Analysis: Acceleration diagrams for four bar and single slider mechanism, Coriolis component of acceleration, acceleration diagrams for crank and slotted lever mechanism

UNIT – III

Gears: Classification of Gears, gear terminology, law of gearing, velocity of sliding, path of contact, arc of contact, number of pairs of teeth in contact, forms of teeth. Interference in involute gears, minimum number of teeth, interference between rack and pinion

Gear Trains: Simple gear train, compound gear train, reverted gear train, planetary or epicyclic gear train, velocity ratio of epicyclic gear train (tabular method), torques in epicyclic

KINEMATICS OF MACHINES (KOM)

trains. Simple problems on gear trains

UNIT – IV

Clutches: Cone clutch, single and multiple plate clutches

Brakes and Dynamometers: Simple block brake, band brake, Internal expanding shoe brake, Dynamometers- absorption and transmission types, general description and method of operation

UNIT – V

Governors: Types of Governors, Watt governor, Porter governor, Proell governor, Hartnell governor, sensitiveness of a governor, hunting, isochronism, stability, effort of a governor, power of a governor, controlling force

Text Books:

1. S. S. Rattan, Theory of Machines, TMH Publishers, New Delhi

2. Sadhu Singh, Theory of Machines, Pearson Education, New Delhi

 C.S. Sharma and K. Purohit, "Theory of Mechanisms and Machines", PHI publishers, New Delhi

Reference Books:

1. Ballaney, Theory of Machines, Khanna Publishers, New Delhi

- 2. Thomas Bevan, Theory of Machines, CBS Publishers, New Delhi
- **3.** J.S. Rao and R.V. Dukkipati , Mechanisms and Machine Theory, NAI Publishers, New Delhi

4. J.E. Shigley, Theory of Machines and Mechanisms, McGraw Hill Publishers, New York

Question Paper Pattern

Sessional Exam: The question paper for sessional examination is for 30 marks, covering half of the syllabus for first sessional and remaining half for second sessional exam. Question No 1 which carries 6 marks contains three short answer questions of two marks each. The remaining three questions shall be EITHER/OR type questions carrying 8 marks each.

MECHANICS OF SOLIDS AND FLUIDS LAB (MSF(P))

IV Semester:		Mechan	nical Eng	ineering	5	Scheme : 2017							
Cour	se Code	Ho	Maximu	Maximum Marks									
C	E216	L	Т	Р	С	Continuous Internal Assessment	End Exam	TOTAL					
0 0 2 1 50 50													
End Exam Duration : 3 Hrs													
Cours	e Outcom	es : At th	e end of t	he cours	se, student	s will be able to							
CO1: Understand working of centrifugal pumps, submersible pump and reciprocating pump													
CO2 :	02: Understand various flow meters and the concept of fluid mechanics												
CO3 :	3: Understand procedures for conducting tensile, torsion tests on mild steel specimens												
	Determine the Young's modulus using deflection test on beams and tensile test on												
CO4:	rods, tens	sion and	compress	ion test	on springs	, and impact tests on	i steel						
	1			LIST OI	F EXPERIM	IENTS							
1.	a. Determ	ination c	of coefficie	nts of di	ischarge, v	elocity and contractio	n for a sma	ll orifice					
	by Con	stant hea	ad method	1									
	b. Determ	ination c	of coefficie	nt of dis	scharge for	an external mouthpie	ece by Cons	tant					
	head m	nethod											
2. De	terminatio	n of fricti	on factor	for a giv	en pipe lin	e							
3	a. Calibra	tion of V	enturimet	er									
0.	b. Calibra	tion of O	rificemete	er									
4. Per	rformance	test on si	ingle stag	e centrif	ugal pump								
5. Per	rformance	test on si	ubmersibl	le pump									
6. Per	rformance	test on R	eciprocat	ing pum	р								
7. To	study the	stress-st	rain chara	acteristic	cs of Mild s	teel rod using Univers	sal Testing	Machine					
8. To	find the	modulus	s of elast	icity of	given mate	erial by measuring	deflection i	n simply					
su	pported be	eam											
9. To	find the m	odulus o	f rigidity o	of given :	material us	sing Torsion Testing M	Iachine						
10. To	o find the n	nodulus d	of rigidity	of given	material u	sing Spring Testing M	lachine						
11. To	o find modu	ulus of el	asticity by	v conduc	cting flexur	al test on carriage spi	ring						
10	a. To find	Rock we	ll hardnes	ss numb	er of given	material							
12.	b. To find	impact s	strength (l	zod & C	harpy) usi	ng impact testing mac	hine						
Note: S	Student has	s to perfor	rm at least	t 10 expe	eriments fro	om the above list							
MACHINE TOOLS LAB (MT(P))

IV Set	nester:	Mechan	ical Engi	neering			Schen	1e:2017				
IV Semester Mechanical Engineering Scheme 12 Course Code Hours / Week Credits Maximum Marks												
ME	213	L	Т	Р	С	Continuous Internal Assessment	End Exam	TOTAL				
		0	0	2	1	50	50	100				
End Ex	am Durati	ion:3H	rs	I	•			-				
Course	Outcome	es : At th	e end of t	he cours	e student	s will be able to						
CO1:	Perform	taper 1	urning,	step tu	rning, ec	centric turning and	thread cu	tting on				
CO 1.	cylindric	cal work	piece usin	ig lathe i	machine							
C02.	Perform	drilling,	shaping,	milling a	and slottir	ng operations on work j	piece using	relevant				
002.	machine tools											
CO3 :	CO3: Prepare single point cutting tools using Tool and cutter grinder											
CO4 :	Prepare	pattern f	or casting	r S								
	1		1	LIST OF	EXPERI	MENTS						
1. 3	Step turni	ing on La	the									
2. ′	Faper turi	ning by c	ompound	swivel n	nethod							
3.]	Eccentric	turning o	on Lathe									
4.]	Right han	d thread	cutting a	nd Left h	and threa	d cutting on Lathe						
5.]	Making of	`a Single	point cut	ting tool	by forme	l grinding wheel on too	l cutter gri	nder				
6.]	Drilling, re	eaming, t	apping ar	nd count	er sinking	ţ						
7.	Pattern m	aking										
8. 1	V – groove	cutting	on shaper	•								
9.]	Key way c	utting on	slotting	nachine	and Spur	gear cutting on milling	g machine					
10.	Wood tur	ning										
11.	11. Alignment Tests on Lathe Machine											
12.	12. Alignment Tests on Radial Drilling Machine											
	0											
Note: St	udent has	to perfor	m at least	10 expe	riments fro	om the above list						

COMPUTER AIDED DRAFTING LAB (CAD(P))

IV Semester: Mechanical Engineering Scheme : 201 ⁴										
Cours	e Code	Но	Maximum	Marks						
ME	214	L	Т	Р	с	Continuous Internal Assessment	End Exam	TOTAL		
		0	0	2	1	50	50	100		
End Ex	am Durati	ion:3H	rs					÷		
Course	Outcome	es : At th	e end of t	he cours	se, studen	ts will be able to				
CO1 :	Underst	and vario	ous AutoC	AD feat	ures					
CO2 :	Draw 2I) models	using Au	toCAD						
CO3 :	CO3: Draw 3D components using AutoCAD									
]	LIST OF	EXPERI	MENTS				
1.]	Introducti	on to CA	D softwar	e						
2.	Exercise o	on usage	of Auto (CAD 2D	drawing	commands				
3.	Exercise o	on usage	of Auto (CAD 2D	editing co	ommands				
4.]	Exercise o	on usage	of Auto (CAD 2D	dimensio	n commands				
5.	Exercises	on Auto	CAD 2D	drawing	s -I					
6.]	Exercises	on Auto	CAD 2D	drawing	s - II					
7.]	Introducti	on to 3D	Modeling	using A	utoCAD S	oftware				
8. 1	Modeling	of Compo	onent in 3	D – V bl	ock					
9.]	Modeling	of Compo	onent in 3	D – Ope:	n Bearing					
10.	10. Modeling of Component in 3D – Angular block									
11.	Modeling	of Comp	onent in 3	BD – Dov	vetail Guid	le				
12.	Modeling	g of Comp	onent in	3D – Do	vetail Bra	cket				
13.	Modeling	g of Comp	onent in	3D – Do	vetail stop)				
Note: St	udent has	to perfor	m at least	10 expe	riments fro	om the above list				

ADVANCED COMMUNICATION SKILLS LAB (ACSP)

III / IV	Semester:	Mechar	nical Engi	neering		Schei	me : 2017				
Cour	se Code	Но	ours / Wee	ek	Credits	dits Maximum Marks					
н	U 20 3	L	Т	Р	С	Continuous Internal Assessment	TOTAL				
		0	0	2	1	100	100				
Course	Outcomes :	At the er	nd of the co	ourse stu	idents will	be able to					
CO1 :	Speak in E	nglish co	nfidently,	fluently a	and effectiv	vely					
CO2 :	Exhibit tea	m playin	g and lead	ership sk	cills						
CO3 :	Give Preser	ntations e	effectively								
CO4 :	Compreher	nd the Ve	rbal and N	lon-verba	al texts						
CO5:	CO5: Prepare Resume, Company profiles and Project presentations										
CO6 :	Enhance p	ossibilitie	es of Job p	rospects							
			I	IST OF	EXPERIM	ENTS					
Focus ir	the lab is n	nore on fl	uency that	n on accı	ıracy						
1. Ice b	oreaking Acti	ivities									
2. JAM											
3. Liste	ening Compr	ehension	– Practice	tests							
4. Oral	Presentation	n									
5. Pres	entation Stra	ategies									
6. Grou	ıp Discussio	n – Team	Playing, I	æadershi	p Skills						
7. Deba	ate										
8. PPT'	s – Principle	s and For	rmats								
9. Infor	mation Tran	nsfer – Ve	rbal to No	n-verbal	and Vice-V	lersa					
10. Res	ume Prepara	ation									
11. Con	npany Profili	ng									
12. Inter	view Skills -	a) Telepi b) Perso	honic Inter nal Intervi	rview iew							
13. Proj	ect Presenta	tion									
Referen	ce Books:										
1. Com	munication	Skills, Sa	anjay Kum	ar and P	ushpaLata	, Oxford University Press.					
2. Engl	ish Languag	ge Labora	tories, A C	omprehe	nsive Man	ual, Nira Konar, PHI.					
3. Tech	3. Technical Communication, 3 E, Raman and Sharma, Oxford University Press.										
4. Pers	onality Deve	lopment	and Soft S	kills, Bar	un k. Mitı	ra, Oxford University Press.					

Four Year B.Tech. Degree Course Scheme of Instruction and Examination (Effective from 2017 – 18)

V Semester

v s	emester								Scheme -	- 2017
No	Quiliant.	Cada	dits	S Iı per	Scheme nstructi riods / v	of on veek	Duration of	Scheme Max	e of Examin timum Marl	ation s
S.]	Subject	Code	Cre	L	D/T	Р	(Hours)	End Exam	Internal Assessm ent	Total
Ι	Theory									
1.	Industrial Engineering & Management	ME301	3	3	-	-	3	60	40	100
2.	Instrumentation and Control Systems	ME302	3	3	-	-	3	60	40	100
3.	Dynamics of Machines	ME303	3	2	1	-	3	60	40	100
4.	Design of Machine Members – I	ME304	3	2	1	-	3	60	40	100
5.	Professional Elective – I		3	3	-	-	3	60	40	100
6.	Open Elective - I		3	3	-	-	3	60	40	100
II	Practical						·			
7.	Geometric Modelling Lab	ME305	1	-	-	2	3	50	50	100
8.	Thermal Engineering Lab	ME306	1	-	-	2	3	50	50	100
9.	Mini Project	ME307	2	-	-	4	-	-	100	100
	Total		22	16	2	8	-	460	440	900

Professional Elective – I (PE-I)

S.No	Name of the Course
1.	IC Engines & Gas Turbines
2.	Power Plant Engineering
3.	Introduction to Aeronautical Engineering

Open Elective – I (OE-I)

S.No	Name of the Course	Offered by Dept
1.	Artificial Intelligence & Expert Systems	CSE
2.	Introduction to Information Systems	CSE
3.	Web Development Programme	CSE
4.	Introduction to Cyber Security	CSE
5.	Internet of Things	ECE
6.	Nano Technology	ECE
7.	Remote Sensing & GIS	CE
8.	Optimization Techniques	ME
9.	Renewable Energy	EEE
10.	Introduction to JAVA	CSE

INDUSTRIAL ENGINEERING & MANAGEMENT (IEM)

V Se	mester:	Mechanic	al Eng	ginee	ring			Schem	e:2017			
Cours	e Code	Category	Ηοι	irs / `	Week	Credits	Maxi	mum Marks				
						Continuous						
MF	201	Core	L	Т	Р	С	Internal					
IVIE	301	Core					Assessment	End Exam	TOTAL			
			3	-	-	3	40	60	100			
Session	nal Exam	Duration :	2 Hrs	5			End Ex	am Duration	a : 3 Hrs			
Course	Outcom	es : At the e	nd of	the c	ourse, s	students will	be able to					
CO1 :	Underst learn In	tand the ind dustrial act	ustri <i>a</i> s	ıl engi	ineerin	g concepts t	o make value-b	ased decision	is and			
CO2: Understand how to locate plant, draw plant layouts and material handling												
CO3 :	Apply th	ne method s	tudy a	and w	ork me	asurement to	echniques					
CO4:	Apply p	roject mana	gemei	nt tec	hnique							
CO5: Understand the concepts of reliability, reliability systems and maintenance												
					UN	IT – I						
Manage	ement: In	troduction t	o Mar	nagem	ient, Sc	ientific Mana	agement, Decisi	on Making Pr	ocess.			
Person	nel Mana	gement: Fu	inctio	ns of	personi	nel managem	ient, Types of tr	aining, Job e	valuation			
and Me	rit rating,											
Industr	rial Acts	Industrial	safety	y, Acc	idents	prevention a	and control, Fa	ctories act, V	Vorkmen			
compen	isation ac	rt, Industria	l dispu	utes a	.ct							
					UN	IT – II						
Plant L	ocation:	Factors affe	cting	plant	locatio	n, Comparis	on between urb	an and rural	location,			
Breakey	ven analy	sis- Mathem	atical	meth	od, Gra	aphical Meth	od.					
Plant L	ayout: In	ntroduction,	Types	s of la	youts, i	merits and d	emerits, Factor	s governing tl	ne design			
of layou	it, Muthe	r's principle	s of p	lant l	ayout. j	principles of	materials hand	lling, types of	material			
handlin	g equipm	lent										
UNIT – III												
Work S	tudy: Int	roduction to	o metł	nod st	udy, St	eps in metho	od study, Recor	ding techniqu	ues- Flow			
process	process chart, String diagram; Therbligs, Principles of motion economy.											
Work 1	Measurer	nent: Stop	watc	h tin	ne stud	ly, Standard	l time calculat	tion. Work s	ampling-			
procedu	are, applie	cations, Wag	ges an	d ince	entives,	types of ince	entive plans					
					UNI	T – IV						

Project management: Introduction, Rules for drawing network diagram, Project Evaluation & Review Technique (PERT), Event time computations-Earliest expected time and latest allowable time, Slack, Critical Path, Critical Path Method (CPM), Activity time estimates (EST,EFT,LST,LFT) and determination of Total Float, Free Float, Independent float, crashing of network

UNIT – V

Reliability and Maintenance: Reliability, exponential distribution of failure and repair times determination of MTBF and MTTR, reliability models; determination of system reliability, Availability and Maintainability, Types of plant maintenance-preventive and breakdown maintenance

Text Books:

- M. Mahajan, Industrial Engineering and production management, Dhanpat rai & sons, New Delhi
- **2.** S.K. Sharma and Savita Sarma, Industrial Engineering and organization management, SK Kataria & Sons, New Delhi
- 3. E. Bala Gurusamy, Reliability Engineering, Tata McGraw Hill

Reference Books:

1. Banga & Sharma, Industrial Engineering and Management, Khanna Publishers, New Delhi

2. ILO, Introduction to Work Study, Universal Publications, Mumbai

3. V.K. Kapoor, Operations Research, S. Chand Publishers, New Delhi

Question Paper Pattern:

Sessional Exam

The question paper for Sessional examination is for 30 marks, covering half of the syllabus for first Sessional and remaining half for second Sessional exam. Question No 1, which carries 6 marks, contains three short answer questions of two marks each. The remaining three questions shall be EITHER/OR type questions carrying 8 marks each

End Exam

INSTRUMENTATION & CONTROL SYSTEMS (INCS)

V Sem	ester: Mechanical Engineering Scheme : 2017											
Course	e Code	Category	Ho	urs /	Week	k Credits Maximum Marks						
ME	302	Core	L	Т	Р	С	Continuous Internal Assessment	End Exam	TOTAL			
			3	-	-	3	40	60	100			
Session	nal Exam Duration : 2 Hrs End Exam Duration : 3 Hrs											
Course	Outcom	es : At the e	nd of	the c	course,	students w	rill be able to					
CO1 .	Underst	and the t	oasic	prin	nciples	of measu	arement and me	chanical,	electrical			
CO 1.	measuri	ing instrume	ents									
C02.	Underst	and the w	vorki	ng o	of meas	suring ins	struments for pr	ressure, fl	ow, and			
02.	tempera	iture										
CO3.	Underst	and the wor	king	of m	easurin	g instrume	ents for force, torqu	le, accelera	ation and			
003.	strain											
CO4 :	Understand the basic principle of mathematical models of control systems											
COF	Solve th	ne problems	on p	perfor	mance	of control	systems using firs	and seco	nd order			
005:	respons	e, routh-hui	witz	criter	rion							

UNIT – I

Measurement and Instrumentation: Measurement, measurement methods, generalized measurement system and its functional elements, classification of instruments, error and its classification, static and dynamic characteristics

Sensors and Transducers: Introduction, mechanical detector transducer elements, electrical transducers, transducers classification and description, transducer sensitivity, variable resistance transducers, variable inductance transducers, capacitive transducers, LVDT, piezo electric and photo electric transducers

UNIT – II

Measurement of Pressure, Flow and Temperature: Pressure measurement terms, measurements of low pressure gauges such as McLeod gauge, Thermal conductivity gauge, Ionization gauge, measurement of high pressure such as Bourdon gauge, Resistance gauge, CRO for varying pressure measurement. Classification of flow measurement techniques, special flow meters such as Turbine flow meter, Magnetic flow meter, Hot wire anemometer, Ultrasonic flow meter. Temperature measurement instruments, Thermocouples, Resistance thermometers and Thermistors, Radiation and Optical Pyrometers

UNIT – III

Measurement of Force, Torque, Acceleration: Basic force measurement methods such as elastic load cells, elastic strain gauge load cells, Hydraulic and Pneumatic load cells, Torque measurement, different types of torsion meters, Piezo electric accelerometer, Seismic accelerometer, Strain gauge accelerometer.

Strain Gauges and Measurement: Strain measuring techniques, requirement of strain gauges, Resistance strain gauges, Strain gauges alloys and material, Bonded and Un bonded strain gauges, bonding techniques, temperature compensation in strain gauges

UNIT – IV

Control Systems, Mathematical Models and Transfer Function: Introduction, examples of control systems, classification of control systems, open loop and closed loop control systems, control system terminology, servomechanism. Physical system and mathematical models, mechanical systems, thermal systems, electrical systems, hydraulic and pneumatic systems, linear control system, transfer function, block diagram and its reduction process, signal flow graphs, Mason's rule

UNIT – V

Performance of Control Systems: Standard test inputs, response of first order control systems, performance of second order control systems, properties of transient response, steady state error and error constants, Concept of stability, necessary conditions for stability, relative stability, Routh-Hurwitz stability criterion

Text Books:

1. Beckwith and Buck, Mechanical Measurements, Narosa Publication, New Delhi

2. S. Ghosh, Control Systems - Theory & Applications, Pearson Education, New Delhi

Reference Books:

1. D.S. Kumar, Mechanical Measurements and Control, Metropolitan Books, New Delhi

2. B. S. Manke, Linear Control Systems, Khanna Publishers, New Delhi

3. Doeblin .E.O., Measurement Systems, TMH Publishers, New Delhi

4. Nagarath and Gopal, Control System Engineering, Narosa Publishers, New Delhi

Question Paper Pattern:

Sessional Exam

The question paper for Sessional examination is for 30 marks, covering half of the syllabus for first Sessional and remaining half for second Sessional exam. Question No 1, which carries 6 marks, contains three short answer questions of two marks each. The remaining three questions shall be EITHER/OR type questions carrying 8 marks each

End Exam

DYNAMICS OF MACHINES (DOM)

V Sen	nester:	Mechanic	al Eng	gineer	ing			Schem	e: 2017			
Cours	e Code	Category	Hou	rs / W	eek	Credits	Maximu	ım Marks				
							Continuous					
МБ	ME303 Core L T P C Internal End Assessment Exam TO?											
WIE	303	Core					Assessment	Exam	TOTAL			
			2	1	-	3	40	60	100			
Session	sional Exam Duration : 2 Hrs End Exam Duration : 3 Hrs											
-						1						
Course	Outcom	es : At the e	nd of t	he coı	arse,	students v	vill be able to					
CO1.	Constru	ict cam prof	ïle for	knife	edge	, roller, fla	at faced follower wi	th uniform	velocity,			
CO 1.	CO1: Simple harmonic, uniform acceleration, uniform retardation and cycloid motion											
C02.	Solve p	roblems on	simple	e peno	lulun	n, compou	nd pendulum, dyn	amically e	quivalent			
002.	system, dynamic analysis of reciprocating engine											
CO3.	Solve pr	roblems on r	educir	ng the	fluctu	uation of s	peed with flywheel	and study	the effect			
000.	of gyros	copic couple										
CO4 :	Underst	tand the con	cept of	f balar	ncing	of rotating	g and reciprocating	masses				
CO5 :	Solve pr	roblems on f	ree, for	ced, ı	ındar	nped and	damped vibrations					
	•				UN	IT – I						
Cams:	Types of	cams, type	es of f	ollowe	ers, te	erminology	y of cam and follow	wer, types o	of motion			
of the	follower	- uniform	n ve	locity,	simp	ole harmo	nic motion, unifor	m accelera	tion and			
retardat	tion and	cycloidal m	otion.	Draw	ing o	f cam prof	file for knife edge,	roller and i	flat faced			
reciproc	ating follo	ower for the §	given n	notion.	. Cam	profile wit	h offset roller follow	er				
					UN	IT – II						
Inertia	rtia Force Analysis: D'Alembert's Principle, simple and compound pendulum, equivalent											
dynami	dynamic system, correction couple, Klein's construction for velocity and acceleration											
analysis, velocity and acceleration of piston, angular velocity and angular acceleration of												
connect	ing rod,	piston effo	rt, cra	ank ei	ffort,	turning 1	noment on crank	shaft, Ine	rtia of a			
connect	ing rod											

UNIT – III

Fly wheel: Function of fly wheel, co-efficient of fluctuation of energy and speed in flywheels, relation between fluctuation of speed and energy, size of flywheel, flywheel in punching press

Gyroscopic Effects: Introduction, Gyroscopic couple, effects of gyroscopic couple on an aeroplane, gyroscopic effects on a naval ship during steering, pitching and rolling, stability of four wheel automobile moving in a curved path, Stability of a two wheel vehicle taking a turn

Balancing of Rotating Masses: Static Balancing, dynamic balancing, balancing of several masses in different planes

UNIT – IV

Balancing of Reciprocating Masses: Balancing of reciprocating masses, partial balancing of

locomotives, effects of partial balancing in locomotives, secondary balancing, balancing of inline engines and balancing of V-engines

$\mathbf{UNIT} - \mathbf{V}$

Principles of Vibrations: Types of vibrations, free vibrations, frequency for free longitudinal, transverse vibrations, differential equation of S.H.M, energy method to find frequency of oscillations or time period, free oscillations of spring mass system, determination of equivalent spring stiffness, free damped vibrations, under damping, critical damping and over damping. Forced vibrations, Vibration isolation and Transmissibility

Transverse Vibrations: Dunkerley's method and Rayleigh's method for finding critical speed of the shaft.

Torsional Vibrations: Free torsional vibrations of single rotor, two-rotor and three-rotor system, torsionally equivalent shaft and geared systems

Text Books:

1. S. S. Rattan, Theory of Machines, TMH Publishers, New Delhi

2. Sadhu Singh, Theory of Machines, Pearson Education, New Delhi

3. C.S. Sharma and K. Purohit, Theory of Mechanisms and Machines, PHI publishers, New Delhi

4. R. K. Bansal and J. S. Brar, Theory of Machines, Laxmi Publications (P), Ltd., New Delhi

Reference Books:

1. Ballaney, Theory of Machines, Khanna Publishers, New Delhi

2. Thomas Bevan, Theory of Machines, CBS Publishers, New Delhi

3. J.S. Rao and R.V. Dukkipati , Mechanisms and Machine Theory, NAI Publishers, New Delhi

4. J.E. Shigley, Theory of Machines and Mechanisms, McGraw Hill Publishers, New York

Question Paper Pattern:

Sessional Exam

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End Exam

DESIGN OF MACHINE MEMBERS - I (DMM 1)

V Sen	nester:	Mechanic	al Er	ngine	ering			Schem	e:2017	
Cours	e Code	Category	Hours / Week			Credits	Maxim	um Marks		
ME304 Core L T P C Internal End Assessment Exam TOTA									TOTAL	
			2	1	-	3	40	60	100	
Session	nal Exam	Duration :	2 Hrs	5			End Exa	m Duration	n:3 Hrs	
Course	Outcom	es : At the e	nd of	the c	ourse, s	students w	ill be able to			
	Underst	and the fun	dame	ntals	of mac	hine desig	n, factor of safety,	Theories of	failures,	
CO1 :	selectio	n of material	l and	impa	ct loads	8				
CO2: Design the components subjected to static and fluctuating loads										
CO3 :	Design	the bolted ar	nd riv	eted j	oints s	ubjected to	direct and eccent	ric loading		
CO4 :	Design	the welded jo	oints,	keys	, cotter	and knucl	de joints			
CO5:	CO5: Understand the fundamentals of belt drives and design of belt drives									
					UN	IT – I				
Design	Principl	es: The art a	and s	cience	e of ma	chine desi	gn, types of design	methods,	stages in	
machin	e design,	selection of	mate	rials,	types	of loads an	d factor of safety.	Maximum	Principal	
stress	theory, N	laximum sh	lear s	stress	theory	, Maximu	m principal strain	n theory, M	laximum	
strain e	energy the	eory, Maximu	ım di	storti	on ener	rgy theory,	impact loads			
					UN	IT – II				
Strengt	th of Mae	chine Eleme	ents:	Stres	s conce	entration, 1	theoretical stress c	oncentratio	n factor,	
fatigue	stress co	ncentration	factor	r, des	ign of f	luctuating	stresses, endurand	ce limit, S-I	N curves,	
Goodma	an's Line,	Soderberg's	Line			~				
Delted	Tointa	Doltad ininta	otec		UNI	T - III	uniform strongth	halted isin	ta undan	
eccentr	joints:	onea joints	, sue	esses	III DOIL	s, Dons of	unnorm strengtn,	bolled join	ts under	
Riveteo	d Joints:	Types of ri	iveted	ioin	ts mor	les of failu	ire strength and	efficiency o	of riveted	
joints.	pitch of	the rivets, o	lesign	n stre	sses, t	oiler joint	s, diamond joints.	and rivete	ed joints	
under e	eccentric 1	loading	0		,		-,,	,	<u> </u>	
					UNI	T – IV				
Welded	Welded Joints: Types of welded joints, strength of welds, Design of simple welded joints									
Keys, (Cotters a	nd Knuckle	e Joi	nts: ′	Types o	of Keys, st	resses in Keys, de	sign of rect	angular,	
square	and tape	r Keys, desig	n of s	standa	ard cott	er and knu	uckle joints			
					UN	IT – V				
Belt Dr	rives: Typ	es of belt di	rives,	angu	ılar velo	ocity ratio	of flat belts, effect of	of belt thick	mess on	
velocity	ratio, eff	ect of slip o	n velo	ocity	ratio, le	ength of fla	at belts, angle of c	ontact of o	pen and	
cross b	elts, Law	of belting,	ratio	of be	lt tens	ions, powe	r transmitted by l	oelt drive,	effect of	

centrifugal tension on the power transmitted, initial tension in belts and its effect on

maximum power transmission, Power transmitted by V-belt drive, Design of flat belt drive,

V – Belt drive, design of CI pulleys.

Text Books:

1. R.K. Jain , Machine Design, Khanna Publishers, New Delhi

2. V.B. Bhandari, Design of Machine Elements, TMH Publishers, New Delhi

Reference Books:

1. Schaum's series, Machine Design, TMH Publishers, New Delhi

2. Sadhu Singh, Machine Design, Khanna Publishers, New Delhi

3. Joseph E. Shigely, Mechanical Engineering Design, TMH Publishers, New Delhi

4. M.F. Spotts, Design of Machine Elements, PHI Publishers, New Delhi

5. Pandya and Shah , Machine Design, Charotar Publishers, Anand

Data Hand Book:

Mahadevan and Balaveera Reddy, Machine Design Data Hand Book, CBS Publishers, New Delhi

Question Paper Pattern:

Sessional Exam

The question paper for Sessional examination is for 30 marks, covering half of the syllabus for first Sessional and remaining half for second Sessional exam. Question No 1, which carries 6 marks, contains three short answer questions of two marks each. The remaining three questions shall be EITHER/OR type questions carrying 8 marks each

End Exam

GEOMETRIC MODELLING LAB (GM(P))

V Se	mester:	Mechan	ical Engi	neering			Schen	ne : 2017			
Cour	se Code	Но	ours / We	ek	Credits	Maximum	Marks				
M	ME305 L T P C Continuous Internal End Assessment TOTA 0 0 2 1 50 50 100										
		0	0	2	1	50	50	100			
End Ez	am Durati	ion:3H	rs	1	•						
Course	Outcome	s: At the	end of the	course,	students	will be able to					
CO1 :	Understa	and featu	res of CAT	'IA and C	Creo softwa	are					
CO2:	Model 31	D compor	nents usin	g CATIA							
CO3 :	Model 31	D compor	nents usin	g Creo							
CO4 :	CO4: Create assembly of machine components using Creo										
			T	IST OF	FYDEDI	MENTS					
Part N	Iodelling			151 OF		MENTS					
1.	Modeling o	of Compor	nent in 3D	– V bloc	k using C	ATIA					
2.	Modeling o	of Compor	nent in 3D	– Open	Bearing us	sing CATIA					
3.	Modeling o	of Compor	nent in 3D	– Angul	ar block u	sing CATIA					
4.	Modeling	of Compor	uent in 3D	– V bloc	k using C	reo Parametric					
5	Modeling	of Compor	$\frac{1}{1}$	- Open	Rearing 11	sing Creo Parametric					
6. 6	Modeling	of Compos	nont in 2D	Angul		sing Cros Darametric					
0.				- Angul							
7.	Modeling	of Compor	nent in 3D	– Doveta		Ising Creo Parametric					
8.	Modeling o	of Compor	nent in 3D	– Doveta	ail Bracket	t using Creo Parametric					
9.	Modeling o	of Compor	nent in 3D	– Doveta	ail stop us	ing Creo Parametric					
Assem	bly Mode	lling									
1.	Assembly	of Oldhan	n's couplir	ig using	Creo Para	metric					
2.	Assembly	of a knuc	kle joint								
3.	Assembly	of screw	jack parts								
4.	Assembly	of a foots	tep bearin	g							
5.	5. Assembly of a stuffing box										
6.	Assembly	or a squa	tre tool pos	St							
Note: S	tudent has	to perfor	m at least	10 expe	riments fro	om the above lists.					

THERMAL ENGINEERING LAB (TE(P))

V Sen	nester:	Mechan	ical Engi	al Engineering Scheme : 2017								
Cours	rse Code Hours / Week Credits Maximum Marks											
ME	306	L	T	P 2	C	Continuous Internal Assessment 50	End Exam	TOTAL				
End End	Durati	с . 2 Ц		4	-	00		100				
End Exa	am Durat	$\mathbf{ion}:3\mathbf{H}$	rs									
Course	Outcome	• At the	end of the	course	students	will be able to						
	Determe			. course,				_				
	Determin			nt of fue	$\frac{1}{1}$ s and dra	w valve timing diagram	of I.C engin	e				
CO2 :	Mechani	cal, electi	iance cha rical loadii	racterist 1g	ics of for	ar stroke diesel engine	es using h	ydraulic,				
CO3 :	Prepare	the heat l	balance sh	eet for fo	our stroke	diesel engine						
CO4 :	Evaluate	e performa	ance chara	acteristic	s of blowe	and compressor						
CO5 :	CO5: Determine the friction power for MPFI engine											
CO6 :	Understa	and the w	various con	nponent	s of I.C en	gine						
			I	JST OF	EXPERI	MENTS						
1. a) St	udy of I.C	. Engine	and Valve	Timing	Diagram o	f a 4-stroke engine						
b) De	etermining	g the Flas	h and Fire	Point of	a given o	il using Pensky apparatu	sı					
2. Load	l test on 1	0 H.P, tw	o cylinder	diesel er	ngine using	g Hydraulic loading						
3. Heat	balance t	test on 5	H.P, single	cylinder	r diesel en	gine using electrical load	ling					
4. Reta	rdation te	st on 5 H	.P, single	cylinder	diesel engi	ne using mechanical loa	ading					
5. More	se test on	MPFI eng	ine									
6. Perfo	ormance t	est on Tw	o stage re	ciprocati	ng air com	pressor						
7. Perfe	ormance t	est on Blo	ower rig									
8. Load	l test on 5	H.P, sing	gle cylinde	er diesel	engine wit	h D.C. generator loading	g					
9. Dete	rmine the Iel	theoretic	al power o	coefficien	t of a labo	ratory model wind turbin	ne using wii	nd				
10. Prac	ticing of D	ois-Assem	ibly/Asser	nbly of I.	C. Engine							
11.Dete	rmining tl	he % emis	ssions of 4	stroke d	liesel engi	ne using exhaust gas an	alyser					
Experii	ments be	yond th	e currici	ılum:								
1. Load loadi	l test on 5 ing	H.P diese	el engine f	uelled wi	ith blend o	f Biodiesel subjected to	D.C. genera	ltor				
2. Test	on Vortex	tube										
Note: St	udent has	to perfor	m at least	10 expe	riments fro	om the above lists.						

MINI PROJECT – I (MP1)

V Sem	ester:	Mechanic	al Eng	ginee	ring			Scher	ne : 2017	
Course C	ode	Category	Hou	rs / V	Veek	Credits	Maxii	num Marks	i	
ME30)7	Core	L	Т	Р	С	Continuous Internal Assessment	End Exam	TOTAL	
			-	-	4	2	100	-	100	
									·	
Course O	utcom	es : At the e	end of	the c	ourse,	students w	ill be able to			
CO1:	Identi	fy project	ideas,	sele	ct stra	tegies and	methodologies	to impleme	ent them;	
001.	under	rstand copy	rights	and	classify	y the literat	ure			
	Apply	Apply standard design and development procedures learnt; solve problems related								
CO2 :	to industry and society ensuring eco-friendly, public safety; and work effectively in									
	teams									
	Utilize	e modern to	ols of	CAD,	, optim	ization met	hods, numerical	techniques	including	
CO3 :	Desig	n of Experin	nents	and	simula	tion that co	ontribute to obta	in the solut	ion of the	
	projec	et problem								
C04·	Develop prototype, perform tests to validate the prototype and analyse the cost and									
004.	effectiveness									
C05:	Orgar	nize the ac	cquire	d kn	owledg	e through	preparation of	project re	port and	
	comm	unicate thr	ough	oral p	oresenta	ations				

Four Year B.Tech. Degree Course Scheme of Instruction and Examination (Effective from 2017 – 18)

VI	I Semester Scheme – 2017												
No	Subject	Codo	dits	Scheme of Instruction periods / week			Duration of	Scheme Max	e of Examin imum Mark	of Examination imum Marks			
ŝ	Subject	Code	Cre	L	D/T	Р	(Hours)	End Exam	Internal Assessm ent	Total			
Ι	Theory		r			r							
1.	Operations Research	ME308	3	2	1	-	3	60	40	100			
2.	Heat Transfer	ME309	3	2	1	-	3	60	40	100			
3.	Design of Machine Members – II	ME310	3	2	1	-	3	60	40	100			
4.	Finite Element Methods	ME311	3	2	1	-	3	60	40	100			
5.	Professional Elective – II		3	3	-	-	3	60	40	100			
6.	Open Elective - II		3	3	-	-	3	60	40	100			
Π	Practical												
7.	Engineering Metrology Lab	ME312	1	-	-	2	3	50	50	100			
8.	Database & Computations Lab	ME313	1	-	-	2	3	50	50	100			
9.	Heat Transfer Lab	ME314	1	-	-	2	3	50	50	100			
	Total		21	14	4	6	-	510	390	900			

VI Semester

Professional Elective – II (PE-2)

S.No	Name of the Course
1.	Tool Design
2.	Hydraulics and Pneumatics
3.	Non Destructive Testing
4.	Mechanical Behaviour of Materials

Open Elective – II (OE-2)

S.No	Name of the Course	Offered by Dept
1.	Object Oriented Programming through JAVA	CSE
2.	Ethical Hacking	CSE
3.	Principles of Programming Languages	CSE
4.	Advanced Information Systems	CSE
5.	Scientific Programming with Python	CSE
6.	Fuzzy Logic & Neural Networks	ECE
7.	Building Information Modelling	CE
8.	Product Lifecycle Management	ME
9.	Simulation of Engineering Systems	EEE
10.	Industrial Safety	ME

OPERATIONS RESEARCH (OR)

VI Seme	ester:	Mechani	cal En	ginee	ring			Schem	e : 2017
Course	Code	Category	Hou	rs / V	Veek	Credits	Maxim	um Marks	
							Continuous		
MEO	00	Como	L	Т	Р	С	Internal	End	
MES	08	Core					Assessment	Exam	TOTAL
			2	1	-	3	40	60	100
Sessiona	l Exam	Duration :	2 Hrs				End Exa	m Duration	n : 3 Hrs
Course C	Course Outcomes : At the end of the course, students will be able to								
CO1:	L: Understand Basics of operations research and solve linear programming problems								
CO2:	2: Solve Transportation and assignment problems								
CO3 :	Solve game and replacement problems								
CO4 :	Solve th	e sequencin	g relat	ed pr	oblems	\$			
CO5 :	Solve qı	leuing probl	ems a	nd otł	ner rele	evant probl	ems using simula	tion tool	
					UNI	$\mathbf{T} - \mathbf{I}$			
Introduc	tion: D	efinition, Ba	isic OI	R mod	le1s & A	Application	s of OR		
Linear H	Program	iming : Int	troduc	tion,	Formu	ulation of	Linear Programm	ning (LP) p	roblems,
Graphical	1 metho	od of solvin	g LP	probl	lem, s	implex me	ethod, Artificial v	variable Te	chnique,
Degenera	acy in L	PP's, Duality	, unb	ounde	ed, infe	asible and	multiple optimum	solution	
					UNI	T – II			
Transportation Models: Finding an initial feasible solution - North West Corner method,									
Least cos	st metho	od, Vogel's A	Approx	imati	on Me	thod; Find	ing the optimal so	olution usir	ng MODI
method, Special cases in Transportation problems - Unbalanced Transportation problem,									
Degenera	acy in tr	ansportation	ı prob	lem, r	nultipl	e optimal s	solutions, prohibit	ed routes.	

Assignment problems: Hungarian method of Assignment problem, maximization in Assignment problem, unbalanced Assignment problem, prohibited Assignments, multiple optimum solutions

UNIT – III

Game Theory : Introduction, Two-person zero sum games, Maxi-min and Mini-max principles, Principle of dominance, solution of mixed strategy problems, Graphical method for $2 \times n$ and $m \times 2$ games

Replacement Models: Introduction, replacement of items that deteriorate gradually ignoring change in money value, replacement of items that deteriorate considering change in money value with time, replacement of items that fail suddenly – Individual replacement policy, Group replacement policy

UNIT – IV

Sequencing Models: Introduction, General Assumptions, Priority rules for job sequencing (Single machine Scheduling), Measures of Performance- Average Completion Time, Average Lateness; Processing n jobs thorough 2 machines, Processing n jobs through 3 machines, Processing n jobs thorough m machines, Processing 2 jobs through m machines

UNIT – V

Queuing Theory: Introduction, Single Channel – Poisson arrivals – Exponential service times with infinite population & finite population, Multi-channel – Poisson arrivals – Exponential service times with infinite population

Simulation : Introduction, Definition, Types of Simulation, Monte-Carlo Simulation, Pseudo Random Numbers, Mid-square Method of Generating Random Numbers, Application of simulation to inventory control and queuing problems

Text Books:

1. S.D. Sarma, Operations Research, Kedarnnath, Ramnath & Co., Meerut

2. N.D. Vohra, Quantitative Techniques in Management, TMH Publishers, New Delhi

Reference Books:

1. V.K. Kapoor, Operations Research, S. Chand Publishers, New Delhi

2. Prem Kumar Gupta and Hira, Operations Research, S. Chand Publishers, New Delhi

3. Hamdy, A. Taha, Operations Research-An Introduction, Prentice Hall of India Pvt. Ltd

4. S. Kalavathi, Operations Research, Vikas Publishers

Question Paper Pattern:

Sessional Exam

The question paper for Sessional examination is for 30 marks, covering half of the syllabus for first Sessional and remaining half for second Sessional exam. Question No 1, which carries 6 marks, contains three short answer questions of two marks each. The remaining three questions shall be EITHER/OR type questions carrying 8 marks each

End Exam

HEAT TRANSFER (HT)

VI Sei	nester:	Mechanic	Mechanical Engineering			ering Scheme : 2017					
Cours	e Code	Category	Ηοι	ırs / V	Veek	Credits	Maxim	um Marks			
							Continuous				
ME	300	Core	L	Т	Р	С	Internal	End			
IVIL	309	Core					Assessment	Exam	TOTAL		
			2	1	-	3	40	60	100		
Session	nal Exam	Duration :	2 Hrs	5			End Exa	m Duration	a : 3 Hrs		
						l					
Course	Outcom	es : At the e	nd of	the co	urse, s	students will	be able to				
CO1 :	Underst	tand the con	cepts	of diff	erent :	modes of hea	at transfer				
CO2:	Apply k	nowledge of	cond	luctior	n heat	transfer in	the design of ins	sulation of	furnaces		
	and pip	es									
CO3 :	Analyse	free and for	ced c	onvect	ion ph	ienomena in	external and inte	ernal flows			
CO4:	Design	of thermal	shiel	ds usi	ng th	e concepts	of black body a	nd non-bla	ick body		
	radiatio	n									
CO5 :	CO5: Analyze the performance of commonly used heat exchangers										
UNIT – I											
Introdu	iction: B	asic modes	of he	at tra	nsfer-	Heat Trans	fer rate equation	s- generali	zed heat		
conduc	tion equa	ition - stead	y sta	te nea	t conc	luction solut	tion for plain and	a composite	e slabs -		
cynnde		ai thickness	OI IIIS	sulatio	n- Cor		i neat generation				
Unstea	dv State	Heat Tran	sfer	Cond		IT – II I - Transien	t heat conduction	n- lumped	1 system		
analysi	s and Ser	ni-infinite so	olids								
Fins - 1	neat cond	uction throu	ıgh fiı	ns of u	niforn	n cross sectio	on- fin effectivene	ss and effic	ciency		
			-		UNI	T – III					
Convec	tion: Ba	isic concept	s of	convec	ction-l	neat transfer	r coefficients - t	ypes of co	nvection		
forced o	convection	n and free co	nvect	tion							
Forced	convect	ion: Forced	conve	ction i	n exte	ernal flow–co	ncepts of hydrody	ynamic and	. thermal		
bounda	ry layer-	use of empire	rical o	correla	tions	for flow over	plates and cylind	ders. Intern	nal flow –		
Use of e	empirical	relations for	conv	ective	heat t	ransfer in ho	rizontal pipe flow	<i>.</i>			
Free Convection - development of hydrodynamic and thermal boundary layer along a vertical											
plate - use of empirical relations for convective heat transfer on plates and cylinders in											
horizontal and vertical orientation											
UNIT - IV											
hodies	shape for	ator radiatio	u alls	hange	betwe	raulation,	Radiation Shield	и, р иаск а	nu oray		
boules,	shape la	loi, iauatio		mange	TIN						
					UN	11 - V					

Heat Exchangers: Types of heat exchangers- parallel flow- counter flow- cross flow heat

exchangers, overall heat transfer coefficient, LMTD and NTU methods, fouling in heat exchangers

Boiling and Condensation: Different regimes of boiling- nucleate, transition and film boiling – condensation - film wise and drop wise condensation

Text Books:

1. J.P. Holman, Heat Transfer, TMH Publishers, New Delhi

2. R.C. Sachdeva, Engineering Heat and Mass Transfer, NAI Publishers, New Delhi

Reference Books:

1. M.N. Ozisik, Elements of Heat Transfer, McGraw-Hill Publishers, New York

2. F.P. Incropera, Introduction to Heat Transfer, John Wiley & Sons Publishers, New York

3. Donald Pitts, Heat Transfer, McGraw Hill Publishers, New York

4. M. Thirumaleshwar, Fundamentals of Heat and Mass Transfer, Pearson Education, New Delhi

Data Hand Book:

B. Sreenivasa Reddy & K. Hemachandra Reddy, Thermal Engineering data hand book, IK International Publishers, Bangalore

Question Paper Pattern:

Sessional Exam

The question paper for Sessional examination is for 30 marks, covering half of the syllabus for first Sessional and remaining half for second Sessional exam. Question No 1, which carries 6 marks, contains three short answer questions of two marks each. The remaining three questions shall be EITHER/OR type questions carrying 8 marks each

End Exam

DESIGN OF MACHINE MEMBERS - II (DMM2)

VI Sea	mester:	Mechani	cal E	nginee	ring			Schen	ne : 2017		
Cours	e Code	Category	Ho	urs / V	Veek	Credits	Maxim	um Marks			
							Continuous				
	010	0	L	Т	Р	С	Internal	End			
IVIE	<i>i</i> 310	Core					Assessment	Exam	TOTAL		
			2	1	-	3	40	60	100		
Session	nal Exam	Duration :	2 Hrs	5			End Exa	m Duratio	n : 3 Hrs		
Course	Outcom	es : At the e	nd of	the cou	urse, s	tudents wi	ill be able to				
CO1:	Design	shafts and c	oupli	ngs							
CO2:	Design	helical, leaf	and c	oncent	ric spr	ings					
CO3 :	Design Journal and Anti friction bearings										
CO4 :	Design	spur, helical	l, beve	el and v	worm §	gears					
CO5 :	Design connecting rod, piston, flywheel, crank and crankshaft										
					UN	(T – I					
Design	Design of Shafts: Design of solid and hollow shaft for strength and rigidity, design of shafts for										
combin	ed loads.	C									
Design	of Shaft	t Couplings	: Des	ign of s	sleeve	or muff co	oupling, split muf	f coupling,	CI flange		
couplin	ig, protec	ted type of	flang	ge couj	oling,	rigid flang	ge coupling, bush	ed pin typ	be flexible		
couplin	ıg										
					UNI	T – II					
Spring	s: Classif	ication of sp	orings	, desig	n of co	oiled sprin	gs of various cros	s section, o	concentric		
springs	, leaf spri	ings, Bellevil	le spi	rings							
					UNI	Γ – III					
Journa	l Bearing	gs: Types of	f jour	mal be	arings	, lubricatio	on, bearing modu	lus, full a	nd partial		
journal	bearing	s, clearance	ratio	o, Hea	t dissi	ipation of	bearings, bearing	g materials	s, journal		
bearing	g design										
Antifri	ction Be	arings: Ball	and	roller	bearin	gs, static	load, dynamic loa	ad, equival	ent radial		
load, de	esign and	selection of	ball a	and roll	ler bea	rings					
					UNI	Γ – IV					
Spur and Helical gears: Classification of gears, design of spur gears, Lewis equation - bending											
strength, dynamic load and fatigue of gear tooth, Design of Helical gears.											
Bevel & Worm Gears: Design of bevel gears and Design of worm gears											
					UNI	T - V					
Design	of I.C. I	Engine Part	s: De	sign of	conne	ecting rod,	design of piston,	design of o	rank and		
cranks	hafts, Fly	wheel for I.C	. engi	ine.							

Text Books:

1. R.K. Jain, Machine Design, Khanna Publishers, New Delhi

2. V.B.Bhandari, Design of Machine Elements, TMH Publishers, New Delhi

Reference Books:

- 1. Schaum's series, Machine Design, TMH Publishers, New Delhi
- 2. Sadhu Singh, Machine Design, Khanna Publishers, New Delhi
- 3. Joseph E. Shigely, Mechanical Engineering Design, TMH Publishers, New Delhi
- 4. M.F. Spotts, Design of Machine Elements, PHI Publishers, New Delhi
- 5. Pandya and Shah , Machine Design, Charotar Publishers, Anand

Data Hand Book:

Mahadevan and Balaveera Reddy, Machine Design Data Hand Book, CBS Publishers, New Delhi

Question Paper Pattern:

Sessional Exam

The question paper for Sessional examination is for 30 marks, covering half of the syllabus for first Sessional and remaining half for second Sessional exam. Question No 1, which carries 6 marks, contains three short answer questions of two marks each. The remaining three questions shall be EITHER/OR type questions carrying 8 marks each

End Exam

FINITE ELEMENT METHODS (FEM)

VI Sen	nester:	Mechani	cal En	ginee	ring	ng Scheme : 2017						
Course	e Code	Category	Hou	rs / V	Veek	Credits	Maximu	um Marks				
				T	D	_	Continuous	Dend				
ME	311	Core	L	1	P	C	Internal	End	TOTAL			
			2	1		2	Assessment	Exam 60	100			
Sector	al Enom	Duration	2 0 Um	1	-	3 40 60 100						
Session		Duration :	2 115				Enu Exa		1:5 HIS			
Course	Outcom	es : At the e	nd of t	he co	urse, s	tudents w	ill be able to					
CO1 :	Underst and trea	tand step by	y step	proce	edure ditions	of FEM, s	hape functions, se	election of e	elements			
CO2 :	Solve p	roblems on t	bar and	trus	s eleme	ents						
CO3 :	Determ	ine slope and	d defle	ction	of bear	n structur	es using beam eler	nent				
CO4 :	CO4: Apply finite element method for solving the two dimensional stress analysis using CST							ing CST				
CO5 :	05: Solve One dimensional heat transfer and Dynamic problems using FEM											
	UNIT – I											
Finite Element Technique: Fundamental concepts of the Finite Element Methods,												
advantages and applications of FEM, steps followed in FEM, Discretization of the domain,												
types of	element	s			-							
Shape	function	is and Bou	ndary	con	dition	s: Shape	functions, elemen	nt stiffness	matrix,			
applying	g of bou	undary conc	litions	: Pen	alty a	nd Elimir	nation approach,	natural co	ordinate			
systems	and glo	bal coordina	te syst	ems.	Formu	lation of f	inite element mode	el and solut	ion			
					UNI	T – II						
Analysi	s of Bar	Structures	Axia	l or B	ar elen	nent, stiffi	ness matrix for bar	element, p	oroblems			
on bar e	element											
Analysi	s of Tr	uss Structu	ires: 1	ſwo-d	imensi	onal trus	s element, stiffne	ss matrix	for two-			
dimensi	onal trus	ss, simple pr	roblem	s on t	wo-din	nensional	truss structures					
					UNI	Г — III						
Analysi	s of B	eam Struc	tures:	Bea	m ele	ments, s	tiffness matrix f	or beam	element,			
transfor	mation r	natrix, simp	le prol	olems	on bea	am structi	ures – slope and de	eflection of	beams –			
cantilev	er and si	mply suppor	rted be	ams								
					UNI'	Γ – IV						
Two Di	mensior	al Stress	Analys	ses:	Finite	element	modeling for two-	dimensiona	al stress			
analysis	, elemen	t stiffness m	natrix f	or con	nstant	strain tria	ngle (CST) and trea	atment of b	oundary			
conditio	ns, Simp	ole problems	on CS	T eler	nent							
					UNI	T – V						
Dynami	ic Analy	sis: Mass m	atrix o	f bar	elemer	nt. Simple	problems on dyna	mic analys	is of bar			
element												
Steady	State H	eat Transfe	er Ana	lysis:	One-o	limension	al heat transfer ar	nalysis of a	fin and			
wall												

Text Books:

- **1.** Tirupati Chandrupatla and Bellagundu, Introduction to Finite Elements in Engineering, Pearson Education, New Delhi
- 2. S. S. Rao, Finite Element Methods, Pergamom Press, New York
- 3. J. N. Reddy, Introduction to FEM, TMH Publishers, New Delhi

Reference Books:

- 1. David V. Hutton, Fundamentals of Finite Element Analysis, TMH Publishers, New Delhi
- 2. Desai and Abel, Introduction to the Finite Element Methods, CBS Publishers, New Delhi
- **3.** O.P. Gupta, Finite and Boundary Methods in Engineering, Oxford and IBH Publishers, New Delhi

Question Paper Pattern:

Sessional Exam

The question paper for Sessional examination is for 30 marks, covering half of the syllabus for first Sessional and remaining half for second Sessional exam. Question No 1, which carries 6 marks, contains three short answer questions of two marks each. The remaining three questions shall be EITHER/OR type questions carrying 8 marks each

End Exam

ENGINEERING METROLOGY LAB (EMT(P))

VI Ser	nester:	Mechan	ical Engi	neering		Scheme : 2017					
Cours	e Code	Но	ours / Wee	k	Credits	Maximum	n Marks				
ME	312	L	Т	Р	С	Continuous Internal Assessment	End Exam	TOTAL			
		0	0	2	1	50	50	100			
End Exa	am Durati	ion:3 H	rs								
Course	Outcomo	• At the	and of the	0011800	atudanta w	rill be able to					
Course		s: At the		courses							
CO1 :	Measure	dimensio	ons of Line	ar, angu	llar, circul	ar objects using appropr	riate equipn	nent			
CO2 :	Determine the elements of gear and screw threads elements using metrology equipment										
CO3 :	Draw the control charts for the given samples using SQC										
CO4 :	Evaluate	e standaro	l times us	ing work	measurer	nent technique					
	LIST OF EXPERIMENTS										
1. N	1. Measurement of parameters of Screw Threads										
2. I	Measurem	ent of ang	gle of Tape	r plug ga	auge						
3. I	Measurem	ent of ang	gle of Tape	r ring ga	luge						
4. N	Measurem	ent of co-	ordinates	of Jig pla	ate						
5. I	Measurem	ent of tap	er angle o	f an obje	ct using S	ine bar and Bevel Protra	ctor				
6. <i>ε</i>	a). Measur	rement of	angle of th	ne V-bloc	k using ba	all and height gauges					
t	o). Measur	rement of	Radius of	Curvatu	re of a ring	5					
7. N	Measurem	ent of Ge	ar parame	ters usin	ng gear too	th vernier callipers					
8. a	a). To find	small ang	gles and le	ngth me	asuremen	t on objects using Tool M	lakers micr	ro scope			
t	o). To find	small ang	gles and le	ngth me	asuremen	t on objects using Profile	e Projector				
9. N	Measurem	ent of sur	face rough	nness us	ing surfac	e roughness tester					
10.	Work Stu	dy- (a) Me	thod stud	y (b) Tin	ne study						
11.8	11. Statistical Quality Control – X bar and R charts										
12. Acceptance Sampling											
13. 7	To collect 1	the anthro	opometric	data usi	ng "Anthro	opometer"					
Note: St	udent has	to perfor	m at least	10 expe	riments fro	om the above lists					

DATABASE AND COMPUTATIONS PRACTICE LAB (DBC(P))

VI Se	emester:	Mechan	ical Engi	neering	Scheme : 2017					
Cour	se Code	Но	ours / We	ek	Credits	Maximum	Marks			
м	E313	L	т	Р	с	Continuous Internal Assessment	End Exam	TOTAL		
		0	0	2	1	50	50	100		
End E	kam Durat	ion:3H	rs							
Course	e Outcome	s: At the	end of the	e course,	students	will be able to				
CO1 :	Underst	and the S	QL concep	ots						
c02.	Execute the solutions of SQL queries for creating the Tables and Function for retrieving									
CO2:	and manipulation of Data									
CO3 :	Understand the basic MATLAB operations									
CO4 :	Solve the mathematical problems using MATLAB									
	1		I	JST OF	EXPERI	MENTS				
Part A	- SQL									
1.	Introductio	on to Data	abase Mar	lagement	t Systems					
2.	Creating T	ables								
3.	Insertion a	and Manip	pulation of	data in	tables					
4.	Retrieval o	of Data fro	om Tables							
5.	Operators	in SQL								
6.	SQL Funct	tions								
7.	Set operat	ors and jo	oins							
Part I	B – MATLA	В								
1.	Basics									
2.	Matrix Op	erations								
3.	Creating a	script file	<u>e</u>							
4.	Generating	g Graphs	i							
Addit	ional Exe	rcises								
1.	Sub Queri	es (SQL)								
2.	Formatting	g Comma	nds (SQL)							
3.	3D – Plotti	ng (MAT)	LAB)							
Note: S	Student has	s to perfor	rm 10 expe	eriments	, at least 4	from each group				

HEAT TRANSFER LAB (HT(P))

VI Semester: Mechanical Engineering Scheme : 2017								ne : 2017		
Cour	se Code	Но	ours / We	ek	Credits	Maximum	Marks			
м	E314	L	Т	Р	С	Continuous Internal Assessment	End Exam	TOTAL		
		0	0	2	1	50	50	100		
End E	xam Durat	ion:3H	rs							
Course	e Outcome	s : At the	end of the	course	students v	rill be able to				
CO1 :	D1: Determine thermal conductivity and heat transfer coefficient through metals and powders									
CO2 :	Apply heat transfer concepts to interpret heat transfer rate of composite walls, fins									
CO3 :	Analyze	Analyze the performance of heat exchangers								
CO4 :	Apply th	Apply the radiation concepts on different heat transfer equipment								
	LIST OF EXPERIMENTS									
1.	Test on co	mposite v	vall							
2.	a). Test on	Lagged p	oipe							
	b). Test on	Lagged s	phere							
3.	a). Test on	emissivit	ty apparat	us						
	b). Test on	n critical f	lux appara	itus						
4.	Test on St	efan Boltz	zmann app	paratus						
5.	Test on Na	atural con	vection Ec	luipment	t					
6.	Test on pir	n fin appa	aratus							
7.	Test on He	eat Excha	nger							
8.	Test on Me	etal rod e	quipment							
9.	Test on Dr	rop wise a	nd Film w	ise cond	ensation a	pparatus				
10	10. Performance test on refrigeration motor									
Exper	iments be	eyond th	e currici	ılum						
11	.Test on un	nsteady st	ate heat ti	ansfer a	pparatus					
Note: S	Student has	s to perfor	rm at least	10 expe	riments fro	om the above lists				

Four Year B.Tech. Degree Course Scheme of Instruction and Examination (Effective from 2017-18)

VII S	/II Semester Scheme - 2017												
No	Subject	Cada	Scheme of g Instruction g periods / week		of on veek	Duration of	Scheme Max	of Examination imum Marks					
S.]	Subject	Code	Cre	L	D/T	Р	(Hours)	End Exam	Internal Assess ment	Total			
Ι	Theory					1			1				
1.	CAD / CAM	ME401	3	3	-	-	3	60	40	100			
2.	Professional Elective – III		3	3	-	-	3	60	40	100			
3.	Professional Elective – IV		3	3	-	-	3	60	40	100			
4.	Open Elective – III		3	3	-	-	3	60	40	100			
5.	Open Elective – IV		3	3	-	-	3	60	40	100			
6.	MLC – II	ML401	-	2	-	-	-	-	-	-			
II	Practical												
7.	CAE Lab	ME402	1	-	-	2	3	50	50	100			
8.	CAM Lab	ME403	1	-	-	2	3	50	50	100			
9.	Dynamics & Instrumentation Lab	ME404	1	-	-	2	3	50	50	100			
10.	Mini Project - II	ME405	2	-	-	4	-	-	100	100			
	Total		20	17		10	-	450	450	900			

Professional Elective – III (PE-3)

S.No.	Name of the Course
1.	Refrigeration & Air Conditioning
2.	Cryogenics
3.	Design of Heat Transfer Equipment

Open Elective – III (OE-3)

S.No.	Name of the Course
1.	Mechanical Vibrations
2.	Computational Fluid Dynamics
3.	Experimental Stress Analysis
4.	Product Design & Development

Professional Elective - IV (PE-4)

S.No.	Name of the Course
1.	Operations Planning & Control
2.	Quality & Reliability Engineering
3.	Optimization Methods
4.	Six Sigma

Open Elective - IV (OE-4)

	· · · · · · · · · · · · · · · · · · ·
S.No.	Name of the Course
1.	Additive Manufacturing Technology
2.	Intelligent Manufacturing Systems
3.	Advanced Materials Technology
4.	Design for Manufacturing

Mandatory Learning Course - II (MLC-2)

	v 0	· · ·
S.No.	Name of the Course	Offered by Dept
1.	Constitution of India	ME

CAD / CAM (CADM)

VII S	emester:	Mechanie	Mechanical Engineering				Scheme: 20			
Cour	se Code:	Category Hours / Wee			Hours / Week		Maximum Marks			
м	E401	Core	L	т	Р	С	Continuous Internal Assessment	End Exam	TOTAL	
			3	0	-	3	40	60	100	
Session	nal End Exa	am : 2 Hrs					End E	xam Du	ration: 3 Hrs	
Course	Outcomes	: At the end	of the	course	e, stuc	lents will be	able to			
CO1 :	Understar Graphics	nd the need	for C	CAD/CA	AM, 3	D modelling	g, Geometric mo	delling a	nd Computer	
CO2:	Understar cubic spli represent	nd the wirefr ine, Bezier a ation	ame : nd B	models -spline	, solid curve	and surfac s, B-rep, Co	e models, param onstructive Solic	netric rep 1 Geomet	resentation of try and sweep	
CO 3:	Understar DNC and machinin	nd Numerica adaptive con g operations	al Cor ntrol a	ntrol, cl and Wr	lassifi ite co	cation of No mputer assi	C machines, part sted part progra	rt progra ams, APT	mming, CNC, Programs for	
CO 4 :	Understar Compone	nd group te nts and layo	chnol uts	ogy, pa	arts c	lassification	, flexible manu	facturing	g systems, its	
CO 5:	Understar manufact process p	nd material uring, Comp lanning	handl outer	ling sys integra	stems, ted p	automated roduction p	guided vehicles lanning systems	s, Compu s and Co	ter integrated mputer aided	
					UNI	T - I				

Fundamentals of CAD: The design process, applications of computers for design, benefits of CAD, Computer configuration for CAD application, Computer peripherals for CAD, Design of work station and Graphic terminal. CAD software: Definition of system software and application software. CAD database and structure Geometric modeling: 3-D wire frame modeling, wire frame entities and their definitions, Interpolation and approximation of curves, concept of parametric and non-parametric representation of curves

UNIT – II

Curve and Surface Modeling: Generation of plane and space curves. Wire frame models and curve representation - parametric representation of curved shapes - cubic spline, Bezier, B-spline curves. Curve manipulations, Introduction to surface modeling

Solid Modeling: Solid models and entities, solid representation, fundamentals of solid modeling, Boundary representation (B-rep), Constructive Solid Geometry (CSG) and sweep representation, Solid manipulations

UNIT – III

Numerical Control of Manufacturing: Numerical control (NC) definition, Classification of NC machines, Open loop, Closed loop, Absolute, Incremental system, Advantages of NC machines, Machining Centre, Method of NC part programming, computer assisted programming, APT language, APT statements, geometric statement, Motion statement, Post processing statement, Auxiliary statements, Structure of APT programming, simple problems using APT language. CNC, DNC, Adaptive control

UNIT – IV

Group Technology (GT): Group technology fundamentals, Part classification methods, coding systems, advantages of GT, applications of GT

Flexible Manufacturing Systems (FMS): Introduction to FMS, components of FMS, computer system configuration, FMS layouts, FMS compared to other types of manufacturing systems, Types of FMS, benefits of FMS, applications of FMS

UNIT – V

Material Handling: Types of material handling equipment, Automated guided vehicles (AGVs), Vehicle guidance and routing; Traffic control, Benefits of AGV

Computer Integrated manufacturing (CIM): Computerized elements of CIM, Computer integrated production planning systems, Computer aided process planning (CAPP), Retrieval type CAPP system, Generative type CAPP system

Text Books:

1. Ibrahim Zeid, CAD/CAM Theory and Practice, TMH Publishers, New Delhi

2. M.P.Groover and E.W.Zimmers, CAD/CAM, PHI Publishers, New Delhi

3. Mikell P. Groover, Automation of Production Systems and Computer Integrated Manufacturing, PHI Publishers, New Delhi

Reference Books:

- 1. P. N. Rao CAD/CAM principles and operations, Tata McGraw Hill
- 2. Joe Rooney and Philip, Principles of CAD, EWP Publishers, New Delhi
- **3.** K. Lalith Narayan, K. Mallikarjuna Rao, M.M.M. Sarcar, Computer Aided Design and Manufacturing, PHI Private Limited, New Delhi

Question Paper Pattern:

Sessional Exam

The question paper for Sessional examination is for 30 marks, covering half of the syllabus for first Sessional and remaining half for second Sessional exam. Question No 1, which carries 6 marks, contains three short answer questions of two marks each. The remaining three questions shall be EITHER/OR type questions carrying 8 marks each

End Exam

CONSTITUTION OF INDIA (COI)

VII Se	emester:	Mechanical I	Engin	eerin	g		Scheme : 201							
Cours	e Code	Category	Hours / Week			Credits	Maximum Marks							
ML	401	Mandatory Learning	L	Т	Р	P C Internal End Assessment Exam TO								
		Course	2	-	-									
Course	Outcom	es : At the end	of the	e cour	rse, stud	ents will be	e able to							
CO1 :	CO1: Understand the formation and principles of Indian Constitution													
CO2:	CO2: Understand structure and functions of Union government and State executive. Duties of President, Vice president, Prime Minister, Governor, Chief Minister, cabinet and State legislature													
CO 2.	Underst	tand constitut	ional	amer	ndments	of 42,44,	74,76,86 and	91. Cen	tral-State					
003:	relation	s, President ru	le											
CO4:	Underst	tand Indian so	cial st	tructu	ire and l	anguages i	n India. Rights	of women	ı, SC, ST					
	and the	en weaker sectio	on											
CO5:	Underst	tand the struc	ture o	of Juo	diciary, 1	Role and fu	unctions of Sup	oreme Co	urt, High					
	court a	nd Subordinate	e cour	ts, Ju	idicial re	view								
					UNIT –	I								
Historio	cal back	ground, Signifi	cance	e of C	Constitut	ion, Makin	g of the constit	tution, Ro	ole of the					
constitu	lent Asse	embly, Salient f	eatur	es, th	e Pream	ble, Citizen	ship, procedure	for amen	dment of					
Constit	ution, Fu	indamental righ	nts-Di	rectiv	e princip	oles of state	e policy-Election	is in India						
Union	Executive	Structures	of IIm	ion (- UNII -	II ant & Fun	otiona Preside	nt Vice	Drasidant					
Prime	Minister	Cabinet Parli	amen	t. Sta	ate Exec	utive Stru	ictures and Fu	inctions	Governor					
Chief M	linister (Cabinet, Tain	egisle	iti, ou	ate Enec		ctures and ru	inctions,	dovernor,					
					UNIT –	III								
Central	- State R	Relations, Presi	dent's	Rule	e, Consti	tutional Ar	nendments [42	, 44, 74,	76, 86 &					
91]-Cor	nstitution	al functionaries	s, Wo	rking	of Parlia	mentary sy	stem in India							
					UNIT -	IV								
Indian	Social S	tructure, Lang	uages	in I	ndia, Po	litical Part	ies & Pressure	groups,	Rights of					
Women	, SC's, S'	T's & other wea	ıker s	ectior	18									
					UNIT –	V								
Judicia	ry: Struc	cture, Organis	ation	of J	udiciary	, independ	ence of the J	udiciary,	role and					
function	ns of Sup	reme Court, Hi	gh Co	ourts	& Sub or	dinate cou	rts, Judicial Re	view						
Text B	ooks:													
1. Dur	gaDas Ba	asu, Introductio	on to	the Co	onstituti	on of India,	Wadhwa & Cor	mpany						
2. Soc:	iety, An l	Introduction An	nalysi	s by	R.M. Ma	civel and C	Charles H. Page	e, New Yo	ork : Holt,					
Rine	ehart and	Winston, 1949)											

- 3. M.V. Pylee, Indian Constitution, S. Chand Publications
- 4. Subhash C Kashyap: Our Constitution, National Bank Trust, India
- 5. Constitutional Law of india by Dr.S.M.Rajan

Reference Books:

- 1. The Constitution of India by the Ministry of Law and Justice, The Govt. of India
- 2. Constitutional Law of India by Kashyap Subhasah
- **3.** Indian constitution Law by M.P. Jain
- 4. Constitutional Law of India by H.M Seervai

CAE LAB (CAE(P))

VII Se	mester:	Mechan	nical Engineering Scheme : 2					ne : 2017			
Cours	e Code	ode Hours / Week Credits Maximum Marks									
ME	402	L	Т	Р	С	Continuous Internal Assessment	End Exam	TOTAL			
		0	0	2	1	50	50	100			
End Ex	am Durati	ion:3H	rs	1							
Course	Outcome	s : At the	end of the	course,	students	will be able to					
CO1 :	01: Understand basic features of ANSYS										
CO2 :	Analyze the deformation and stresses in beams, trusses and plate using ANSYS										
CO3 :	Analyze	heat tran	sfer on pla	ites usin	g ANSYS						
			I	JST OF	EXPERI	MENTS					
1.	Introductio	on to ANS	SYS softwa	re							
2. /	Analysis of	f 2D Trus	s								
3.	Analysis of	f plate wit	h a hole s	ubjected	to tensile	loading					
4.	Analysis of	f flat recta	angular pla	ate with	a hole und	ler Plane Stress conditio	ns				
5.	Analysis of	f a bracke	t								
6.	Exercise c	on simple	conductio	n							
7.	Analysis c	of square	plate cons	idering c	onduction	and convection					
8. 5	Stress and	deflectio	n analysis	of cantil	lever beam	S					
9. ;	Stress ana	lysis of si	mply supp	orted be	eams						
10.	Analysis c	of bars wit	th differen	t materia	als						
11.	Analysis c	of taper b	ar								
12.	Coupled a	nalysis (structural	and the	rmal)						
Experi	ments be	yond th	e currici	ılum	,						
- 13.	Modal ana	alysis of b	eams								
14.	Fracture 7	Foughnes	s and Fati	gue prob	olems						
15.	Contact p	roblems									
Note: St	udent has	to perfor	m at least	10 expe	riments fro	om the above lists					

CAM LAB (CAM(P))

VII Se	emester:	Mechan	ical Engi	neering	Scheme : 2							
Cour	se Code	Hours / Week			Credits	Maximum Marks						
M	ME403 L T P C Continuous Interna Assessment							TOTAL				
	0 0 2 1 50 50											
End E	End Exam Duration : 3 Hrs											
Course	Outcome	s : At the	end of the	course,	students	will be able to						
CO1 :	Simulate	e the com	ponents ir	ESPIRI'	Г САМ, МА	ASTER CAM						
CO2 :	Write and execute CNC part programs using G and M codes and manufacture components											
CO3 :	Produce	simple co	omponents	s on 3D p	orinter							
			I	IST OF	EXPERI	MENTS						
1.	Modelling	and simu	lation of n	nachinin	g using ES	PRIT CAM for Lathe						
2.	Modelling	and simu	lation of n	nachinin	g using ES	PRIT CAM for Milling						
3.	Modelling	and simu	lation of n	hachining	g using MA	ASTER CAM for LATHE						
4.	Modelling	and simu	lation of n	hachining	g using MA	ASTER CAM for MILLING	r					
5.	Step Turni	ing on HI	FECH CNC	LATHE	(Step Turi	ning)						
6.	Taper Turr	ning on H	ITECH CN	C LATHI	E (Taper Ti	arning)						
7.	Radius Tu	rning on I	HITECH C	NC LATH	IE (Radius	turning)						
8.	Producing	Work pie	ce on HITI	ECH CNC	C MILLING	(Model-1)						
9.	Producing	Work pie	ce on HITI	ECH CNC	C MILLING	(Mode1-2)						
10.	Producing	g a simple	model us	ing 3D P	rinting							
11.	Modelling	and simu	lating Con	nplex geo	ometries u	sing CUT viewer Lathe						
12.	Modelling	and simu	lating Con	nplex geo	metries u	sing CUT viewer Mill						
Note: S	tudent has	to perfor	rm at least	10 expe	riments fro	om the above lists						

DYNAMICS & INSTRUMENTATION LAB (DIN(P))

VII Se	mester:	Mechan	ical Engi	neering		Scheme : 20							
Cours	e Code	Но	Hours / Week			Maximum	n Marks						
ME	404	L	т	Р	с	Continuous Internal Assessment	End Exam	TOTAL					
		0	0	2	1 50 50 100								
End Exa	am Durati	ion:3H	rs		·								
Course	Outcome	s : At the	end of the	course :	students v	vill be able to							
CO1 :	Balance rotating masses in different planes												
CO2:	Measure	the critic	cal speed o	of the sha	aft with fix	ed end conditions							
CO3:	Measure vibration characteristics of spring mass system, rotor system and damped system												
CO4 :	Measure	pressure	e, displace:	ment and	d temperat	ure using instrumentati	on tutors						
			I	JST OF	EXPERI	MENTS							
DYNAN	IICS												
1. I	Determina	tion of Ra	adius of Gy	vration o	f Connecti	ng Rod							
2. I	ongitudin	al Vibrat	ions of Spi	ring-Mas	s System								
3. I	Performan	ce chara	cteristic c	urves of	f Watt, Po	orter, Proell and Hartne	ell Governe	ers using					
τ	Universal (Governer	apparatus	5									
4. S	Static and	Dynamic	balancing	g of rotati	ing masse	s and reciprocating mass	ses						
5. \	/elocity &	Accelerat	tion analys	sis of Car	n & Follov	ver							
6. \	/erification	n of magn	nitude of g	yroscopio	c couple &	applied couple on motor	rized gyroso	cope					
7. \$	Study of D	amped ar	nd Undam	ped Tors	ional Vibr	ations							
8. 1	Corsional V	Vibration	s of Single	and Two	Rotor Sys	stem							
9 . \	/erification	n of Dunk	cerley's Ru	le									
10.	Determina	ation of C	ritical spe	ed or Wh	irling spee	ed of shaft							
INSTRU	JMENTA	TION	-										
11.7	fest on Ins	strumenta	ation Tuto	rs									
12.0	Calibratior	n of Dead	Weight Pr	essure G	lauge								
13.5	Study of si	imple con	trol syster	ns									
14.0	Calibratior	n of rotan	neter										
Note: St	udent has	to perfor	rm at least	10 expe	riments fr	om the above lists							

MINI PROJECT – II (MP2)

VII Se	emester:	Mechanic	al En	ginee	ring		Scheme : 20			
Cours	se Code	Category	Hours / Week		Credits	Maximum Marks				
ME405		Core	L	Т	Р	С	Continuous Internal Assessment	End Exam	TOTAL	
			-	-	4	2	100	-	100	
Course	Outcom	es : At the e	nd of	the c	ourse, s	students w	ill be able to			
CO1·	Identify	project ide	eas,	select	strate	egies and	methodologies	to impleme	nt them;	
	understa	and copy rig	hts a	nd cla	issify th	ne literature	e			
CO 2·	Apply st	Apply standard design and development procedures learnt; solve problems related to								
002.	industry and society ensuring eco-friendly, public safety; and work effectively in teams									
	Utilize n	nodern tool	s of C	CAD,	optimiz	ation meth	nods, numerical	techniques	including	
CO3 :	Design of Experiments and simulation that contribute to obtain the solution of the									
	project p	oroblem								
CO4:	Develop	Develop prototype, perform tests to validate the prototype and analyse the cost and								
04.	effective	ness								
C05.	Organize	e the acqu	aired	knov	wledge	through	preparation of	project rep	port and	
	commur	nicate throug	gh ora	al pres	sentatio	ons				
Four Year B.Tech. Degree Course Scheme of Instruction and Examination (Effective from 2017-18)

VIII	Semester								Scheme	- 2017
No	Subject	Code	dits	s ii pei	Scheme nstructi riods / v	of on veek	Duration of end exam (Hours)	Scheme of Examination Maximum Marks		
S.]	Subject		Cre	L	D/T	Р		End Exam	Internal Assess ment	Total
Ι	Theory									
1.	Professional Elective – V		3	3	-	-	3	60	40	100
2.	Professional Elective – VI	3	3	-	-	3	60	40	100	
II	Practical									
3.	Project Work	ME406	6	-	-	12	3	50	50	100
	Total		12	6	-	12		170	130	300
				(OR					
1.	Internship	ME407	6	-	-	12	-	-	100	100
2.	Project Work	6	-	-	12	3	50	50	100	
	Total		12	-	-	24		50	150	200

Professional Elective – V (PE-5)

S.No	Name of the Course
1.	Industrial Robotics
2.	Computer Numerical Control Machines
3.	Advanced Production Methods
4.	Mechatronics

Professional Elective – VI (PE-6)

S.No	Name of the Course
1.	Renewable Energy Sources
2.	Automobile Engineering
3.	Energy Conservation and Management

PROJECT WORK (PW)

VIII Sem	ester:	Mechanic	al En	ginee	ring		Scheme : 201					
Course (Course Code Category Hours / Week Credits Maximum Marks											
ME40	06	Core	L	Т	Р	С	End Exam	TOTAL				
			-	-	12	6	50	50	100			
End Exam Duration : 3 Hrs												
Course O	utcom	es : At the e	nd of	the c	ourse,	students w	ill be able to					
CO1:	Identi	fy project	ideas,	sele	ct stra	tegies and	methodologies	to impleme	ent them;			
understand copy rights and classify the literature												
	Apply standard design and development procedures learnt; solve problems related											
CO2:	to industry and society ensuring eco-friendly, public safety; and work effectively in											
	teams											
	Utilize	e modern to	ols of	CAD,	, optim	ization met	hods, numerical	techniques	including			
CO3 :	Desig	n of Experir	nents	and	simula	tion that co	ontribute to obta	in the solut	ion of the			
	projec	et problem										
Develop prototype, perform tests to validate the prototype an							ne prototype and	analyse the	e cost and			
	effecti	iveness										
CO5:	Organ	nize the ac	quire	d kn	owledg	e through	preparation of	project re	port and			
	comm	unicate thr	ough	oral p	oresenta	ations						

PROFESSIONAL ELECTIVES

Code	Professional Elective	Name of Course
ME315		IC Engines & Gas Turbines
ME316	PE - 1	Power Plant Engineering
ME317		Introduction to Aeronautical Engineering
ME318		Tool design
ME319	PE – 2	Hydraulics and Pneumatics
ME320]	Non Destructive Testing
ME321		Mechanical Behaviour of Materials
ME408		Refrigeration & Air Conditioning
ME409	PE - 3	Cryogenics
ME410		Design of Heat Transfer Equipment
ME411		Operations Planning & Control
ME412	PE - 4	Quality & Reliability Engineering
ME413		Optimization Methods
ME414		Six Sigma
ME415		Industrial Robotics
ME416	PE - 5	Computer Numerical Control Machines
ME417		Advanced Production Methods
ME418		Mechatronics
ME419		Renewable Energy Sources
ME420	PE - 6	Automobile Engineering
ME421		Energy Conservation And Management

List of Professional Electives

IC ENGINES & GAS TURBINES (ICGT)

V Sem	ester	Mechanica	l Engi	neer	ing	Scheme: 2017					
Course	Code	Category	Hou	rs / V	Week	Credits	Maxi	mum Marks	5		
							Continuous				
ME315		Professional	L	Т	Р	С	Internal	External	TOTAL		
MIEO	10	Elective – I					Assessment				
			3	-	-	3	40	60	100		
Session	al Exai	n Duration: 2 H	rs	1	I		End Exa	am Duratio	n: 3 Hrs		
						1					
Course	Outco	mes : At the end	d of th	e cou	rse, sti	udents will be	able to				
CO1 :	Solve	problems on er	igine p	erfor	mance	parameters					
CO2 :	Unde	erstand the com	oustion	n proe	cess, ca	arburetion, en	nissions of eng	ines			
CO3:	Unde	rstand the work	ing of	supe	rcharge	ers and senso	rs				
CO4 :	Unde	rstand the work	ing of	gas t	urbines	s and its perfo	ormance				
CO5 :	Unde	rstand the work	ing of	jet pr	opulsi	on and its par	ameters				
					UNI	? – I					
IC Eng	ines: I	ntroduction, En	gine p	perfor	mance	parameters,	Calculation of	engine po	wer and		
efficienc	cies, Pe	erformance cha	racteri	stics,	Heat	balance calc	ulation, Measu	arement of	friction		
power a	nd bra	ke power									
					UNIT	- II					
Carbure	tion:	Air-fuel mixtur	es an	d its	requir	ements, Prin	ciple of carbu	retion, Wo	rking of		
simple o	carbure	etor, Basic princ	iple of	mech	- nanical	and electroni	c fuel injection	l	C		
Combu	stion:	Stages of combu	stion	in SI (engines	s and CI engir	nes				
Emissic	ons: Ba	asic categories of	of engi	ne er	nission	s, causes of	HC, CO, and	NOx emissi	ons and		
method	s to co	ntrol them									
					UNIT	– III					
Engine	Elect	ronics: Introdu	ction,	Engir	ne mar	nagement sys	tems, Position	displacem	ent and		
speed so	ensing,	Temperature a	nd Inta	ake ai	ir flow i	measurement					
Superc	hargin	g : Introduction,	advan	tages	and lin	nitations, typ	es of supercha	rgers			
					UNIT	– IV					
Gas Tu	rbines	: Simple Gas T	urbine	e, idea	al cycle	e, essential co	omponents, ope	en and clos	ed cycle		
arrange	ments,	requirements of	of worl	king r	nediun	n, application	s of Gas Turbi	nes, compa	arison of		
Gas Tu	rbines	with reciprocati	ng eng	gines,	work	output and e	fficiency of a s	simple Gas	Turbine		
cycle, o	ptimur	n pressure ratio	o for n	naxim	ium sp	ecific output,	Gas Turbines	with reger	neration,		
reheating and intercooling											
					UNIT	· – V					
Jet Pro	pulsio	n: Introduction	to Pro	peller	engin	es and Gas T	urbine engines	s, working J	principle		
of Ramj	et eng	ine, Pulse jet er	igine,	Turbo	oprop e	engine and Tu	urbojet engine,	Thrust an	d thrust		
equation	n, spe	cific thrust, pa	ramet	ers a	ffecting	g flight perfo	ormance, intro	duction to	Rocket		

propulsion, classification of Rockets and principle of Rocket propulsion

Text Books:

1. V. Ganesan, Internal Combustion Engines, TMH Publishers, New Delhi

2. V. Ganesan, Gas Turbines, TMH Publishers, New Delhi

Reference Books:

1. R.K Rajput, Thermal Engineering, Lakshmi Publications, New Delhi

2. S.L. Soma Sundaran, Gas dynamics and Jet Propulsion, NAI Publishers, New Delhi

3. P.L. Ballaney, Thermal Engineering, Khanna Publishers, New Delhi

4. Sarvanamutto and GFC Rogers, Gas Turbine Theory, Pearson Education, New Delhi

Data Hand Book:

Sreenivasa Reddy, B. and Hemachandra Reddy, K, Thermal Data Handbook, IK International Publishers, Bangalore

Question Paper Pattern:

Sessional Exam

The question paper for Sessional examination is for 30 marks, covering half of the syllabus for first Sessional and remaining half for second Sessional exam. Question No 1 which carries 6 marks contains three short answer questions of two marks each. The remaining three questions shall be EITHER/OR type questions carrying 8 marks each

End Exam

POWER PLANT ENGINEERING (PPE)

V Sem	V Semester Mechanical Engineering Scheme: 2								e: 2017
Course	Code	Category	Hou	ırs / V	Week	Credits	Maximum Marks		
ME316		Professional Elective – I	L	Т	Р	С	Continuous Internal Assessment	TOTAL	
			3	-	-	3	40	60	100
Session	al Exar	n Duration: 2 H	rs				End Exa	a <mark>m Duratio</mark>	n: 3 Hrs
Course	Outcor	nes : At the end	of the	cours	e, stude	ents will be at	ole to		
CO1 :	Unde powe:	rstand the conce r generation	pts of	source	es of en	ergy, combus	tion of fuels and	l combined	cycle
CO2 :	Desci	ribe the idea of ea	conomi	ics of	power §	generation and	d diesel engine p	ower plant	
CO 3:	Analy	rse the working a	nd lay	out of	steam	power plant			
CO 4:	CO 4: Describe the working principle and basi						of the gas turbin	ne power pla	nt
CO 5:	Comp nucle	pare the working ar power plant	princij	ple an	d basic	components	of the hydroelec	tric power p	olant and
					UNIT	' – I			

Sources of Energy: Introduction, different sources of energy, types of power plants, essential requirements of a power plant.

Fuels and Combustion: Coal, fuel oil, natural and petroleum gas, industrial wastes and byproducts, biomass, thermodynamic view, combustion reactions, calculation of weight of air required for combustion, heat of combustion.

Combined Cycle Power Generation: Gas turbine – Steam turbine (combined) power plant, advantages of combined cycle power generation

UNIT – II

Economics of Power Generation: Terms and definitions, load duration curves, power plant economics – construction costs, Fixed cost and depreciation, fuel cost, present worth concept, incremental heat rate, input-output curves.

Diesel Engine Power Plant: Introduction, advantages and disadvantages of diesel power plant, applications of diesel power plant, general layout, essential components of diesel power plant, layout of a diesel engine power plant

UNIT – III

Steam Power Plant: Introduction, classification of steam power plants, layout of a modern steam power plant, fuel handling, combustion equipment for boilers, fluidized bed combustion, advantages and disadvantages of steam power plants, efficiencies in a steam power plant – calculation of different efficiencies – simple problems

UNIT – IV

Gas Turbine Power Plant: General aspects, closed cycle and open cycle plants, applications, advantages and disadvantages of a gas turbine power plant, analysis of a gas turbine power plant, gas turbine fuels, performance of gas turbine plants, components of gas turbine power plant

Hydro-Electric Power Plant: Introduction, advantages and disadvantages, selection of site, essential elements of hydro-electric power plant, classification of hydro-electric power plants, calculation of available hydro power.

 $\mathbf{UNIT} - \mathbf{V}$

Nuclear Power Plant: Chemical and Nuclear reactions, Nuclear Fission, chain reaction, main components of nuclear power plant, essential components of a nuclear reactor, types of reactors, power of nuclear reactor, safety measures for nuclear power plants

Text Books:

1. P.K Nag, Power Plant Engineering, TMH Publishers, New Delhi

2. Manoj Kumar Gupta, Power Plant Engineering, PHI Publishers, New Delhi

Reference Books:

1. R.K Rajput, Power Plant Engineering, Lakshmi Publications, Bengalore

2. G.D. Rai, Power Plant Technology, Khanna Publishers, New Delhi

3. G.R. Nagpal, Power Plant Engineering, Khanna Publishers, New Delhi

Question Paper Pattern:

Sessional Exam

The question paper for Sessional examination is for 30 marks, covering half of the syllabus for first Sessional and remaining half for second Sessional exam. Question No 1 which carries 6 marks contains three short answer questions of two marks each. The remaining three questions shall be EITHER/OR type questions carrying 8 marks each

End Exam

INTRODUCTION TO AERONAUTICAL ENGINEERING (IAE)

V Semester: Mechanical Engineering			Schen	ne : 2017						
Course	e Code	Category	H	ours Week	/	Credits	Maximu	m Marks		
ME317		Professional Elective - I	L	т	Р	С	Continuous Internal Assessment	End Exam	TOTAL	
			3	-	-	3	40	60	100	
Sessional Exam Duration : 2 Hrs End Exam Duration : 3 Hr										
						·				
Course	Outcome	es : At the end o	of the	cour	se, s	tudents wi	ill be able to			
CO 1	Underst configut	and the stru rations	ictura	al co	ompo	onents of	aircraft system,	its layouts	, design	
CO2	Interpre	t the mechanic	al, e	lectric	cal, e	electronic	and hydraulic princip	oles used in	air craft	
02	systems	\$								
CO 3 :	Describ	e the principles	of fli	ght aı	nd ae	erofoil con	cepts			
CO 4 :	: Understand the aircraft structures									
CO 5 :	Underst	and the stabilit	y and	l cont	rol s	ystems of	aircraft			
	I				U	NIT – I				
Introdu	ction to	Aircrafts: Bas	ic co	mpor	ents	of an Ai	rcraft. Structural mer	mbers, Airc	raft Axis	

System, Aircraft Motions, Control surfaces and High lift Devices.

Types of Aircrafts: Lighter than Air/Heavier than Air Aircrafts, Conventional Design, Configurations based on Power Plant Location, Wing vertical location, intake location, Tail Unit Arrangements, Landing Gear Arrangements. Unconventional Configurations-Biplane, Variable Sweep, Canard Layout, Twin Boom Layouts, Span loaders, Blended Body Wing Layout, STOL and STOVL Aircraft, Stealth Aircraft. Advantages and disadvantages of these Configurations

UNIT – II

Mechanical Systems: Environmental control systems (ECS), Pneumatic systems, Hydraulic systems, Fuel systems, Landing gear systems, Engine Control Systems, Ice and rain protection systems, Cabin Pressurization and Air Conditioning Systems, Steering and Brakes Systems Auxiliary Power Unit

Electrical systems: Avionics, Flight controls, Autopilot and Flight Management Systems, Navigation Systems, Communication, Information systems, Radar System

UNIT – III

Basic Principles of Flight: Significance of speed of Sound, Air speed and Ground Speed, Properties of Atmosphere, Bernoulli's Equation, Forces on the airplane, Airflow over wing section, Pressure Distribution over a wing section, Generation of Lift, Drag, Pitching moments, Types of Drag, Lift curve, Drag Curve, Lift/Drag Ratio Curve, Factors affecting Lift and Drag, Center of Pressure and its effects

Aerofoil: Aerofoil Nomenclature, Types of Aerofoil, Wing Section- Aerodynamic Center, Aspect Ratio, Effects of lift, Drag, speed, Air density on drag

UNIT – IV

BASICS OF AIRCRAFT STRUCTURES: General types of construction, Monocoque, semimonocoque and geodesic constructions, typical wing and fuselage structure. Metallic and nonmetallic materials. Use of Aluminium alloy, titanium, stainless steel and composite materials. Stresses and strains-Hooke's law- stress-strain diagrams, elastic constants-Factor of Safety

$\mathbf{UNIT} - \mathbf{V}$

Stability and Control: Degree of Stability- Lateral, Longitudinal and Directional Stability and controls of Aircraft. Effects of Flaps and Slats on Lift Coefficients, Control Tabs, Stalling, Landing, Gliding Turning, Speed of Sound, Mach Numbers, Shock Waves, Mach Waves, Mach Angles, Sonic and Supersonic Flight and its effects

Text Books:

1. Flight without Formulae by A.C Kermode, Pearson Education

2. Mechanics of Flight by A.C Kermode, Pearson Education

3. Fundamentals Of Flight, Shevell, Pearson Education

4. Introduction to Flight by John David Anderson, McGraw Hill

Reference Books:

 Manuel Soler, Fundamentals of Aerospace Engineering: An Introductory Course to Aeronautical Engineering, Create Space Independent Publishing Platform

Question Paper Pattern:

Sessional Exam

The question paper for Sessional examination is for 30 marks, covering half of the syllabus for first Sessional and remaining half for second Sessional exam. Question No 1 which carries 6 marks contains three short answer questions of two marks each. The remaining three questions shall be EITHER/OR type questions carrying 8 marks each

End Exam

TOOL DESIGN (TD)

VI Sen	nester:	Mechanical	Engi	neeri	ng			Scheme : 2017				
Course	e Code	Category	H	ours Week	/	Credits	Maximur	n Marks				
ME	318	Professional Elective - II	L	т	Р	С	Continuous Internal Assessment	End Exam	TOTAL			
			3	-	-	3	40	60	100			
Session	al Exam	Duration : 2 H	rs	•			End Exa	am Duratio	n : 3 Hrs			
Course	Outcome	es : At the end o	of the	cours	se, s	tudents w	ill be able to					
CO1 :	Solve th	e problems rela	ated t	o the	meta	al cutting	mechanics, the tool we	ar concept,	tool life			
	estimati	ion, significance	e of c	utting	par	ameters of	n tool life		of montol			
CO2 :	Cutting	and the proper	ties o	i cutt	ing t	ool materi	ais, cutting liuids and	economics (oi metai			
CO3 :	Underst	and the design	conc	epts c	of cu	tting tools	in manufacturing					
	Underst	and the press	work	ting to	ermi	nology, sł	neet metal operations	including s	hearing			
CO4 :	and form	ming, design pr	rincip -	les of	pre	ss tools, c	entre of pressure, scra	ap strip layo	out and			
CO5 :	Underst	and the design	conc	epts c	of jigs	s, fixtures						
		5		1	J U	NIT _ I						
Metal (Cutting:	Classification	of m	etal	cutti	ng operat	tions, mechanics of 1	metal cuttir	ng, tool			
signatu	re, obliqu	ae and orthogo	nal c	cutting	g, R	eview of l	Merchant's theory of	metal cuttir	ng, Two			
compon	ent tool d	lynamometer.										
Tool W	ear and '	Tool Life: Sou	rces	of hea	at in	metal cu	tting, heat dissipation	and distrib	oution to			
chip, to	ol and wo	ork piece, meth	ods c	of eval	uati	ng temper	ature at tool-chip inte	rface. Mach	inability,			
factors a	affecting	machinability,	mech	anisn	n of	tool wear	and various types of t	ool wear-cra	ater wear			
and flar	nk wear.	Introduction to	tool	life, '	Taylo	or's tool li	fe equation, effects of	tool geomet	try, feed,			
depth of	f cut, cutt	ting speed on to	ol life	2								
					U	NIT – II						
Cutting	Tool Ma	aterials: Essen	itial 1	requir	eme	nts of a t	ool material, tool mate	erials - HCS	S, HSS,			
Cast all	oys, Carb	ides, Ceramic t	ools,	Diam	ond	tool bits						
Cutting	Fluids:	Essential requi	ireme	nts o	fag	good cuttin	ng fluid, types of cutti	ng fluids ar	nd their			
relative	applicatio	ons										
Econon	nics of M	achining: Intro	ducti	on, eo	cono	mic tool li 	fe, derivations on optin	nal cutting s	speed to			
– maxim	ium prod	uction, maximu	ım pr	ofit a	nd m	iinimum c	cost criteria.					
Desim	- 6 0				UN	IIT – III	t 1 1	4				
Design		ig Tools: Desig	n oi s	single	poir	it cutting	tool, elements of twist	drill and its	s design			
consider	rations, L		g cutt	ers								
Dross W	orting. I	Press working t	ormir			NIT – IV	ions nunching blonk	ing and oth	er tunes			
of proce working energing and deep drawing banking and other types								Design				
consider	press working operations, drawing and deep drawing, bending and lorging, Design											
Press T	ools: tvn	es of cutting di	es ar	nd the	ir w	orking de	sign considerations for	r press tool	s-centre			
of press	ure, scrat	o strip lavout r	oress	tonna	ige c	apacity et		- p1000 (001)				
p-000		rh, out, h			-0		-					

UNIT – V

Jigs and Fixtures : Definition, elements of jigs and fixtures, difference between jig and fixture,3-2-1 principle of location, locating devices, clamping devices Design features, principles and considerations of jigs and fixtures with examples (drill jig and milling fixture)

Text Books:

1. P. C. Sharma, Production Engineering, S. Chand Publishers, New Delhi

2. Amitabha Ghose and Mallik , Manufacturing Science, EWP Publishers, New Delhi

3. Donaldson, Tool Design, TMH Publishers, New Delhi

Reference Books:

1. Roy A. Lindberg, Processes and Materials of Manufacture, PHI Publishers, New Delhi

2. G. R. Nagpal, Tool Engineering & Design, Khanna Publishers, New Delhi

3. ASTME, Fundamentals of Tool Design, PHI Publishers, New Delhi

4. R.K. Jain, Production Technology, Khanna Publishers, New Delhi

5. G.R. Nagpal, Metal Forming Processes, Khanna Publishers, New Delhi

Question Paper Pattern:

Sessional Exam

The question paper for Sessional examination is for 30 marks, covering half of the syllabus for first Sessional and remaining half for second Sessional exam. Question No 1 which carries 6 marks contains three short answer questions of two marks each. The remaining three questions shall be EITHER/OR type questions carrying 8 marks each

End Exam

HYDRAULICS AND PNEUMATICS (HAP)

VI Ser	nester:	Mechanical	Engi	neeri	ng			Schen	ne : 2017
Cours	e Code	Category	Hours / Week		Credits	Maximu	m Marks		
ME	319	Professional Elective - II	L	т	Р	С	Continuous Internal Assessment	End Exam	TOTAL
			3	-	-	3	40	60	100
Session	al Exam	Duration : 2 H	lrs				End Ex	am Duratio	n : 3 Hrs
Course	Outcome	es: At the end o	of the	cour	se, s	tudents w	ill be able to		
CO1 :	Underst	and Properties	of Fl	uid a	nd I	Pascal's la	w applied to Fluid pow	ver system	
CO2:	Underst	and the constru	uctio	n and	ope	ration of H	ydraulic pumps		
CO3:	Analyse	the control cor	npon	ents c	of hy	draulic sys	stem		
CO4 :	Underst	and the charac	terist	tics of	com	pressed a	ir and components of	pneumatic s	ystems
CO5 :	Design a	and analyse the	e hydi	raulic	and	pneumat	c circuits		
					U	NIT – I			
Introdu	iction to	Hydraulic Pow	ver: D	Definit	ion (of fluid po	wer, Advantages of flu	id power, Ap	oplication
of fluid	power sy	stem, structure	e of th	ne flu	id po	ower syste	ms, Choice of working	g medium, F	roperties
of Fluid	s, Fluid F	'low, Pascal's La	aw, A	pplica	tion	s of Pasca	l's Law		
					U	NIT – II			
Hydrau	lic Pump	s: Classification	n of p	oump	s-Ge	ar pumps	vane pumps, Piston	pumps; Con	struction
and wor	rking of p	umps, Pump pe	erforn	nance	-Var	iable displ	acement pumps.		
Fluid p	ower Ac	tuators : Linea	r hyo	drauli	c ac	ctuators-T	pes of hydraulic cyl	inders-Sing	le acting,
Double	acting, s	pecial cylinders	s like	e Tano	dem	Telescopi	c. Construction of do	uble acting	cylinder,
Rotary a	actuators	. Fluid motors-	Gear	, Vane	e ano	d Piston m	otors		
					U	III – TII			
Contro	l compon	ients in hydra	ulic	syste	ms:	Construct	ion and operation of	control com	ponents-
directio	n control	valve-Ball chec	k val	ve, Po	oppe	t or Seat v	valve, shuttle valve- 2,	/2 way -3/2	way-4/2
way. So	olenoid ac	ctuated valve, 1	Press	ure c	ontr	ol valves-	Pressure relief valve	or Pressure	e limiting
valve,	Pressure	reducing valve	e, Pı	ressur	e s	equence	valve; Flow control	valves-Non	pressure
compen	sated val	ves Pressure co	mne	nsate	d val	ves			

UNIT – IV

Pneumatic System Components: Characteristics of compressed air, Basic components of pneumatic systems. Fluid conditioners- air filters, Air regulators, Air Lubricator. Pneumatic Control valves-Direction control valves, Quick exhaust valves, Pressure control valves. Pneumatic Actuators-linear actuator or Pneumatic cylinders, Rotary actuator or air motors

$\mathbf{UNIT} - \mathbf{V}$

Design of Hydraulic and Pneumatic Circuits: Control of a Single acting Hydraulic cylinder circuit, Circuit of a Double acting Hydraulic cylinder, Circuit of a Counter balance valve application. Cylinder synchronizing circuits- cylinders in parallel, Cylinders in series. Pneumatic Circuit of single acting cylinder control, Pneumatic Circuit of double acting cylinder control

Text Books:

- T. Jagadeesha, Hydraulics and Pneumatics, I. K. International Publishing House Pvt. Ltd, New Delhi
- **2.** P. K. Chandrasekhara, Fluid Power(A text book of Hydraulics and Pneumatics), Everest Publishing House, Pune
- **3.** Andrew Parr, Hydraulics and Pneumatics, Jaico Publishing House

Reference Books:

- 1. Langov Soundarrajan, Introduction to Hydraulics and Pneumatics, Prentice hall of India, New Delhi
- 2. H. L. Stewart, Hydraulics and Pneumatics, Industrial Press

Question Paper Pattern:

Sessional Exam

The question paper for Sessional examination is for 30 marks, covering half of the syllabus for first Sessional and remaining half for second Sessional exam. Question No 1 which carries 6 marks contains three short answer questions of two marks each. The remaining three questions shall be EITHER/OR type questions carrying 8 marks each

End Exam

NON DESTRUCTIVE TESTING (NDT)

VI Ser	nester:	Mechanical	Engi	neeri	ng			Schen	ne : 2017
Cours	e Code	Category	H	ours Week	/	Credits	Maximu	m Marks	-
ME	320	Professional Elective - II	L	т	Р	С	Continuous Internal Assessment	End Exam	TOTAL
			3	-	-	3	40	60	100
Session	al Exam	Duration : 2 H	irs				End Ex	am Duratio	n : 3 Hrs
Course	Outcom	es : At the end o	of the	cour	se, s	tudents w	ill be able to		
CO1 :	Underst	tand the princip	oles a	nd cla	assifi	cation of I	NDT methods for failur	re identifica	tion
CO2 :	Underst	tand the theory	of su	rface	NDT	`and tech	niques involved in it		
CO3 :	Underst	tand Thermogra	phy a	and E	ddy	current te	sting methods to detec	et the flaws	
CO4 :	Identify	the flaws and leal	ks in t	he cor	npon	ents using	ultrasonic and acoustic	emission Met	hods
CO5 :	Utilize r	adiography to i	denti	fy und	lerly	ing failure	sites		
					U	NIT – I			
Overvie	w Of ND	T:							
NDT Ve	rsus Mec	hanical testing,	Over	rview	of th	ne Non De	structive Testing Meth	ods for the	detection
of man	ufacturin	g defects as w	ell a	s mat	teria	l characte	erisation. Relative me	rits and lir	nitations,
Various	physical	characteristics	s of 1	nater	ials	and their	applications in NDT,	Visual ins	pection –
Unaideo	l and aide	ed							
					U	NIT – II			
Surface	NDT M	ethods: Liquid	l Per	ietrar	nt T	esting –	Principles, types and	properties	of liquid
penetra	nts, deve	elopers, advan	tages	and	lım	iitations	of various methods,	Testing P	rocedure,
Magnet		results	0.01777	of m	00000	tion inor	notion motorials Ma	motiontion	mathada
Internre	tation a	nd evaluation	of te	of ind	dicat	ions Prir	ciples and methods	of demogra	etization
Residua	il magnet	ism	or ic	St III	iicai	.10115, 1111	leipies and methods	or ucmagn	cuzation,
ittobiada					TIN				
Thermo	graphy A	And Eddy Curr	ent T	estin	g:	11 - 111			
Thermo	ography-	Principles. Con	tact	and n	on-c	contact ins	spection methods. Tec	hniques for	applving
liquid	crystals,	Advantages	and	limita	ation	n – infra	ared radiation and	infrared of	detectors,
Instrum	entations	s and methods,	appli	catior	ıs				,
Eddy C	urrent T	'esting - Gener	ation	of eq	ldy (currents,	Properties of eddy cu	rrents, Edd	y current
sensing	element	s, Probes, Ins	trum	entati	ion,	Types of	arrangement, Applie	cations, ad	vantages,
Limitati	ons, Inter	rpretation/Eval	uatio	n					
					UN	NIT – IV			
Ultraso	nic Testi	ng And Acoust	ic Er	nissio	on:				
Ultraso	nic Testin	g-Principle, Tra	nsdu	lcers,	tran	smission a	and pulse-echo metho	d, straight l	beam and
angle 1	beam, in	strumentation,	data	a rep	orese	ntation,	A-Scan, B-scan, C-s	scan. Phas	ed Array

Ultrasound, Time of Flight Diffraction

Acoustic Emission Technique – Principle, AE parameters, Applications

$\mathbf{UNIT} - \mathbf{V}$

Radiography:

Principle, interaction of X-Ray with matter, imaging, film and film less techniques, types and use of filters and screens, geometric factors, Inverse square law, characteristics of films – graininess, density, speed, contrast, characteristic curves, Penetrometers, Exposure charts, Radiographic equivalence. Fluoroscopy- Xero -Radiography, Computed Radiography, Computed Tomography

Text Books:

- 1. Baldev Raj, T.Jaya kumar, M.Thavasimuthu, Practical Non-Destructive Testing, Narosa Publishing House
- **2.** Ravi Prakash, Non-Destructive Testing Techniques, 1st revised edition, New Age International Publishers

Reference Books:

 ASM Metals Handbook, Non-Destructive Evaluation and Quality Control, American Society of Metals, Metals Park, Ohio, USA

2. Paul E Mix, Introduction to Non-destructive testing: a training guide, Wiley, New Jersey

3. Charles, J. Hellier, Handbook of Non-Destructive evaluation, Mc Graw Hill, New York

4. Dr. V. Jayakumar, Dr. K. Elangovan, Non-Destructive Testing of Materials Lakshmi

Question Paper Pattern:

Sessional Exam

The question paper for Sessional examination is for 30 marks, covering half of the syllabus for first Sessional and remaining half for second Sessional exam. Question No 1 which carries 6 marks contains three short answer questions of two marks each. The remaining three questions shall be EITHER/OR type questions carrying 8 marks each

End Exam

MECHANICAL BEHAVIOUR OF MATERIALS (MBM)

VI Se	mester:	Mechanical	Engi	neeri	ng			Schen	ne : 2017
Cours	se Code	Category	H	ours Week	/	Credits	Maximu	m Marks	
ME321		Professional Elective - II	L	т	Р	С	Continuous Internal Assessment	End Exam 60	TOTAL
			3	-	-	3	40		100
Session	nal Exam	Duration : 2 H	rs				n: 3 Hrs		
						I			
Course	Outcom	es : At the end o	of the	cour	se, s	tudents wil	ll be able to		
CO1 :	Unders	tand the deform	ation	beha	avior	of material	s		
CO2 :	Unders	tand the elastic	beha	vior c	of the	e metals			
CO3 :	Unders	tand the plastic	defor	rmatio	on ai	nd their dis	locations		
CO4 :	Unders	tand the fractur	e and	l fatig	gue b	ehaviour o	fmaterials		
CO5 :	Unders	tand creep beha	vior o	of ma	teria	ls			
					U	NIT – I			

Introduction to deformation behavior: Concept of stresses and strains, engineering stresses and strains, Different types of loading and temperature encountered in applications, Tensile Test - stress-strain response for metal, ceramic and polymer, elastic region, yield point, plastic deformation, necking and fracture, Bonding and Material Behaviour, theoretical estimates of yield strength in metals and ceramics

UNIT – II

Elasticity Theory: The State of Stress and strain, stress and strain tensor, tensor transformation, principal stress and strain, elastic stress-strain relation, anisotropy, elastic behaviour of metals, ceramics and polymers

Yielding and Plastic Deformation: yield criteria and yield surface, texture and distortion of yield surface, Limitation of engineering strain at large deformation, true stress and true strain, effective stress, effective strain, flow rules, strain hardening, stress-strain relation in plasticity, plastic deformation of metals and polymers

UNIT – III

Microscopic view of plastic deformation: Crystals and defects, classification of defects, thermodynamics of defects, geometry of dislocations, slip and glide, dislocation generation - Frank Read and grain boundary sources, stress and strain field around dislocations, force on dislocation - self-stress, dislocation interactions, partial dislocations, twinning, dislocation movement and strain rate, deformation behavior of single crystal, Critical Resolved Shear Stress (CRSS), deformation of poly-crystals - Hall-Petch and other hardening mechanisms, grain size effect - source limited plasticity, Hall-Petch breakdown, dislocations in ceramics and glasses

UNIT – IV

Fracture: Fracture in ceramics, polymers and metals, different types of fractures in metals, fracture mechanics - Linear fracture mechanics - KIC, elasto-plastic fracture mechanics - JIC, Measurement and ASTM standards, Design based on fracture mechanics, application of fracture mechanics in the design of metals, ceramics and polymers

Deformation under cyclic load - Fatigue: S-N curves, Low and high cycle fatigue, Life cycle prediction, Fatigue in metals, ceramics and polymers

UNIT – V

Deformation at High temperature: Time dependent deformation - creep, different stages of creep, creep and stress rupture, creep mechanisms and creep mechanism maps, creep under multi-axial loading, micro structural aspects of creep, high temperature deformation of ceramics and polymers

Text Books:

- 1. G.E. Dieter, Mechanical Metallurgy, McGraw-Hill
- 2. A.K. Bhargava & C.P Sharma, Mechanical behaviour and testing of materials, PHI publication
- **3.** Joachim Roesler, Harald Harders, Martin Baeker, Mechanical Behaviour of Engineering Materials Metals, Ceramics, Polymers, and Composites, Springer

Reference Books:

- 1. J. Roesler, H. Harders, and M. Baeker, Mechanical Behaviour of Engineering Materials: Metals, Ceramics, Polymers, and Composites", Springer Verlag.
- W.K. Liu, E. G. Karpov, H. S. Park, Nano Mechanics and Materials, John Wiley and Sons Pvt. Ltd
- 3. Thomas H. Courtney, Mechanical Behaviour of Materials, McGraw-Hill.
- **4.** R.W. Hertzberg, Deformation and Fracture Mechanics of Engineering Materials, John Wiley & Sons.
- 5. Prashant Kumar. R, Elements of Fracture Mechanics, Tata Mc Graw Hill, New Delhi, India

Question Paper Pattern:

Sessional Exam

The question paper for Sessional examination is for 30 marks, covering half of the syllabus for first Sessional and remaining half for second Sessional exam. Question No 1 which carries 6 marks contains three short answer questions of two marks each. The remaining three questions shall be EITHER/OR type questions carrying 8 marks each

End Exam

REFRIGERATION AND AIR CONDITIONING (RAC)

VII Sen	nester:	Mechanical I	Engin	eerin	g			Schen	ne : 2017		
Course	Code	Category	H	ours	/	Credits	Maximur	n Marks			
			,	Week							
							Continuous				
		Professional	L	Т	Р	С	Internal	End			
IVIE2	108	Elective - III					Assessment	Exam	TOTAL		
			3	-	-	3	40	60	100		
Session	al Exar	n Duration : 2 H	[rs		1		End Exa	m Duratio	n : 3 Hrs		
Course	Outcor	nes : At the end	of the	cour	se, s	tudents w	ill be able to				
CO1 :	Under	stand different m	etho	ds of 1	refrig	geration ar	nd the applications				
CO2 :	Classi	fy different types	of re	frigera	ants	and their	impact on the environr	nent			
CO3:	Under	stand the vapour	abso	orptio	n ref	rigeration	and other refrigeration	systems			
CO4:	Solve	load calculations	for a	ir con	ditio	ning syste	ems				
CO5 :	Understand the knowledge of different equipment used in Air conditioning systems										
UNIT – I											
Introduction: Methods of refrigeration											
Gas cy	cle refri	geration -Air rea	friger	ation,	Idea	al and actu	ual cycles, aircraft refr	igeration ar	nd simple		
problen	18										
Vapor	compre	ssion refrigerat	ion s	yster	n –	Working	principle, effect of sub	o cooling a	nd super		
heating	, ideal a	nd actual cycle, i	nume	rical j	prob	lems					
					U	NIT – II					
Vapour	Compr	ession Refrigera	ation	Syst	em	Compone	nts: General classifica	tion of com	pressors,		
conden	sers, eva	aporators and exp	pansi	on de	vices	and work	ing principles				
Refrige	rants:	Desirable proper	ties,	Class	sifica	tion of re	efrigerants, Nomenclat	ure, Envir	onmental		
impact											
					UI	IIT – III					
Vapour	Absorp	tion Refrigerati	on sy	vstem	: Int	roduction	– practical vapour abs	orption refi	rigeration		
system,	Lithiu	m-Bromide abso	orptio	n ref	riger	ation sys	tem, three fluid abso	orption refi	rigeration		
system	and con	nparison of comp	ressi	on an	d ab	sorption r	efrigeration systems				
Other I	Refriger	ation systems:	Work	ing pr	rincij	ples of Ste	am jet refrigeration sys	stem, Thern	noelectric		
refriger	ator, Vo	rtex & Pulse tube	e refri	gerato	ors						
					UI	NIT – IV					
Introdu	iction '	Fo Air Conditio	ning	: Psyc	hror	netric pro	perties & processes –	characteri	zation of		
sensible	e and la	tent heat loads –	- nee	d for v	venti	lation, cor	nsideration of infiltration	on – load co	ncepts of		
RSHF,	GSHF- j	problems, concep	ot of l	ESHF	and	ADP tem	perature. Requirement	s of humar	n comfort		
and con	ncept of	f effective temper	rature	e- cor	nfor	t chart –c	omfort air conditionin	g – require	ments of		
industr	ial air co	onditioning, air c	onditi	ioning	g loa	d calculati	ons				

UNIT – V

Air Conditioning Systems: Classification of equipment, cooling, heating, humidification and dehumidification, filters, grills and registers fans and blowers. heat pump – heat sources – different heat pump circuits

Text Books:

1. C. P. Arora, Refrigeration and Air Conditioning, TMH Publishers, New Delhi.

2. Domkundwar, Arora, Domkundwar A course in Refrigeration and Air Conditioning, Dhanpati Rai publications, New Delhi.

Reference Books:

- 1. R.S. Khurmi , J.K. Gupta, Refrigeration and Air Conditioning, S.Chand publications
- 2. Dossat , Principles of Refrigeration, Pearson Education, New Delhi

3. Manohar Prasad , Refrigeration and Air Conditioning, NAI Publishers, New Delhi

4. R.K. Rajput, Refrigeration and Air Conditioning, Kataria & Sons, New Delhi

Data Hand Book:

Sreenivasa Reddy, B. and Hemachandra Reddy, K., *Thermal Data Handbook*, IK International Publishers, Bangalore

Question Paper Pattern:

Sessional Exam

The question paper for Sessional examination is for 30 marks, covering half of the syllabus for first Sessional and remaining half for second Sessional exam. Question No 1 which carries 6 marks contains three short answer questions of two marks each. The remaining three questions shall be EITHER/OR type questions carrying 8 marks each

End Exam

CRYOGENICS (CRG)

VII Sem	lester:	Mechanical H	Engineering					Schem	e: 2017		
Course	Code	Category	Hours / Week			Credits	Maximun	n Marks			
ME4	09	Professional Elective - III	L	т	Р	С	Continuous Internal Assessment	End Exam	TOTAL		
			3	-	-	3	40	60	100		
Session	al Exan	n Duration : 2 H	rs				End Exa	m Duratio	n : 3 Hrs		
Course	Outcon	nes : At the end o	of the	cour	se, s	tudents w	ill be able to				
CO1 :	Under	stand the concep	ot of c	ryoge	nic s	system and	l its applications				
CO2 :	Know	the concepts of li	quefa	action	of g	asses.					
CO3 :	Under	stand the concep	t of g	gas sej	para	tion.					
CO4 :	Under	stand the concep	t of l	ow ter	nper	ature insu	lation and handling of	cryogenic 1	iquids		
CO5 :	Under	stand the concer	ot of c	rvoge	nic r	efrigeratio	n system	5.0	1		
	UNIT – I										
Introdu	Introduction to Cryogenic Systems: Historical development. Low Temperature properties of										
Enginee	Engineering Materials, Mechanical properties- Thermal properties- Electric and magnetic properties										
– Cryoge	- Cryogenic fluids and their properties.										
Applica	tions o	f Cryogenics : A _f	oplica	tions	in s	pace, Food	1 Processing, super cor	nductivity, 1	Electrical		
Power,	Biology,	Medicine, Elect	ronic	s and	1 Cu	tting Tool	Industry. Low tempe	rature prop	perties of		
enginee	ring ma ⁻	terials									
					U	II – TIN					
Gas liq	uefacti	on: Introduction	n-Pro	ductio	on o	f low ten	nperatures-General Lic	quefaction	systems-		
Liquefac	ction sys	stems for Neon, H	łydro	gen a	nd H	lelium –Cr	itical components of Li	quefaction	systems		
					U	IIT – III					
Cooling	by adia	abatic de-magne	tizati	on -	Gas	separatio	n and cryogenic sy	stems-sepa	ration of		
gases- F	Rectifyin	g Columns-Air	sepa	rating	- sin	gle and do	uble columns, Air sepa	ration plan	t		
					UI	NIT – IV					
Cryoger	nic flui	d storage: Cryog	genic	Stora	age v	vessels an	d Transportation, Cryo	ogenic fluid	transfer		
systems											
Cryoger	nic Insu	lation Thermal	insul	ation	and	their perf	ormance at cryogenic t	emperature	es, Super		
Insulati	ons, Va	ccum insulation	and I	Powde	r ins	ulation					
					U	NIT – V					
Cryogen	nic Ref	rigeration syste	ems:	Ideal	Ref	rigeration	systems, Refrigeration	n using liq	uids and		
gases as	s refrige	rant- Refrigerator	rs us	ing so	lids	as working	g media				
Text Bo	oks:	~	~		<u> </u>	1					
1. Ran	dall F. E	Barron, Cryogenio	c Sys	tems,	Oxfo	ord Univer	sity Press, New York				
2. Man	nata Mu	khopadhyay, Fu	ndan	nental	s of	Cryogenic	Engineering, PHI, Delh	i			

Reference Books:

 Domkundwar, Arora & Domkundwar, Course in Refrigeration & Air-Conditioning, Dhanpatrai & Co, New Delhi

Question Paper Pattern:

Sessional Exam

The question paper for Sessional examination is for 30 marks, covering half of the syllabus for first Sessional and remaining half for second Sessional exam. Question No 1 which carries 6 marks contains three short answer questions of two marks each. The remaining three questions shall be EITHER/OR type questions carrying 8 marks each

End Exam

DESIGN OF HEAT TRANSFER EQUIPMENT (DHE)

VII Se	mester	Mechanical E	ngin	eerin	g	Scheme : 20					
Cours	e Code	Category	H	ours Week	/	Credits	Maximum Marks				
ME410		Professional Elective - III	L	Т	Р	С	Continuous Internal Assessment	End Exam	TOTAL		
	З		0	-	3	40	60	100			
Session	al Exam I	Duration : 2 Hrs					End Ex	am Duratio	n : 3 Hrs		
Course	Outcome	s : At the end of t	he co	ourse,	stu	dents will	be able to				
CO1 :	Apply the	e Kay and Londo	n cha	art in	the	design pro	cedure of heat exchan	gers			
CO2:	Apply de	sign procedure of	f Evaj	porato	ors a	nd compre	essors				
CO3 :	Understa	and the concepts	of he	at pip	e						
CO4 :	Understa	and the concepts	of co	oling	towe	rs and spr	ray ponds				
CO5 :	O5: Apply design procedure of ducts and fans										
UNIT – I											
Design	Design Of Heat Exchangers : Introduction - mean temperature differences for parallel and counter										

flow- effectiveness method N.T.U-kay and London charts.

Design of Condensers: Types-overall heat transfer coefficients- temperature distribution and heat flow in a condenser-pressure drop in a condenser –extended fin surfaces-consideration of fouling factor-L.M.T.D. correction factor

UNIT – II

Design Of Evaporators: Introduction-Temperature distribution and heat flow in an evaporatorpressure drop- factors to be consider in the design of heat transfer equipment-types of heat consideration of fouling factor – correction factor

Design Of Compressors: Types-equivalent shaft work-volumetric efficiency-factors affecting total volumetric efficiency –compound compression with inter cooling- rotary compressors-surging

UNIT – III

Heat Pipe: Introduction, working of Heat Pipe, Different types of Heat Pipes, Details of Heat Pipe components, Advantages, Applications, Performance, Limitations of Heat Pipe. Design Criteria of Heat Pipe

UNIT – IV

Design of Cooling Towers and Spray Ponds: Classification - Performance of cooling towers – analysis of counter flow cooling towers- enthalpy-temperature diagram of air and water- cooling ponds- types of cooling ponds –cross flow cooling towers- procedure for calculation of outlet conditions

UNIT – V

Design Of Ducts: Continuity equation-Bernoulli's equation-pressure losses-frictional chartscoefficient of resistance for fillings- duct sizing methods

Design Of Fans: Standard air-fan horsepower-fan efficiency-similarity laws-fan laws-performance coefficients- theoretical expression for total pressure drop by a fan-centrifugal fan- axial flow fan-system resistance

Text Books:

- 1. S. C. Arora, S. Domkundwar, Anand V. Domkundwar, A Course in Heat and Mass Transfer Dhanpat Rai & Co.(P) Ltd-Delhi
- 2. P L Ballaney, Refrigeration and Air Conditioning, Khanna publications

3. C Arora, Refrigeration and Air Conditioning, McGraw Hill Education

Reference Books:

- **1.** R. K. shah, E. C. Subbarao, R. A. Mashelkar, Heat Transfer Equipment Design, Hemisphere publishing corporation
- **2.** Stanley M. Walas, Chemical process equipment selection and design, Butterworths series in chemical engineering
- 3. Stoecker ,Refrigeration and Air Conditioning, McGraw-Hill Higher Education

Question Paper Pattern:

Sessional Exam

The question paper for Sessional examination is for 30 marks, covering half of the syllabus for first Sessional and remaining half for second Sessional exam. Question No 1 which carries 6 marks contains three short answer questions of two marks each. The remaining three questions shall be EITHER/OR type questions carrying 8 marks each

End Exam

OPERATIONS PLANNING & CONTROL (OPC)

VII Sem	ester:	Mechanical H	Engin	leerin	g			Schem	e : 2017	
Course	Code	Category	Hours / Week			Credits	Maximun	1 Marks		
ME4	-11	Professional Elective – IV	L 3	T	P -	С 3	Continuous Internal Assessment 40	End Exam 60	TOTAL 100	
Session	al Exar	n Duration : 2 H	rs				End Exa	m Duratio	n : 3 Hrs	
Course	Outcon	nes : At the end o	of the	cour	se, s	tudents w	ill be able to			
CO1 :	Under	stand the overvie	w of	the pr	odu	ction / op	erations management	system		
CO2:	Apply	the forecasting te	echni	ques						
CO3:	CO3: Apply aggregate planning, master scheduling and MRP techniques and solve line balancing problems									
CO4 :	Solve inventory related problems									
CO5 :	CO5: Understand the concepts of quality and its related techniques									
UNIT – I										
Introdu	ction :	Definition, funct	ions	of PI	PC, 7	Types of	production – job, bate	ch and con	tinuous,	
Product	design	and development	t, sta	ndard	izati	on, simpli	fication, specialization,	Product life	e cycle	
					U	NIT – II				
Forecas	ting:	Introduction to	For	recasti	ing,	Forecasti	ng methods – Opinio	on and juc	igmental	
methods	s, Time	series method, E	xpon	ential	smo	othing, Re	egression & Correlation	method		
					UN	III – III				
Aggrega	te Plar	nning & Master	Sche	dulin	g: Ir	ntroductio	n, Objectives of Aggreg	ate Plannin	ng, Costs	
in aggre	gate pla	nning, Strategies	s in a	ggreg	ate p	olanning, N	Master Production Sche	duling		
Assemb	ly line	balancing - M	letho	ds of	line	balancin	g: Largest candidate	rule, Kilbri	dge and	
Wester's	metho	d, and Ranked Po	ositio	nal W	eigh	ts method				
Materia	l Requi	rement Plannin	g (MI	RP): I1	npoi	rtance of N	IRP, MRP system input	s and outpu	ıts, MRP	
calculat	ions									
					Ur					
Invento	ry Man	agement: Introd	uctio	n, Typ - ·	bes o	of Inventor	ies, Inventory Costs			
Determ	inistic	Inventory mod	els:	Basıc	EO	Q model,	Manufacturing model	without sh	iortages,	
EOQ mo	odel wit	h planned shorta	ges, l	nvent	ory 1	model with	n price breaks, ABC and	alysis		
					U	NIT – V				
Quality	Contro	ol: Concept of qu	lality	, evol	utior	n of qualit	y control, assignable a	nd chance o	auses of	
and C c	n, Varia hart)	ble Control char	ts (a	averag	jes a	nd ranges	s charts) Attributes cor	itrol charts	(P chart	
Accepta	nce Sa	ampling – Singl	e Sa	mplin	g, D	ouble Sa	mpling and Multiple s	ampling pl	ans, OC	
curves o	of single	sampling plans								

Text Books:

1. Joseph G. Monks, Operations Management, TMH Publishers, New Delhi

2. M.Mahajan, Industrial Engineering and production management, Dhanpat rai and Co, New Delhi

Reference Books:

- 1. S.N. Chary, Operations Management, TMH Publishers, New Delhi
- 2. N.D. Vohra, Quantitative techniques in Management, TMH publishers, New Delhi
- 3. R. Panneerselvam, Production and operations management, PHI

Question Paper Pattern:

Sessional Exam

The question paper for Sessional examination is for 30 marks, covering half of the syllabus for first Sessional and remaining half for second Sessional exam. Question No 1 which carries 6 marks contains three short answer questions of two marks each. The remaining three questions shall be EITHER/OR type questions carrying 8 marks each

End Exam

QUALITY AND RELIABILITY ENGINEERING (QRE)

VII Sem	ester:	Mechanical E	ngin	eerin	g			Schen	ne : 2017		
Course	Code	Category	H	ours Week	/	Credits	Maxim	um Marks			
ME4	-12	Professional Elective – IV	L	Т	Р	С	Continuous Internal Assessment	End Exam	TOTAL		
			3	-	-	3	40	60	100		
Session	al Exar	n Duration : 2 H	rs				End E	xam Duratio	n : 3 Hrs		
Correct	0+	At the and a	f +1= -				11 he able to				
Course	Outcon	nes : At the end o		cours	se si						
CO1 :	Under	stand the overvie	w of	the To	otal	Quality Ma	anagement system				
CO2 :	Under	stand concepts o	f cus	tomer	sati	isfaction a	nd employee involver	nent			
CO3: Apply the appropriate tools and techniques of continuous process improvement for controlling and improving quality											
CO4:	Apply	Quality Function	n De	eployr	nent	and Ber	nch Marking proces	s for improv	ring a		
04.	product or process										
CO5 :	D5: Understand concept of Reliability Engineering										
UNIT – I											
Introdu	ction t	o T.Q.M. : Introd	luctio	n to (Qual	lity; Evolu	tion of and basic app	proach to Tota	al Quality		
Manage	ment; l	Leadership conce	epts;	The	Seve	en habits	of highly effective	people; Role	of TQM		
Leaders	; Impler	nentation of TQM	l; Qu	ality c	oun	cil, quality	v statements				
					U	NIT – II					
Custom	er Sati	sfaction: Types o	of Cu	stome	rs-Iı	nternal an	d External; Custome	r perception o	of quality;		
Feedbac	k & bri	ef discussion on l	Infori	natio	n Co	llecting To	ools				
Employ	ee Inv	volvement: Mas	low's	hier	rarch	ny of ne	eds; Types of Tea	ms, Stages	of team		
develop	ment, C	ommon barriers	to tea	ım pro	ogre	ss, Trainin	g; Benefits of Employ	yee Involveme	ent		
					U	NIT – III					
Continu	ious Pr	ocess Improven	ient:	Intro	duc	tion, Juro	n trilogy, Improveme	nt strategies	; P-D-S-A		
cycle &	Probler	n solving method	l; Ba	sic co	ncer	ots of Kaiz	en and Six sigma q	uality control	, Taguchi		
method,	Qualit	y circles									
Supplie	r Partı	hership: Introdu	ction	, Part	neri	ing, Sourc	cing, Supplier Selec	tion, Supplie	r Rating,		
Relation	ship De	evelopment									
Tools &	Techn	iques of TQM : F	Pareto	o diag	ram,	, Cause &	Effect diagram				
					UI	NIT – IV					
Benchn	narking	: Introduction, B	ench	marki	ng p	orocess					
Quality	Functi	on Deployment:	Ben	efits o	f QF	D, House	of Quality				
					U	NIT – V					
Reliabil	ity Eng	gineering: Introdu	uctio	n, Fai	lure	s & failure	modes, Causes of fa	ilures			
Design	for Reli	i ability: Designin	ıg for	highe	er Re	eliability, F	Reliability & Cost				
Compo	nent Re	eliability: MTTF,	Time	depe	nder	nt hazard 1	nodels – Exponentia	Distribution			
System	Reliat	oility: Systems	with	comp	one	nts- in Se	eries, and in Parall	el; Non-Serie	s-Parallel		

I

systems

Redundancy Techniques: Introduction, Component & Unit Redundancy, Weakest link technique

Text Books:

- 1. Dale H. Bester field, Total Quality Management, Pearson Education, New Delhi
- 2. E. Balagurusamy, Reliability Engineering, TMH Publishers, New Delhi

3. M. Mahajan, Statistical Quality Control, Dhanapat Rai and Sons Publishers, New Delhi

Reference Books:

- Douglas C. Montgomery, Introduction to Quality Control, John Wiley and Sons Publishers, New York
- 2. N. Logothetis, Managing for Total Quality, From Deming to Taguchi, PHI Publishers, New Delhi
- **3.** L.S. Srinath, Reliability Engineering, East West Press, New Delhi

Question Paper Pattern:

Sessional Exam

The question paper for Sessional examination is for 30 marks, covering half of the syllabus for first Sessional and remaining half for second Sessional exam. Question No 1 which carries 6 marks contains three short answer questions of two marks each. The remaining three questions shall be EITHER/OR type questions carrying 8 marks each

End Exam

OPTIMIZATION METHODS (OM)

VII Sen	lester:	Mechanical H	Engineering					Schen	1e:2017
Course	Code	Category	Hours / Week		Credits	Maximu	n Marks	-	
ME4	-13	Professional Elective – IV	L 3	T	P -	C 3	Continuous Internal Assessment 40	End Exam 60	<u>TOTAL</u> 100
Session	ol Evon	Duration · 2 H	**			-	End Ev	m Duratio	n · 3 Hrs
56551011		i Duration : 2 h	.15				Enu Exa		<u>II : 3 IIIs</u>
Course	Outcon	nes : At the end o	of the	cours	se, s	tudents w	ill be able to		
CO1 :	Solve	problems of optin	nizati	ion us	ing l	nteger pro	ogramming		
CO2 :	Solve	problems of optin	nizati	ion us	ing l	Dynamic p	programming		
CO3 :	Under	stand optimizatio	on us	ing Ge	eneti	c algorith	ms		
CO4 :	Under	stand and solve of	classi	ical op	otimi	zation pro	blems		
					U	NIT – I			
Optimiz	zation:	Introduction, H	istori	ical D	evel	opment, I	Engineering Applicatio	ns of Opti	mization,
Classifie	cation o	f Optimization pr	obler	ns.					
Integer	Progra	mming : Simple	appl	icatior	ns o	f integer p	programming, solution	methods of	of integer
program	nming- I	Branch and Bour	nd Alg	gorith	m, C	utting Pla	ne Algorithm		
					U	II – TIN			
Dynami	ic Prog	ramming: Introd	ducti	on- B	ellm	an's princ	ciple of optimality-App	olication of	dynamic
program	nming to	Linear program	ming	probl	em a	and Capita	l budgeting problem		
					UN	IIT – III			
Genetic	Algori	ithm (GA): Intro	oduc [®]	tion,	Diffe	rence bet	ween Genetic Algorit	hm and Ti	aditional
Methods	s, Simpl	e Genetic Algorit	hms,	, Simil	larity	7 Template	es (Schemata), Genetic	algorithm	operators
- selecu	on, cros	sover and mutat	1011,	Simpi	e ap		01 GA		
Classic	1 Ont	mization 1. Ta	tradi	otion		nonstroin	ad problems of me	wime and	minimo
constrai	ned pro	blems of maxi	ma	and m	, UI	na	led problems of ma	xiilla allu	mmma,
	iieu pre		ma		U	NIT – V			
Classic	al Onti	mization-2: Con	strai	nts	in	the for	m of equations -	Lagrangian	method:
Constra	ints in t	he form of inequ	alitie	s -Kuł	nn-ti	ucker cond	litions	248.018.01	u,
Text Bo	oks:								
1. S.D.	Sharma	, Operations Re	searc	h, Keo	darn	ath and C	o. Publishers, Meerut		
2. A.P.	Verma ,	Operations Rese	arch	, S.K.I	Kata	ria & Sons	s, New Delhi		
Referen	ce Boo	ks:							
1. V. K	. Кароо	r , Operations Re	sear	ch, S.	Cha	nd, New D	elhi		
2. S.S.	Rao, Op	timization Theor	y and	l Appl	icati	ons, NAI F	Publishers, Hyderabad		

Question Paper Pattern:

Sessional Exam

The question paper for Sessional examination is for 30 marks, covering half of the syllabus for first Sessional and remaining half for second Sessional exam. Question No 1 which carries 6 marks contains three short answer questions of two marks each. The remaining three questions shall be EITHER/OR type questions carrying 8 marks each

End Exam

SIX SIGMA (SS)

VII Ser	nester	Mechanical E	ngine	eering	g			Scher	ne : 2017		
Cours	e Code	Category	Hours / Week			Credits	Maxir	num Mark	s		
ME414		Professional Elective - IV	L	Т	Р	С	Continuous Internal Assessment	End Exam	TOTAL		
	Lietive		3	-	-	3	40	60	100		
Session	nal Exam	Duration : 2 I	Hrs				End Exa	m Duratio	on: 3 Hrs		
	· · · · ·										
Course	Course Outcomes : At the end of the course, students will be able to										
CO1 :	Unders organiz	tand the signifi ations	icance	e of S	ix Sign	na methodo	ology in manufa	cturing ar	nd service		
CO2 :	Unders	tand the steps	invol	ved in	n the de	fine phase	of Six Sigma m	ethodology	7		
CO3:	Apply a	appropriate tool	s in tl	ne Me	asure p	ohase of Siz	x Sigma method	ology			
CO4 :	Identify	v the deliverable	s in a	nalys	se phas	e of Six Sig	ma methodolog	у			
CO5 :	Develop	p a road map for	r imp	olanta	tion of	six sigma					
-	•				UNIT	– I					
INTRO	DUCTIO	N: Overview - Si	ix sig	ma de	efinitior	1 – Backgro	ound – Six sigm	a compare	ed to total		
quality	manage	ment (quality)	– tra	dition	al vs.	Manufactu	ring six sigma	– Comme	on terms,		
founda	tions of s	ix sigma, six sig	gma t	ools -	- COPQ	– Total qua	ality cost – Unde	erstanding	variation		

- Value stream mapping -DMAIC vs DFSS

UNIT – II

PREPARATION PHASE: Organizational success factors – leadership, six sigma as strategic initiative, internal communication strategy and tactics, formal launch, organizational structure, six sigma training plan, project selection, assessing organizational readiness, pitfalls. work as a process – vertical functions and horizontal processes.

DEFINE PHASE: Overview – customer identification, feedback, requirements – problem statement - voice of customer – importance, collect VOC data, critical to quality CTQ – Affinity process – Pareto diagrams – BRD – Project scope - Project charter – High level process map – Project team – SIPOC – Process map – Practice live exercises

UNIT – III

MEASURE PHASE: Overview – Types of measures – Introduction to statistical methods – Sampling plan – Population or sample – Central limit theorem - Types of data - Data collection – Choosing statistical software – Measure tools – Cause and effect diagrams – Line , bar, stacked bar graphs – Pie chart – Histograms - Control charts. Six sigma measurements – Quality cost - Cost of poor quality – Quality loss function. Measurement system analysis – Process capability calculations

UNIT – IV

ANALYSE PHASE: Overview – Process analysis – Correlation coefficient – Regression – Hypothesis testing applications (DOE/ANOVA, Chi square test) – Failure mode and effects analysis - Statistical tests and tables – Tools for analyzing relationships among variables – Gap

analysis - Root cause analysis - Waste analysis - Survival analysis - Practice exercises.

IMPROVE PHASE: Overview - Process redesign - Generating improvement alternatives -

Design of experiments - Waste elimination - Cycle time reduction - Theory of constraints -

Pilot experiments – Cost/benefit analysis – Implementation plan – Risk analysis and mitigation

UNIT – V

CONTROL PHASE: Overview – Process scorecard – SPC: selection of chart and selection of analysis – TPM – Sustain improvement - Final project report and documentation. Roadmap to implementation.

SIXSIGMA IMPLEMENTATION: Roadmap for implementation. Common Implementation issues and management strategies

Text Books:

1. Joseph De Feo, William Barnard and Juran Institute, Juran Institute's Six Sigma Breakthrough and Beyond, The McGraw-Hill Companies

2. Kai Yang and Basem El Haik, Design for Six Sigma, McGraw Hill, New York

Reference Books:

1. Betsiharris Ehrlich, Transactional Six Sigma and Lean Servicing, St. Lucia Press

2. Thomas Pyzdek, Six Sigma Handbook: Complete Guide for Greenbelts, Blackbelts and Managers at All Levels, Tata McGraw Hill Companies Inc

Question Paper Pattern:

Sessional Exam

The question paper for Sessional examination is for 30 marks, covering half of the syllabus for first Sessional and remaining half for second Sessional exam. Question No 1 which carries 6 marks contains three short answer questions of two marks each. The remaining three questions shall be EITHER/OR type questions carrying 8 marks each

End Exam

INDUSTRIAL ROBOTICS (IRT)

VIII Se	mester:	Mechanical E	Engineering				Scheme : 2017			
Cours	e Code	Category	Hours / Week			Credits	Maximun	ı Marks	-	
ME	415	Professional Elective – V	L	Т	Р	C	Continuous Internal Assessment 40	End Exam	TOTAL	
Section	ol Exom l	Duration : 2 Hrs	5	-	-	5	Fod Evo	m Duratio	100 . 2 Hrs	
Session		Duration : 2 Hrs					Enu Exa		n : 5 n is	
Course	Outcome	s : At the end of t	he co	ourse.	stu	dents will	be able to			
CO1 :	Understa	and the basic con	ipone	ents o	f ind	lustrial rol	oots			
CO1.	Underst	and the types of F	nd F	ffecto	rea	nd Sensor	s in robots			
02:	Underste	and the Debet me			form		s III TODOUS			
CO3 :	Understa	and the Robot ma	nipu	lator,	IOTW					
CO4 :	Understand the programming methods for robots and design considerations of Robot									
005	WORK CEL	I and the manufact	111110	rond	proc	occing on	plications of rabot			
C05:										
UNIT - I										
anatom	v robot co	onfigurations wo	rk vo	lume	nre	cession of	movement robot actua	ation and f	feed-back	
compon	ent actu	ators hydraulic	act	uator:	s e	lectrical a	actuators (variable re	luctance t	vpe and	
perman	ent magn	et type stepper i	notor	r). Po	sitio	n sensors	(potentiometer, resolv	ers. and e	ncoders).	
velocity	sensors (t	achometer), powe	er tra	nsmis	ssion	devices	(P)		,,	
					UN	IT – II				
End Eff	fectors an	nd Sensors: Robo	ot en	d effe	ctor	s, types of	f end effectors, mechan	nical grippe	ers, other	
type of	grippers-	Vacuum cups,	mag	netic	grip	pers, adh	esive grippers, Hooks,	Scoops a	nd other	
miscella	neous de	vices. Sensors in	rob	otics-	tact	tile sensor	rs, proximity and rang	e sensors,	Machine	
Vision, t	use of sen	sors in robotics								
-					UN	IT – III				
Robot	Motion	Analysis and	Con	trol:	Int	troduction	to manipulator ki	nematics,	position	
represer	ntation, fo	rward transforma	ation	and	revei	rse transfo	ormation of two degree	freedom ro	obot arm,	
three de	gree of fre	edom arm in two	dime	ensior	ns, fo	our degree	freedom manipulators	in three di	mension,	
homoge	neous trai	nsformation and l	homo	geneo	ous t	ransforma	tion matrix			
					UN	IT – IV				
Robot 1	Programn	ning: Methods c	of rol	oot p	rogra	amming-	Lead through- WAIT,	SIGNAL a	nd delay	
commar	nds; The	textual robot p	orogra	ammi	ng	languages	, robot language stru	actures, c	onstants,	
variable	s and oth	er data objects,	motic	on cor	nma	nds, end	effectors, sensors com	nands and	l monitor	
mode co	mmands				-			_		
Robot d	cell desig	n and control: F	kobot	cell 1	layoi	ut, work c	ell control, interlocks,	error detec	ction and	
recovery	, graphica	al simulation of re	bot v	vork (cell					

Robot Applications in Manufacturing: Material transfer and machine loading and unloadinggeneral considerations in material handling.

 $\mathbf{UNIT} - \mathbf{V}$

Processing Operations: Spot welding, continuous arc welding, spray coating, and other processing operations

Text Books:

1. Mickel. P. Groover et. al, Industrial Robotics- Technology, Programming and Applications, McGraw Hill Publishers, New Delhi

2. Deb S.R., Robotics Technology and Flexible Automation, TMH Publishers, New Delhi

3. Richard D. Klafter, Robotic Engineering: An Integrated Approach, Pearson Publications

Reference Books:

1. K. S. Fu, Ralph C. Gonzalez and C.S.G. Lee, Robotics, control, sensing, vision, Mc Graw Hill

2. Rama chandran, Nagarajan, Introduction to Industrial Robotics, Pearson

Question Paper Pattern:

Sessional Exam

The question paper for Sessional examination is for 30 marks, covering half of the syllabus for first Sessional and remaining half for second Sessional exam. Question No 1 which carries 6 marks contains three short answer questions of two marks each. The remaining three questions shall be EITHER/OR type questions carrying 8 marks each

End Exam

COMPUTER NUMERICAL CONTROL MACHINES (CNCM)

VIII Se	mester:	Mechanical E	Engineering					Schen	le : 2017			
Cours	e Code	Category	H	ours Week	/	Credits	Maximun	n Marks				
ME	416	Professional Elective – V	L 3	T	P -	С 3	Continuous InternalEnd Exam4060					
Session	al Exam I	Duration : 2 Hrs]		End Exa	m Duratio	<u> </u>			
Dession								in Duracio				
Course	Outcome	s: At the end of t	he co	ourse.	stu	lents will	be able to					
CO1 :	Understa	and the construct	ion.	princi	ples.	working a	and maintenance of CN	C machine				
CO2	Understa	and the interfacin	a dri	ves fe	edb.	aclz devrice	es in CNC machines					
CO2:	Underste	and the interfacio	a an	vcs, ic	mala		CNC mashing tools					
CO3:	Understa	and the interfacin	g and	1 cont	rois	systems of	CNC machine tools					
CO4 :	O4: Understand Manual and Computer Aided Part Programming with logical / optimum											
	sequence	e to translate par	t drav	wings	into	finished p	products					
CO5 :	Understa	and the communi	catio	n betv	ween	DNC and	machine control unit					
					UN	IT – I						
Introdu	Introduction to CNC Machines: Working principles of typical CNC lathes, turning centers,											
machin	ng centers	8.										
Constru	ictional F	eatures of CNC	Macl	nine '	Γool	s : Design	Considerations, Spindl	e drives, S	lideways-			
Lead S	crew, Acc	essories of Mac	hinin	g Cei	nters	s, Automa	ated Tool changer, ma	aintenance	of CNC			
machine	es											
					UN	IT – II						
System	Devices:	Drives- Hydrauli	c sys	tems,	dire	ect current	t motors, stepper motor	rs, alternat	e current			
motors,	Feedback	devices-encode	rs, r	esolve	ers,	tachomete	ers, Counting devices-	flip-flops,	counters,			
decoder	s, digital t	o analog converte	ers									
					UNI	T – III						
Control	Systems	and Interfacing	g: Op	oen lo	op a	nd closed	l loop systems, block o	liagram of	a typical			
CNC sys	stem, desc	ription of hardwa	ire ar	nd sof	twar	e interpola	ation systems					
					UNI	T – IV						
Manual	Part Pr	ogramming: Int	rodu	ction,	No	menclatur	re of CNC Machines,	Reference	e Points,			
Absolut	e, Increme	ental programmin	g, G	and M	/ co	des, custo:	m macros, part program	mming exa	mples for			
CNC Tu	rning and	Milling										
Compu	ter Aided	Part Programmi	ng: Ii	ntrodu	uctio	n, Langua	ages for computer Aided	l part Progr	amming,			
APT La	nguage, C	eometric Statem	nents	, Mot	ion	Statement	ts, Post processing st	atements,	Auxiliary			
stateme	statements, Simple problems using APT language											
					UN	IT – V						
Concep	t of Distr	ibuted Numerica	l Co	ntrol:	DN	C system-	communication betwee	en DNC con	nputer &			
machine	e control u	nit- hierarchical	proce	essing	g of d	ata in DN	C system – features of I	DNC syster	n			
Text Bo	oks:											
1. Yora	ım Koren,	Computer Contr	ol of	Manu	lfact	uring Syst	ems, McGraw Hill					

2. Radha krishnan P, Computer Numerical control (CNC) Machines, New Central Book Agency, India

3. B. S. Pabla, M. Adithan, CNC Machines, New Age International.

Reference Books:

1. James V. Valantino, Joseph Goldberg, Introduction to CNC machine Programming, Pearson

2. Chen Dhe Hang Zhu, CNC Programming and Operations, Southwest Jiaotong University Press

Question Paper Pattern:

Sessional Exam

The question paper for Sessional examination is for 30 marks, covering half of the syllabus for first Sessional and remaining half for second Sessional exam. Question No 1 which carries 6 marks contains three short answer questions of two marks each. The remaining three questions shall be EITHER/OR type questions carrying 8 marks each

End Exam
ADVANCED PRODUCTION METHODS (APM)

VIII Se	mester:	Mechanical E	ngin	eerin	g		Scheme : 2017				
Cours	e Code	Category	H	ours Week	/	Credits	Maximur	n Marks			
ME	417	Professional Elective – V	L	Т	Р	С	Continuous Internal Assessment	End Exam	TOTAL		
			3	-	-	3	40	60	100		
Session	al Exam	Duration : 2 Hrs					End Exa	am Duratio	n : 3 Hrs		
Course	Outcome	s : At the end of t	he co	ourse	stuc	lents will b	be able to				
CO1 :	Understa	and modernized c	hang	ges too	ok pl	ace in fou	ndry and advanced cas	sting proces	ses		
CO2 :	Understa	and different meta	al for	ming	proc	esses					
CO3 :	Understa	and advanced wel	ding	techr	nique	es					
CO4 :	Identify :	surface treatment	met	hods	to al	ter surface	e properties				
CO5 :	Understa	and the concepts	of ra	pid pr	otot	vping proc	esses				
		-			UN	ITT – I					
Modern	ization a	nd Mechanizati	on d	of Fo	und	ry: Need	for Modernization an	d Mechani	zation of		
Foundry	y-belt conv	veyors, bucket ele	vator	rs, sai	nd re	eclamators	and sand conditioners	3.			
Advanc	ed Castin	g Processes: Vac	cuum	die d	casti	ng, squeez	ze casting, centrifugal	casting and	thin roll		
casting											
					UN	IT – II					
Advanc	ed Metal	forming: Roll	form	ning,	High	velocity	hydro forming, High	velocity me	echanical		
forming	, Electrom	agnetic forming,	and I	High e	energ	gy rate for	ming (HERF)				
					UN	IT – III					
Advanc	ed Weldir	ng Processes: Fri	ction	weld	ing,	Friction st	tir welding, Resistance	welding, Pl	asma arc		
welding	, Laser bea	am welding, Elect	ron t	beam	weld	ing, Electi	ro slag welding				
					UN	IT – IV					
Surface	Cleanin	g and Coating	s: M	echar	nical	cleaning	, Chemical cleaning,	Polishing,	Surface		
coatings	s-Metallic	coatings, plastic o	coatir	ngs, c	onve	rsion coat	ings and paint coating	S			
					UN	$\mathbf{IT} - \mathbf{V}$					
Rapid	Prototyp	ing: Introduction	n to	rap	id p	prototyping	g, steps in rapid p	rototyping	process,		
classific	ation of F	RP systems, Stere	o litł	nograj	phy	systems, 1	Laminated object man	ufacturing,	Selective		
laser sir	ntering an	d applications of 1	RP sy	vstem	s						
Text Books:											
1. P. L.	Jaın , Pri	nciples of Found	ту Те	chnol	ogy,	TMH Publ	ishers, New Delhi				
2. Bade	ebhau , Ao	dvanced Manufac	turin	g Pro	cess	, Trainee	engineer at Indo-Germa	an Tool Roo	m		
3. Dr K S Yadav, Advanced Welding Technology, Rajsons Publications Pvt Ltd, New Delhi				Rajsons Publications Pvt Ltd, New Delhi							
4. P.C. Sharma, Production Engineering, S.Chand Publishers, New Delhi						ublishers, New Delhi					
5. Chu	a C.K. Leo	ong. K.F, and Lim	CC.S	S., Ra	pid l	Prototypin	ping Principles and Applications, World				
Scie	ntific Publ	lishing Co. Pvt. Lt	d								

Reference Books:

1. Heine and Rosenthal, Principles of Metal Casting, TMH Publishers, New Delhi

2. Dr. R. S. Parmar, Welding Processes and Technology, Khanna Publishers, New Delhi

3. A. Ghosh and A K Malik, Manufacturing Science, East West Press Pvt Ltd, New Delhi

Question Paper Pattern:

Sessional Exam

The question paper for Sessional examination is for 30 marks, covering half of the syllabus for first Sessional and remaining half for second Sessional exam. Question No 1 which carries 6 marks contains three short answer questions of two marks each. The remaining three questions shall be EITHER/OR type questions carrying 8 marks each

End Exam

Question Paper Contains Six Questions. Question 1 contains 5 short Answer questions each of 2 marks. (Total 10 marks) covering one question from each unit. The remaining five questions shall be EITHER/OR type questions carrying 10 marks each. Each of these questions is from one unit and may contain sub-questions. i.e. there will be two questions from each unit and the student should answer any one question

MECHATRONICS (MT)

VIII Se	mester:	Mechanical E	ngin	eerin	g			Schem	e:2017			
Cours	e Code	Category	Hours / Week			Credits	Maximun	n Marks				
ME	418	Professional Elective – V	L	Т	Р	C	ContinuousEndInternalEndAssessmentExam4060					
Cossion			3	-	-	3						
Session	al Exam I	Duration : 2 Hrs					End Exa	m Duration	\mathbf{n} : 3 Hrs			
Course	Outcome	s : At the end of t	he co	ourse	stud	lents will t	be able to					
CO1 :	Illustrat	e various compo	nents	s of m	nech	atronics s	vstems and sensors					
CO2:	Identify	the actuating sys	stem	s bas	ed o	n mechat	ronics system applicat	ion				
CO3:	Underst	and the concept	and	appli	catio	ons of data	a acquisition system					
CO4 :	Discuss	the architecture	of m	icron	roce	essors and	l microcontroller					
CO5 :	Make us	se of the PLC arc	hitec	ture :	and	ladders p	rogramming in indust	rial applica	tions			
	mane ac				UN	IIII – I						
Introdu	ction to	Mechatronics. S	Senso	ors -	wor	king cha	racteristics and math	ematical n	nodel of			
sensors	-Thermal	, Pressure, Strai	n, lo	ad ce	ell, N	lotion, Ac	celerometer, Optical,	Photo diod	e, Photo			
Emissive, Force and Torque sensors.												
	UNIT – II											
Hydrau	lic, Pneu	matic & Electri	ical	syste	ms	- Elemen	nts, Construction, Op	peration, S	standard			
Symbol	s and Ind	ustrial Application	ons.	Hydra	aulic	and Pneu	umatic Circuits					
Introdu	ation on	d aignifican ac	of T	lata		IT – III	Sustem (DAS) turned	of DAG	Sign of			
conditio	ning syst	em Industrial A	or r nnlic	Jala	Acq	uisition	System (DAS), types	5 01 DAS,	Signai			
			ppne		UN	IT – IV						
Digital	Logic, Lo	gic Gates, Boole	ean a	algebi	ra. I	Principles	of basic electronics,	Microproc	essors /			
microco	ontroller, 1	Industrial Applic	atior	ıs, Ha	ardw	vare in me	echatronics systems,	Interfacing,	, Digital-			
to-Anal	ogue (DA)	and Analogue-t	o-Dig	gital ((AD)	converter	rs, software and hardw	vare princi	ples and			
tools to	build me	chatronics system	ms									
					UN	IT – V						
Program	nming Log	gic Controllers (F	PLC):	basi	c str	ucture, se	election of PLCs, Ladd	er Program	iming in			
Industr	ial Applica	ations										
Advanced applications in mechatronics: mechatronics control in automated manufacturing, CIM,												
Robot, Artificial Intelligence in mechatronics, fuzzy logic applications in mechatronics, micro												
Schools												
1. Nita	1. Nitaigour Premchand Mahalik, Mechatronics-Principles, Concepts and Applications, Tata											
McG	Fraw Hill	manan	, .				-pros, concepto and	- ppiloutoi	, iuu			
2. W.	2. W. Bolton, Mechatronics – Electronic Control Systems in Mechanical and Electrical											
	•						-					

Engineering, Pearson Education

Reference Books:

1. Mechatronics by HMT Ltd. – Tata Mc Graw Hill

2. Anthony Esposito, Fluid Power, Pearson Education

3. Ernest O. Doeblin, Measurement Systems Application and Design, McGraw Hill International Publication

Question Paper Pattern:

Sessional Exam

The question paper for Sessional examination is for 30 marks, covering half of the syllabus for first Sessional and remaining half for second Sessional exam. Question No 1 which carries 6 marks contains three short answer questions of two marks each. The remaining three questions shall be EITHER/OR type questions carrying 8 marks each

End Exam

Question Paper Contains Six Questions. Question 1 contains 5 short Answer questions each of 2 marks. (Total 10 marks) covering one question from each unit. The remaining five questions shall be EITHER/OR type questions carrying 10 marks each. Each of these questions is from one unit and may contain sub-questions. i.e. there will be two questions from each unit and the student should answer any one question

RENEWABLE ENERGY SOURCES (RES)

VIII Se	mester:	Mechanical H	ngin	eerin	g		Scheme : 201'				
Cours	e Code	Category	H	ours Week	/	Credits	Maximur	n Marks			
ME	419	Professional Elective – VI	L	т	Р	С	Continuous Internal Assessment	End Exam	TOTAL		
			3	-	-	3	40	60	100		
Session	al Exam l	Duration : 2 Hrs		•			End Exa	am Duratio	n : 3 Hrs		
Course	Outcome	s : At the end of t	he co	ourse	stuc	lents will b	be able to				
CO1:	Understa	and the changes t	hat t	ook p	lace	in Energy	Sources				
CO2:	Identifyi	ng different Sourc	ces of	Ener	gies	and their	applications				
CO3 :	Solve pro	oblems associated	l with	1 the s	solai	energy					
	Understa	and the technolo	gies	invol	ved	in extract	ion of wind energy, h	piomass en	ergy and		
CO4 :	geothern	nal Energy	8						<i>a a a</i>		
CO5 :	Understa	and the knowledg	e of 7	Fidal a	and '	Wave and	Ocean energy conversi	on methods	3		
					UN	IT – I					
Introdu	ction and	d Energy Conse	rvati	on: C	lass	ification o	f energy sources-Impo	rtance of r	enewable		
energy	sources	and energy c	hain-	Princ	iples	of ene	rgy conservation –E	nergy con	servation		
opportu	nities.				_						
Fundar	entals of	Solar Energy: E	xtra-	terres	trial	and terre	estrial radiation- Solar	constant a	and solar		
radiatio	n geometr	y-Solar time and	day	lengt	h-Es	stimation o	of monthly average dai	ly total rad	liation on		
horizont	al surface	e and tilted surfac	e-Me	easure	emer	nts of radia	ation data.				
					UN	IT – II					
Solar C	ollecting	Devices: Flat	plate	colle	ector	-selective	surfaces-Air collector	rs- Classifi	cation of		
concent	rating coll	ector-Tracking of	CPC	collee	ctor						
Solar T	hermal S	Systems: Method	ls of	stori	ng s	solar ener	gy-Solar water heatin	g-Solar ref	rigeration		
system ·	- Solar the	ermal power gene	ratio	n-Sola	ar Di	istillation-	Solar space heating				
					UN	IT – III					
Solar V	oltaic Sys	tems: Basic prin	ciple	of PV	cell	-Arrangem	ents of PV cell-classifie	cation of PV	' cell		
Wind E	nergy: Or	rigin of wind-App	olicat	ion of	f wir	nd power ·	-Betz limit-Componen	ts of horizo	ontal axis		
wind tu:	rbine-Type	es of blades- Clas	sifica	tion c	of ver	rtical axis	turbine				
					UN	IT – IV					
Biomas	s Energy	: Photosynthesis	pro	cess-	Bior	nass conv	version technologies-	Biogas pro	duction -		
Types of	f digester-	Factors affecting	the o	digest	er pe	erformance	e				
Geothe	rmal Ene	rgy: Types of ge	other	mal e	energ	gy resourc	urces-Energy conversion through geothermal				
energy r	esources-	Environmental co	onsid	eratio	n						
					UN	IT – V					
Ocean '	Chermal H	Energy Conversion	on: P	rincip	le of	f OTEC- Ar	nderson and Claude cy	cles, Tidal a	and Wave		
energy o	conversion	n methods									
Emergi	ng Techr	ologies: Princip	le of	f mag	gneto	o hydro d	lynamics-thermo elect	tric and th	nermionic		

conversion, Introduction to Fuel cell

Text Books:

1. B.H. Khan, Non-conventional Energy Sources, 3rd edition TMH Publishers, New Delhi

2. Suhas P.Sukhatme., Solar energy: Principles of thermal collection and storage, Tata McGraw Hill publishing Co. Ltd

Reference Books:

- 1. G.D Rai, Non-conventional Energy Sources, Khanna Publishers, New Delhi
- 2. S. Rao and Paulekar, Energy Technology, Khanna Publishers, New Delhi
- **3.** H. P. Garg, J. Prakash, Solar energy fundamentals and applications, Tata McGraw Hill publishing Co. Ltd

Question Paper Pattern:

Sessional Exam

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End Exam

Question Paper Contains Six Questions. Question 1 contains 5 short Answer questions each of 2 marks. (Total 10 marks) covering one question from each unit. The remaining five questions shall be EITHER/OR type questions carrying 10 marks each. Each of these questions is from one unit and may contain sub-questions. i.e. there will be two questions from each unit and the student should answer any one question

AUTOMOBILE ENGINEERING (AME)

VIII Se	emester:	Mechanical H	ngin	eerin	g	Scheme			ne : 2017		
Cours	e Code	Category	H	ours Week	/	Credits	its Maximum Marks				
ME	420	Professional Elective – VI	L	Т	Р	С	ContinuousInternalAssessmentExa		TOTAL		
			3	-	-	- 3 40	40	60	100		
Session	al Exam	Duration : 2 Hrs			-		End Ex	am Duratio	n : 3 Hrs		
Course	Outcome	s : At the end of t	he co	ourse,	stu	dents will b	e able to				
	Understa	and the use and o	opera	tion o	f cyl	inder block	, cylinder liners, pist	on, connecti	ng rod,		
CO1 :	crank sh	aft, cam shaft, ai	r clea	aners,	exh	aust intake	e manifolds and muff	lers and the	working		
	of coolin	g system, lubrica	tion s	syster	n						
CO2 :	Understa	and the fuel supp	ly sys	stem	of SI	and CI eng	gine automobiles				
	Understa	and the working o	of eleo	ctroni	c ign	ition system	m for automobiles an	d componen	ıts like		
CO3 :	battery, sparkplu	dynamo, alternat Ig	or, cı	it out	, cui	rrent regula	ator, voltage regulator	r, starting m	otor and		
C04·	Understa	and the working	of 1	nanu	al tr	ansmissior	n system, differentia	l gear box,	steering		
	geometry and axles of an automobile										
	Understa	and the working	of fro	ont ax	de su	uspension,	rear axle suspension	n and air su	spension		
CO5 :	systems of an automobile and working of mechanical braking, hydraulic braking, pneumatic										
	braking	braking systems and emission standards of an automobile									

 $\mathbf{UNIT} - \mathbf{I}$

Engine Parts: Function and constructional details of Cylinder block, Cylinder liners-wet and dry types, Piston, Connecting rod, Crankshaft, Camshaft, Air cleaner, Intake and Exhaust manifolds, Mufflers.

Cooling System: Need for cooling of automobile, Types of cooling-air cooling, water-cooling. Natural circulation (Thermo-syphon system), Forced circulation and sealed Systems. Components of water-cooling system. Water pump, fan, Radiator, Thermostats and temperature indicators. Anti-freeze mixtures.

Lubricating Systems: Need for lubrication, Functions of lubricating oil. Properties of lubricating oil, and S.A.E grading of lubricants. Lubricating systems-Petroil, Splash, Pressure feed, Wet and Dry sump, Semi pressure and pre-lubrication system

UNIT – II

Fuel Supply Systems: Fuel supply system of diesel engine, fuel injection pumps, Super charging of diesel engines. Fuel supply system for petrol engines-Carburettors, Air-fuel ratios at different vehicle running conditions, Working of a simple carburettor. Various carburettor systems- Float, Starting, Idle, Low speed, High speed and acceleration systems. MPFI and EFI systems. Types of carburettors-Working and constructional details of SU, Zenith and Carter carburettors

UNIT – III

Ignition System: Electronic ignition system. Storage battery, Battery rating, Dynamo, Alternators, Cut outs, Voltage and Current regulators. Starting motors. Sparkplugs-Hot and Cold, Computer controlled coil ignition sensors

Transmission System: Clutch-Principle and requirements of a clutch, types of clutches-Single plate, Multi plate and Centrifugal, Semi-centrifugal clutches.

 $\mathbf{UNIT} - \mathbf{IV}$

Gearbox - Requirements of a gear box, Gear selecting mechanism, Types of gear boxes-Sliding mesh, Constant mesh and Synchromesh. Propeller shaft - Functions and constructional details,

Differential: Principle of working and its construction, Front axle-stub axle-types of stub axles.

Rear axle –Semi floating, Three-quarter floating and Full floating axles. Steering-Wheel alignment. Steering geometry-Camber-Castor, Kingpin inclination, Toe in, and Toe-out. Steering linkages-Under steering and over steering. Power steering

UNIT – V

Suspension: Types of suspension springs, Front axle independent suspension systems-Wishbone type. Trailing link type, Vertical link type. Rear axle suspension systems, Shock absorbers, Air suspension system

Brakes: Requirements of good braking system. Types of brakes-Mechanical, Hydraulic and pneumatic systems, Emission control, environmental effects on engines, Euro Standards I&II. Introduction to concept of Mechatronics

Text Books:

1. Kirpal Singh, Automobile Engineering Vol.1&2, Standard Publishers, New Delhi

2. R.B. Gupta, Automobile Engineering, Satya Prakasam Publishers, New Delhi

Reference Books:

1. W.H.Crowse, Automotive Mechanics, TMH Publishers, New Delhi

2. Joseph Heitner, Automotive Mechanics, EWP Publishers, New Delhi

3. Heldt, High Speed Combustion Engines, Oxford and IBH Publishers, New Delhi

Question Paper Pattern:

Sessional Exam

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ENERGY CONSERVATION & MANAGEMENT (ECM)

VIII Se	emester:	Mechanical I	Engin	eerin	g		Scheme : 20				
Cours	se Code	Category	H	ours Week	/	Credits	Maximu	m Marks			
ME	2421	Professional Elective – VI	L	Т	Р	С	Continuous Internal Assessment	End Exam	TOTAL		
			3	-	-	3	40	60	100		
Sessior	nal Exam	Duration : 2 Hrs					End Ex	am Duratio	n:3 Hrs		
-						1					
Course	Outcome	s: At the end of	the co	ourse	stuc	lents will b	be able to				
CO1 :	Underst	and various tech	nologi	ies of	ener	gy conserv	vation				
CO2 :	Underst	and the thermal i	nsula	ation a	and	refractors					
CO3:	Underst	and the concepts	of en	ginee	ring	economics	3				
C04·	Underst	and the concepts	s of p	projec	t ma	anagement	including Pay back	method, Net	t present		
	value me	ethod and budget	s	Ū					-		
CO5 :	Underst	and the concept o	of ene	ergy at	Jditi	ng and en	ergy management prog	grams			
					UN	IT – I					
Introdu	iction to	Energy Conserv	atior	1 and	Ma	nagement	Power scenario in Ir	ndia and the	e world-		
Rules fo	or energy o	conservation- Tec	hnolo	ogies f	or ei	nergy cons	ervation-Energy conse	ervation patt	erns.		
Cogene	ration: Pr	rinciple of Cogene	ratio	n-topj	ping	cycle and	bottoming cycle, Amor	unt of energ	y saving		
through	n cogenera	tion									
					UN	IT – II					
Therma	al Insulati	ion and Refracto	ors: I	leat l	oss t	hrough u	n insulated surfaces –	Effect of in	sulation		
on cur	rent carr	ying wires- Crit	cical	thick	ness	of insul	lation- Classification	and prope	rties of		
refracto	ories and in	nsulators									
					UN	IT – III					
Engine	ering Eco	onomics: Steps i	n pla	nning	g – 1	Efficiency	of organization- Capit	tal budgetin	g- Time		
value o	f money-	Cash flow Diagr	ams	– Pre	sent	worth fac	ctor-Capital recover fa	ctor- Equal	annual		
paymen	nt method	s-Nominal and o	effect	ive in	itere	st rates-D	Discrete and continuo	ous compou	nding –		
Equival	ence betw	een cash flows									
					UN	IT – IV					
Project	Manager	nent: Method of	inve	stmen	t ap	praisal- R	ate of return method-	- Pay back 1	method-		
Net pre	sent value	e method- Types o	of pro	ject- 1	Гуре	s of budge	ts- Purpose of project	managemen	t- Roles		
and res	ponsibiliti	es of project man	ager								
Energy	Auditing	: Objectives- Lev	vel of	respo	onsil	oility- Con	trol of energy- Use of	energy- Sch	emes of		
energy	conservati	ion- Energy index	k and	d cost index-Pie charts and sankey diagrams -Load profiles -							
Prelimi	nary and d	letailed energy au	ldit –	Energ	gy sa	wing poter	ntial				
					UN	IT – V					

Energy Management Programs: Necessary steps of energy management program- Concepts of energy management –General principles of energy management

Energy management in manufacturing and process industries: Qualities and functions of energy

managers - Language of energy manager - Checklist for top management

Text Books:

1. W.R. Murphy and G. Mickay, Energy Management, Butterworth Publishers, New Delhi

2. P.W.O. Calighan, Energy Conservation, Pergmon Press, New York

Reference Books:

1. Albert Thumann , Hand Book of Energy Audits, Prentice Hall, New Jersey

2. Craig B. Smith, Energy Management Principles, Pergmon Press, New York

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OPEN ELECTIVES

List of Open Electives

Code	Professional	Name of Course	Offered by the
OE301	Elective	Artificial Intelligence & Expert Systems	CSE
OE302		Introduction to Information Systems	CSE
OE303		Web Development Programme	CSE
OE304		Introduction to Cyber Security	CSE
OE305		Internet of Things	ECE
OE306	OE - I	Nano Technology	ECE
OE307		Remote Sensing & GIS	CE
OE308		Optimization Techniques	ME
OE309		Renewable Energy Systems	EEE
OE310		Introduction to JAVA	CSE
OE311		Object Oriented Programming through JAVA	CSE
OE312		Ethical Hacking	CSE
OE313		Principles of Programming Languages	CSE
OE314		Advanced Information Systems	CSE
OE315	OF U	Scientific Programming with Python	CSE
OE316	0E - 11	Fuzzy Logic & Neural Networks	ECE
OE317		Building Information Modelling	CE
OE318		Product Lifecycle Management	ME
OE319		Simulation of Engineering Systems	EEE
OE320		Industrial Safety	ME
OE401	OE – III	Mechanical Vibrations	ME
OE402	(Department Emerging	Computational Fluid Dynamics	ME
OE403	Technologias)	Experimental Stress Analysis	ME
OE404	reennologies	Product Design & Development	ME
OE405	OE – IV	Additive Manufacturing Technology	ME
OE406	(Department Emerging	Intelligent Manufacturing Systems	ME
OE407	Technologies)	Advanced Materials Technology	ME
OE408	Technologies)	Design for Manufacturing	ME

ARTIFICIAL INTELLIGENCE & EXPERT SYSTEMS (AIES)

V Semester: B.Tech					Scheme: 2017				
Course	Category	Ηοι	urs/V	Veek	Credits	Maxi	i <mark>mum Mark</mark> s	1	
		L	Т	Р	С	Continuous Internal Assessment	End Exam	TOTAL	
OE301	Open Elective	3	0	0	3	40	60	100	
Sessional Ex	am Duration:2 I	Hrs				End E	xam Duratio	n:3 Hrs	
Course Ou	tcomes: At the	end	of th	e cou	ırse, stud	lents will be a	ble to		
CO1:Under	stand how to for	mula	ate ar	n effic	cient prob	lem state spa	ce for a probl	em	
CO2:Discu	ss how search st	rate	gies w	vill fir	nd solutio	ns to problems	s by systemat	cically	
generating new states and testing them against goals									
CO3:Apply Hill-climbing, simulated annealing, Local Beam Search, Genetic Algorithms									
(Local sear	ch								
problems) f	for Agent's Proble	ems							
CO4: Desci	ribes how to solv	e un	predi	ctabil	lity, conti	ngencies of age	ent's problem	-solving	
process, in	which the agent	s' GA	AME §	goals	are in con	nflict			
CO5: Understand the features and working of Expert System.									
Introduction	what Ia AID T	h o F			- I	iol Intolligon	-		
Introduction	Agents: Agents	ne r	ouna 1 Em	viron	s of Artillo ments - G	cial intelligence	e Ir: The Con	cent of	
Rationality '	The Nature of En	viroi	i Eir	ts At	nd the Str	ucture of Ager	nts	Jupt of	
Solving Pre	oblems by Sea	arch	ing:	Prob	lem-Solvi	ng Agents. I	Example Pro	oblems.	
Searching for	r Solutions		8'	110.0				,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	
			τ	JNIT-	· II				
Uninformed	Search Strateg	ies:	BFS,	DFS	, Depth -	limited search	n, IDA, Bidire	ctional	
search									
Informed (Heuristic) Sear	ch	Strat	tegies	s- Greed	y best-first s	search, A*	search,	
Memory-bou	nded heuristic se	earcl	n, Lea	arning	g to searc	h better. Heur	istic Functior	18.	
			<u> </u>	NIT-	III	1.0			
Beyond Clas	ssical Search: Lo	ocal	Searc	ch Alg	gorithms	and Optimizat	ion Problems	, Local	
Search In Co	ntinuous Spac	es,	Searc	hing	With Par	tial Observatio	ons. Searchir	ig with	
Adversarial	Search: Games.	Opti	imal I	Decis	ions In Ga	ames. Alpha—	Beta Pruning		
Constraint	Satisfaction F	Probl	ems:	Def	fining Co	onstraint Sati	sfaction Pro	oblems.	
Constraint P	ropagation: Infer	ence	InCs	sps, E	Backtrack	ing Search For	Csps, Local	Search	
For Csps, Th	e Structure Of P	roble	ems	- 1		0	± ´		

UNIT-V

Introduction to Expert System: What are Expert Systems, Features of Expert system, Features of good expert system, Role of human in Expert system, Expert system organization, Difference between expert system and conventional program, Basic activities of expert system and the areas in which they solve problems, Prospector system features, working.

Text Books:

- 1. Stuart Russell and Peter Norvig, Artificial Intelligence: A Modern Approach, Third Edition, 2010. Pearson Education.
- 2. Donald A.Water man," A Guide to expert systems", Addison Wesley publishing company.

Reference Books:

1. Elaine Richie Kevin Knight [2008], [3rd Edition], Artificial Intelligence, TMH

Web References:

- 1. https://onlinecourses.nptel.ac.in/noc18_cs51
- 2. https://www.geeksforgeeks.org/artificial-intelligence-an-introduction/
- 3. https://www.tutorialspoint.com/artificial_intelligence/artificial_intelligence_expert _systems.htm

Question Paper Pattern:

SessionalExam

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End Exam

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INTRODUCTION TO INFORMATION SYSTEMS (IIS)

V Semester	: B.Tech						Schen	ne: 2017	
Course	Category	Ηοι	urs/W	eek	Credits	Credits Maximum Marks			
OE302	Open Elective - 1	L	Т	Р	С	Continuous Internal	End Exam	TOTAL	
	-	3	0	0	3	40	60	100	
Sessional	Exam Duration:	2 Hr	'S		End Exam Duration:3 Hrs				

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

CO1: Understand the concepts of Computer architecture and functionalities of System software

CO2: Understand the page replacement and CPU Scheduling Algorithms

CO3: Understand the phases of software development life cycle and process models.

CO4: Design ER model for real life scenarios

CO5: Apply SQL commands to create, update, modify and retrieve data from the data bases.

CO6: Apply normalization techniques to normalize the database.

UNIT– I

Fundamentals of Computers & Computer Architecture: Introduction, Organization of a small computer, Central Processing Unit, Execution cycle, Instruction categories, measure of CPU performance, Memory, Input/output devices, BUS, addressing modes

System Software: Assemblers, Loaders and linkers, Compilers and interpreters.

UNIT- II

Operating System: Introduction, Memory management schemes, Page replacement algorithms, Process management, CPU scheduling algorithms.

Software engineering: Software engineering: Introduction to Software engineering, Life cycle of a software project, software Development models.

UNIT- III

Relational Database Management System: Introduction to DBMS, the database technology, data models, Database Users.

Entity Relationship (E-R) Modelling: Introduction, Notations, Modelling E-R Diagrams, Case Studies, Merits and Demerits of E-R modelling.

UNIT- IV

Structured Query Language (SQL): Introduction to SQL, Data types, Data Definition language commands, Data Manipulation Language Commands and Data control Language Commands, Candidate Key, Primary key, Foreign key, Select Clause, Where Clause, Logical Connectives – AND, OR, Range Search, Pattern Matching, Order By, Group By, Set Operations – Union, Intersect and Minus, Aggregate Functions, Join Operations.

UNIT- V

Normalization:

Introduction, Need for Normalization, Process of Normalization, Types of Normal Forms (1 NF, 2 NF,

3 NF & BCNF), Merits and Demerits of Normalization.

Text Books:

1. Campus Connect Foundation Program – Computer Hardware and System Software

Concepts, Programming Fundamentals- Vol. - 1, INFOSYS.

2.Campus Connect Foundation Program – Relational Database Management System, Client Server Concepts, Introduction to Web Technologies - Vol. – 4, INFOSYS

3.Henry F. Korth& Abraham Silberschatz, - Data Base System Concepts, 5th Edition, 2005, Ic Graw hill

Reference Books:

- 1. M. Morris Mano [2011], [3 rd Edition], Computer system architecture, Pearson Education, 2011
- 2. Sommerville [2008], [7th Edition], Software Engineering, Pearson education.
- Raghu Ramakrishna and Johannes Gehrke [2003], [3rd Edition], Data Base Management Systems, TATA McGraw Hil
- 4. Tanenbaum [2000], Modern Operating System, Pearson Education.

Web References:

- 1. <u>https://www.w3schools.com/sql/</u>
- 2. <u>https://www.geeksforgeeks.org/dbms/</u>
- 3. https://www.tutorialride.com/software-engineering/software-engineering-tutorial.htm

Question Paper Pattern:

Sessional Exam

The question paper for sessional examination is for 30 marks, covering half of the syllabus for first Sessional and remaining half for second sessional exam. Question No.1 which carries 6 marks contains three short answer questions of two marks each. The remaining three questions shall be EITHER/OR type questions carrying 8 marks each.

End Exam

Question Paper Contains Six Questions. Question 1 contains 5 short Answer questions each of 2 marks. (Total 10 marks) covering one question from each unit. The remaining five questions shall be EITHER / OR type questions carrying 10 marks each. Each of these questions is from one unit and may contain sub-questions. i.e. there will be two questions from each unit and the student should answer any one question.

WEB DEVELOPMENT PROGRAMMING (WDP)

V Semester:	V Semester: B.Tech						Scheme	: 2017	
Course Code	Category	Ho	urs/V	Week	Credits	Max	imum Marks		
OE303	Open Elective - 1	L	Т	Р	С	Continuous Internal Assessmen	End Exam	TOTAL	
		3	0	0	3	40	60	100	
Sessional E	xam Duration: 2	Hrs	1			End l	Exam Duratio	n: 3 Hrs	
Course Outcomes: At the end of the course students will be able to CO1: Understand the fundamental concepts of web designing.									
CO2: Design a static web page using HTML tags and attributes.									
CO3: Develo	op web pages using	g HT	ML a	nd Cas	scading St	yles sheets.			
CO4: Under	estand the concepts	s of	serve	r side	programn	ning.			
CO5: Create	e dynamic and inte	ract	ive w	ebsites	s using da	tabase connec	ction.		
				UNIT-	- I				
Web Technol	ogy Fundamenta	ıls:	Intro	oductio	on to the	e Web, Web	servers and	Clients,	
Resources, U	RL and its Ana	atom	ny, N	Aessag	ge Forma	t, Persistent	and Non-pe	ersistent	
connections, V	Web Caching, Prox	xy, J	ava a	and th	e Net, Ja	va Network Cl	asses and Int	erfaces,	
Looking up Int	ternet Address.								
UNIT– II									
HTML: HTML	HTML: HTML and its Flavours, HTML basics, Elements, Attributes and Tags, Basic Tags,								
Advanced Tag	s, Frames, Images,	, Me	ta taş	g, Plan	ning of W	eb page, Mod	el and Structu	re for a	
Website, Desig	gning Web pages, M	lulti	medi	a cont	ent.				

UNIT- III

Cascading style sheets: Advantages, Adding CSS, Browser compatibility, CSS and page layout, Selectors.

UNIT- IV

Server side programming: Server-side Java, Advantages over Applets, Servlet alternatives, Servlet strengths, Servlet architecture, Servlet life cycle, Generic and HTTP Servlet, First servlet, Passing parameters to servlets, Retrieving parameters, Server-side include, Cookies, Filters, Problems with servlet, Security issues, JSP and HTTP, JSP Engines, How JSP works, JSP and Servlet, Anatomy of a JSP page, JSP syntax, JSP components.

UNIT– V

Database Connectivity: Database connectivity, JDBC drivers, Basic steps, Loading a driver, Making a connection, Execute and SQL statement, SQL statements, Retrieving the result, Getting database information. **Text Books :**

1. UtamK.Roy, Web Technologies, Oxford Higher Education, 1st Edition, Seventh Impression.

2. K.L.James, The Internet- A User Guide, 2nd Edition, PHI Publications.

Reference Books :

 Introduction to Java Programming, Y.Daniel Liang, 6th Edition, Pearson Education, 2007

2. Web Technologies Srinivasan, Pearson Education, 2012.

3. Kognet Learning Solutions inc., HTML5 in Simple Steps, DreamTech press.

4. Java EE 5 for Beginners, Ivan Bayross, Sharanam Shah, Cynthia Bayrossand. Vaishali shai,SPD.

Web References:

1. https://www.tutorialspoint.com/html/

2. https://www.tutorialspoint.com/css/

3. https://www.javatpoint.com/java-tutorial

Question Paper Pattern:

Sessional Exam

The question paper for sessional examination is for 30 marks, covering half of the syllabus for first Sessional and remaining half for second sessional exam. Question No 1which carries 6 marks contains three short answer questions of two marks each. The remaining three questions shall be EITHER/OR type questions carrying 8 marks each.

End Exam

Question Paper Contains Six Questions. Question 1 contains 5 short Answer questions each of 2 marks. (Total 10 marks) covering one question from each unit. The remaining five questions shall be EITHER/OR type questions carrying 10 marks each. Each of these questions is from one unit and may contain sub-questions i.e there will be two questions from each unit and the student should answer any one question.

INTRODUCTION TO CYBER SECURITY (ICS)

V Semester: B.Tech							Sche	eme: 2017									
Course Code	Category	Ηοι	ırs/W	eek	Credits	Credits Maximum Marks											
OE304	Open Elective -	L	Т	Р	С	ContinuousInternalEnd ExamTOTALAssessment											
	I	3	0	0	3	40	60	100									
Sessional E	xamDuration:2	Hrs				End E	xam Duratio	n:3 Hrs									
Course Outcomes: At the end of the course students will be able to																	
course outcomes. At the end of the course students will be able to																	
CO1: Understand Cyber Security architecture principles																	
CO2: Identif	ying different cla	asses	s of att	acks													
CO3:Unders	tand about cybe	ercrin	ne wit	h mot	oile and w	rireless devices											
CO4:Unders	tand about the	tools	and n	netho	ds used ir	n cybercrime.											
CO5:Unders	tand about cybe	er sec	curity	and s	ocial med	ia marketing.											
				UN	IT– I												
Introduction	to Cybercrime																
Introduction,	Cybercrime: De	finiti	on an	d Ori	gins of t	he Word, Cyb	ercrime and	Information									
Security, Who	are Cybercrin	ninal	s? Cla	assific	cations of	f Cybercrimes	Cybercrime:	The Legal									
Perspectives,	Cybercrimes: Ar	n Inc	lian F	Perspe	ective, Cy	bercrime and	the Indian I'	ГА 2000, А									
Global Perspec	tive on Cybercri	mes,	Cyber	rcrime	e Era: Sui	vival Mantra fo	or the Netizens	3.									
<u> </u>				UN	IT– II												
Cyber offense	S							Cuber offenses									

How Criminals Plan Them –Introduction, How Criminals Plan the Attacks, Social Engineering, Cyber stalking, Cyber cafe and Cybercrimes, Botnets: The Fuel for Cybercrime, Attack Vector Cloud Computing.

UNIT- III

Cybercrime Mobile and Wireless Devices

Introduction, Proliferation of Mobile and Wireless Devices, Trends in Mobility, Credit Card Frauds in Mobile and Wireless Computing Era, Security Challenges Posed by Mobile Devices, Registry Settings for Mobile Devices, Authentication Service Security, Attacks on Mobile/Cell Phones. Mobile Devices:

Security Implications for Organizations, Organizational Measures for Handling Mobile,

Organizational Security Policies and Measures in Mobile Computing Era, Laptops.

UNIT- IV

Tools and Methods Used in Cybercrime

Introduction, Proxy Servers and Anonymizers, Phishing, Password Cracking, Key loggers and Spywares, Virus and Worms, Trojan Horses and Backdoors, Steganography, DoS and DDoS Attacks, SQL Injection, Buffer Overflow, Attacks on Wireless Networks, Phishing.

UNIT- V

Cyber Security:

Organizational Implications: Introduction, Cost of Cybercrimes and IPR issues, Web threats for Organizations, Security and Privacy Implications, Social media marketing: Security Risks and Perils for Organizations, Social Computing and the associated challenges for Organizations.

Text Books:

1. Cyber Security: Understanding Cyber Crimes, Computer Forensics and Legal

Perspectives, Nina Godbole, Sunit Belapure, Wiley.

 Principles of Information Security, Micheal E. Whitman and Herbert J. Mattord, Cengage Learning.

Reference Books:

- 1. Information Security, Mark Rhodes, Ousley, MGH.
 - 2. Cyber Security Essentials, James Graham, Richard Howard and Ryan Otson, RC Press

Web References:

1.https://www.tutorialspoint.com/fundamentals_of_science_and_technology/cyber_crime_a nd_cyber_security.html

Question Paper Pattern:

Sessional Exam

The question paper for sessional examination is for 30 marks, covering half of the syllabus for first Sessional and remaining half for second sessional exam. Question No1which carries 6 marks contains three short answer questions of two marks each. The remaining three questions shall be EITHER/OR type questions carrying 8 marks each.

End Exam

Question Paper Contains Six Questions. Question 1 contains 5 short Answer questions each of 2 marks. (Total 10 marks) covering one question from each unit. The remaining five questions shall be EITHER/OR type questions carrying 10 marks each. Each of these questions is from one unit and may contain sub-questions.i.e. there will be two questions from each unit and the student should answer any one question.

INTERNET OF THINGS (IOT)

V Semester: B.Tech							Schen	ne: 2017		
Course	Course	Hou	rs/We	ek	Credits	Maxir	num Marks			
Code	Category									
						Continuous				
05205	Open Elective -	L	Т	Р	С	Internal	End Exam	TOTAL		
OE305	1					Assessment				
		3	0	0	3	40	60	100		
Sessional	Exam Duration:	2 Hr	s		End Exa	m Duration: 3 H	Irs			
Course Outcomes: At the end of the course the student will be able to										
CO1: Understand the basic knowledge of Internet of things and its design										
CO2: Unde	rstand the purpo	se of	sensor	s and	l Actuator	s in IoT				
CO3: Anal	yze Various IoT P	rotoco	ols							
CO4: Desi	gn IoT Projects Us	sing A	rduino)						
CO5: Unde	erstand Raspberr	y-Pi P	rocess	or ar	nd Raspbia	an Operating Sys	tems			
				U	I – TIV					
Introducti	ion to IoT:									
Definition	and Characteris	tics c	of IoT,	Phys	sical Desi	gn and Logical	Design, IoT	Enabling		
Technologi	ies, IoT Levels and	l Dep	loymeı	nt Tei	mplates, I	oT Vs M2M				
				UN	IIT – II					
Sensing a	nd Actuation:									
Definition	of Sensor, Sens	sor fe	eatures	s, Re	solution,	Classes, Differe	ent types of	sensors,		
Actuator, I	Different types of	Actua	itors, p	ourpo	ose of Sens	sors and Actuator	rs in IoT			
				UN	IT – III					
Wireless 7	echnologies and	l Data	a Tran	smis	sion for I	oT:				
Wi-Max, W	/i-Fi (802.11), Blu	letoot	h/Blue	etootl	n smart,Zi	gbee/Zigbee sma	rt, Cellular,			
NFC,Serial	Transmission, R	S-232	2, RS-4	485, I	2C Inter-I	ntegrated Circuit	t, Ethernet, C	AN bus,		
USB, Firev	vall, Serial ATA, F	Paralle	el Tran	smis	sion.					
				UN	IT – IV					
Building I	oT with Arduino	:Ardu	ino ID	E, Pr	ogrammir	ng of Arduino, Int	terfacing LED	, switch,		
potentiom	eter, Sensors, LCI	D, Blu	aetooth	ı, Wi-	·Fi, GPS, F	RFID with Arduin	.0			
UNIT –V										
Raspberry	Pi:									
Linux basi	ics, Linux File sy	stem,	Navig	ating	g the File	system, Text Edi	itors, Accessi	ng Files,		
Permission	ns, Processes, Lin	ux G	raphic	user	Interface,	, Raspberry Pi Pr	ocessor, Ras	pberry Pi		
Vs Arduine	Vs Arduino, Operating system benefits, Raspberry Pi Set up, Configuration.									
Text Book	KS:									

 ArsheepBahga , Vijay Madisetti ,Internet of Things: A Hands-On Approach Paperback,2015

- 2. RajkumarBhuyya,Internet of Things: Principles and Paradigms ,2016
- 3. Adeel Javed, Building Arduino Projects for the Internet of Things, Apress, 2016
- 4. Wolfram Donat, Learn Raspberry-Pi with Python, Apress, 2016

Reference Books:

- 1. Charles Bell, Beginning Sensor Networks with Arduino and Raspberry-Pi, Apress, 2016
- 2. AndrianMcEwen, Hakim Casimally, Designing of Internet of Things, John Wiley, 2014
- 3. Warren Gay, Masteringthe Raspberry-Pi, Apress, 2016

Web References:

- 1. https://nptel.ac.in/courses/106105166/
- 2. https://onlinecourses.nptel.ac.in/noc17_cs22/course
- 3. https://nptel.ac.in/courses/108108098/4
- 4. https://onlinecourses.nptel.ac.in/noc19_ee28

Question Paper Pattern:

Sessional Exam:

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End Exam:

Question Paper Contains Six Questions. Question 1 contains 5 short Answer questions each of 2 marks. (Total 10 marks) covering one question from each unit. The remaining five questions shall be EITHER/OR type questions carrying 10 marks each. Each of these questions is from one unit and may contain sub-questions. i.e. there will be two questions from each unit and the student should answer any one question.

NANO TECHNOLOGY (NNT)

V Sen	nester	: B.Tech						Scheme	2017	
Cour	rse	Course Category	Hours	s/Wee	k	Credits	Maxir	num Marks		
Cod	le									
OE3	06	Open Elective - 1	L	т	Р	С	Continuous Internal Assessment	End Exam	TOTAL	
			3	0	0	3	40	60	100	
Sessional Exam Duration: 2 Hrs End Exam Duration: 3 Hrs									n: 3 Hrs	
Cou	rse Ou	itcomes: At the en	nd of t	he cou	ırse t	he studer	nt will be able to)		
CO1:	Acqu	ire some of the fu	ndame	ntal p	rincip	les behind	d nanotechnolog	y and nano	materials	
	and t	their vital role in no	ovel ser	nsing p	roper	ties and a	pplications.			
CO2:	Unde	erstand the fabricat	tion, cł	naracte	erizati	ion, and n	nanipulation of 1	nano materi	als, Nano	
	sense	ors and introductio	n to se	nsors.						
CO3:	CO3: Understand about metal nanoparticle based sensors and nanowire based sensors.									
CO4: Understand about sensors based on nanostructures of metal oxides.										
	UNIT – I									

Introduction to Nanotechnology:

Definition of nanotechnology; main features of nanomaterials; types of nanostructures (0D, 1D, and 2D structures); nanocomposites; and main chemical/physical/electrical/optical properties of nanomaterials. Methods for characterizing the nanomaterials: Atomic Force Microscopy (AFM), Scanning Electron Microscopy (SEM), Transmission Electron Microscopy (TEM), and spectroscopy- and spectrometry-based surface analysis techniques. Fabrication of sensors by bottom-up and top-down approaches; self-assembly of nanostructures; and examples for nanotechnology application

UNIT – II

Introduction to Sensors' Science and Technology:

Definition of sensors; main elements of sensors; similarities between living organisms and artificial sensors; working mechanism of physical sensation (seeing, hearing, and feeling) and chemical sensation (smelling and tasting); the parameters used for characterizing the performance of sensors: accuracy, precision, sensitivity, detection limit, dynamic range, selectivity, linearity, resolution, response time, hysteresis, and life cycle

$\mathbf{UNIT} - \mathbf{III}$

Metal nanoparticle-based Sensors:

Definition of nanoparticle; features of nanoparticles; and production of nanoparticles by physical approach (laser ablation) and chemical approaches (Brust method, seed-mediated growth, etc.).Quantum Dot Sensors. Definition of quantum dot; fabrication techniques of quantum dots; Macroscopic and microscopic photoluminescence measurements; applications of quantum dots as multimodal contrast agents in bio imaging; and application of quantum dots as biosensors.

UNIT – IV

Nanowire-based Sensors:

Definition of nanowires; features of nanowires; fabrication of individual nanowire by top-down approaches and bottom-up approaches; and fabrication of nanowire arrays (fluidic channel, blown bubble film, contact printing, spray coating, etc.).Carbon Nanotubes-based Sensors: Definition of carbon nanotube; features of carbon nanotubes; synthesis of carbon nanotubes; fabrication and working principles of sensors based on individual carbon nanotube; fabrication and working principles of sensors based on random array of carbon nanotubes.

UNIT – V

Sensors Based on Nanostructures of Metal Oxide:

Synthesis of metal oxide structures by dry and wet methods; types of metal oxide gas sensors (0D, 1D, and 2D); defect chemistry of the metal oxide sensors; sensing mechanism of metal-oxide gas sensors; and porous metal-oxide structures for improved sensing applications.

Text Books :

1. Jiří Janata, Principles of Chemical Sensors, Springer, 2nd Edition (1989).

2. Roger George Jackson, Novel Sensors and Sensing, CRC Press (2004).

Reference Books :

- 1. Florinel-Gabriel Banica, Chemical Sensors and Biosensors: Fundamentals and Applications, John Wiley and Sons (2012).
- 2. Ramsden Jeremy, Nanotechnology, an Introduction. Elsevier (2011).

Question Paper Pattern:

Sessional Exam:

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End Exam:

Question Paper Contains Six Questions. Question 1 contains 5 short Answer questions each of 2 marks. (Total 10 marks) covering one question from each unit. The remaining five questions shall be EITHER/OR type questions carrying 10 marks each. Each of these questions is from one unit and may contain sub-questions. i.e. there will be two questions from each unit and the student should answer any one question.

REMOTE SENSING AND GEOGRAPHIC INFORMATION SYSTEMS(RSGIS)

VSemester :B.	Tech	Scheme : 2017						
Course Code	Category	H	ours / Week	1	Credits	Maximum Marks		ks
OE307	Open Elective - 1	L	Т	Р	С	Continuous Internal Assessment	End Exam	Total
		2	1	-	3	40	60	100
Sessional Exa	m Duration: 2 Hr	s				End Exa	m Durati	on:3 Hrs
Course Outcomes: At the end of the course students will be able to								
CO1: Understa	and the concept c	of elec	troma	gnet	ic radiatio	n and its inter	action wi	th earth's
surface								
CO2: Understa	and air borne and	space	e born	le pl	atforms, sj	pace imaging s	atellites o	of different
Countrie	28.							
CO3: Understa	and the image proc	cessin	g tech	niqu	ies and ap	plications of rea	mote sens	sing.
CO4: Understa	and the concept of	GIS a	and or	gani	zation of G	IS data structu	ires.	
CO5: Understa	and primary and s	econd	ary m	etho	ds of capti	uring spatial ar	nd attribu	te data.
			U	NIT	- I			
Introduction	to Remote Sens	ing: (Conce	pt a	nd Scope	of Remote Se	nsing: D	efinition –
Physics of Rem	note Sensing – Ele	ctro N	lagne	tic R	adiation (I	EMR), Process a	and Char	acteristics
of Remote Ser	nsing System – E	nergy	Intera	actic	on with th	e atmosphere	and Eart	h Surface
Features – Ve	getation, soils, w	rater-	Spect	tral	Reflectanc	e Curves, atm	ospheric	windows,
Advantages an	d limitations of re	mote	sensin	ıg.				

UNIT - II

Platforms and Sensors: Remote Sensing Systems: Platforms: Introduction – Types – Satellites and orbits, Passive and Active sensors– Spatial, spectral, radiometric and temporal resolution of satellites, Whiskbroom and Push-broom scanners, Multi-band concepts and False Color Composites - Some remote sensing satellites and their features.

UNIT - III

Image Processing Techniques and Remote Sensing Applications: Digital Image Processing: Image enhancement – Contrast stretch, Spatial filtering and edge enhancement; Classification – Supervised and unsupervised classification – Visual image interpretation techniques.

Remote Sensing Applications - Applications in land use and land cover analysis - Mapping of forest and agriculture -Watershed management - Drought Assessment - Environmental modeling and other applications.

 Geographic Information System: Basic Concepts: Definition - Components - Functions of GIS - Areas of GIS application - Advantages and Limitations of GIS - Information Organization and Data Structures - Raster and Vector data structures - Data file organization and formats - Data Base Management Systems. UNIT - V GIS Data Input & Editing: Method of Spatial and Attribute data capture- Primary and Secondary digitization and scanning method - Techniques and procedure for digitizing, Topology- Errors of Digitization and rectification - Re-projection - Transformation and Generalization - Edge matching and Rubber sheeting - Proximity - Buffering and overlay Text Books : M. Anji Reddy, Text Book of Remote Sensing and Geographic Information System, BS Publication. Lo C.P. & Yeung A.K.W., (2004), Concepts and Techniques of GIS, Prentice-Hall of India, New Delhi. Thomas Lilles and, Ralph W Kiefer and Jonathan Chipman "Remote Sensing and Image Interpretation", John Wiley & Sons, India Reference Books : B.Bhatta, Remote sensing and Geographic Information System, Oxford Publications.
 GIS - Areas of GIS application - Advantages and Limitations of GIS - Information Organization and Data Structures - Raster and Vector data structures - Data file organization and formats - Data Base Management Systems. UNIT - V GIS Data Input & Editing: Method of Spatial and Attribute data capture- Primary and Secondary digitization and scanning method - Techniques and procedure for digitizing, Topology- Errors of Digitization and rectification - Re-projection - Transformation and Generalization - Edge matching and Rubber sheeting - Proximity - Buffering and overlay Text Books : M. Anji Reddy, Text Book of Remote Sensing and Geographic Information System, BS Publication. Lo C.P. & Yeung A.K.W., (2004), Concepts and Techniques of GIS, Prentice-Hall of India, New Delhi. Thomas Lilles and, Ralph W Kiefer and Jonathan Chipman "Remote Sensing and Image Interpretation", John Wiley & Sons, India Reference Books : B.Bhatta, Remote sensing and Geographic Information System, Oxford Publications.
Organization and Data Structures – Raster and Vector data structures - Data file organization and formats - Data Base Management Systems. UNIT - V GIS Data Input & Editing: Method of Spatial and Attribute data capture– Primary and Secondary digitization and scanning method - Techniques and procedure for digitizing, Topology– Errors of Digitization and rectification - Re-projection - Transformation and Generalization - Edge matching and Rubber sheeting - Proximity - Buffering and overlay Text Books : 1. M. Anji Reddy, Text Book of Remote Sensing and Geographic Information System, BS Publication. 2. Lo C.P. & Yeung A.K.W., (2004), Concepts and Techniques of GIS, Prentice-Hall of India, New Delhi. 3. Thomas Lilles and, Ralph W Kiefer and Jonathan Chipman "Remote Sensing and Image Interpretation", John Wiley & Sons, India Reference Books : 1. B.Bhatta, <i>Remote sensing and Geographic Information System</i> , Oxford Publications.
organization and formats - Data Base Management Systems. UNIT - V GIS Data Input & Editing: Method of Spatial and Attribute data capture– Primary and Secondary digitization and scanning method - Techniques and procedure for digitizing, Topology– Errors of Digitization and rectification - Re-projection - Transformation and Generalization - Edge matching and Rubber sheeting - Proximity - Buffering and overlay Text Books : 1. M. Anji Reddy, Text Book of Remote Sensing and Geographic Information System, BS Publication. 2. Lo C.P. & Yeung A.K.W., (2004), Concepts and Techniques of GIS, Prentice-Hall of India, New Delhi. 3. Thomas Lilles and, Ralph W Kiefer and Jonathan Chipman "Remote Sensing and Image Interpretation", John Wiley & Sons, India Reference Books : 1. B.Bhatta, <i>Remote sensing and Geographic Information System</i> , Oxford Publications.
UNIT - V GIS Data Input & Editing: Method of Spatial and Attribute data capture– Primary and Secondary digitization and scanning method - Techniques and procedure for digitizing, Topology– Errors of Digitization and rectification - Re-projection - Transformation and Generalization - Edge matching and Rubber sheeting - Proximity - Buffering and overlay Text Books : 1. M. Anji Reddy, Text Book of Remote Sensing and Geographic Information System, BS Publication. 2. Lo C.P. & Yeung A.K.W., (2004), Concepts and Techniques of GIS, Prentice-Hall of India, New Delhi. 3. Thomas Lilles and, Ralph W Kiefer and Jonathan Chipman "Remote Sensing and Image Interpretation", John Wiley & Sons, India Reference Books : 1. B.Bhatta, <i>Remote sensing and Geographic Information System</i> , Oxford Publications.
 GIS Data Input & Editing: Method of Spatial and Attribute data capture- Primary and Secondary digitization and scanning method - Techniques and procedure for digitizing, Topology- Errors of Digitization and rectification - Re-projection - Transformation and Generalization - Edge matching and Rubber sheeting - Proximity - Buffering and overlay Text Books : M. Anji Reddy, Text Book of Remote Sensing and Geographic Information System, BS Publication. Lo C.P. & Yeung A.K.W., (2004), Concepts and Techniques of GIS, Prentice-Hall of India, New Delhi. Thomas Lilles and, Ralph W Kiefer and Jonathan Chipman "Remote Sensing and Image Interpretation", John Wiley & Sons, India Reference Books : B.Bhatta, Remote sensing and Geographic Information System, Oxford Publications.
 Secondary digitization and scanning method - Techniques and procedure for digitizing, Topology– Errors of Digitization and rectification - Re-projection - Transformation and Generalization - Edge matching and Rubber sheeting - Proximity - Buffering and overlay Text Books : M. Anji Reddy, Text Book of Remote Sensing and Geographic Information System, BS Publication. Lo C.P. & Yeung A.K.W., (2004), Concepts and Techniques of GIS, Prentice-Hall of India, New Delhi. Thomas Lilles and, Ralph W Kiefer and Jonathan Chipman "Remote Sensing and Image Interpretation", John Wiley & Sons, India Reference Books : B.Bhatta, <i>Remote sensing and Geographic Information System</i>, Oxford Publications.
 Topology- Errors of Digitization and rectification - Re-projection - Transformation and Generalization - Edge matching and Rubber sheeting - Proximity - Buffering and overlay Text Books : M. Anji Reddy, Text Book of Remote Sensing and Geographic Information System, BS Publication. Lo C.P. & Yeung A.K.W., (2004), Concepts and Techniques of GIS, Prentice-Hall of India, New Delhi. Thomas Lilles and, Ralph W Kiefer and Jonathan Chipman "Remote Sensing and Image Interpretation", John Wiley & Sons, India Reference Books : B.Bhatta, <i>Remote sensing and Geographic Information System</i>, Oxford Publications.
 Generalization - Edge matching and Rubber sheeting - Proximity - Buffering and overlay Text Books : M. Anji Reddy, Text Book of Remote Sensing and Geographic Information System, BS Publication. Lo C.P. & Yeung A.K.W., (2004), Concepts and Techniques of GIS, Prentice-Hall of India, New Delhi. Thomas Lilles and, Ralph W Kiefer and Jonathan Chipman "Remote Sensing and Image Interpretation", John Wiley & Sons, India Reference Books : B.Bhatta, <i>Remote sensing and Geographic Information System</i>, Oxford Publications.
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 M. Anji Reddy, Text Book of Remote Sensing and Geographic Information System, BS Publication. Lo C.P. & Yeung A.K.W., (2004), Concepts and Techniques of GIS, Prentice-Hall of India, New Delhi. Thomas Lilles and, Ralph W Kiefer and Jonathan Chipman "Remote Sensing and Image Interpretation", John Wiley & Sons, India Reference Books : B.Bhatta, <i>Remote sensing and Geographic Information System</i>, Oxford Publications.
 Publication. 2. Lo C.P. & Yeung A.K.W., (2004), Concepts and Techniques of GIS, Prentice-Hall of India, New Delhi. 3. Thomas Lilles and, Ralph W Kiefer and Jonathan Chipman "Remote Sensing and Image Interpretation", John Wiley & Sons, India Reference Books : B.Bhatta, Remote sensing and Geographic Information System, Oxford Publications.
 Lo C.P. & Yeung A.K.W., (2004), Concepts and Techniques of GIS, Prentice-Hall of India, New Delhi. Thomas Lilles and, Ralph W Kiefer and Jonathan Chipman "Remote Sensing and Image Interpretation", John Wiley & Sons, India Reference Books : B.Bhatta, <i>Remote sensing and Geographic Information System</i>, Oxford Publications.
New Delhi. 3. Thomas Lilles and, Ralph W Kiefer and Jonathan Chipman "Remote Sensing and Image Interpretation", John Wiley & Sons, India Reference Books : 1. B.Bhatta, Remote sensing and Geographic Information System, Oxford Publications.
 Thomas Lilles and, Ralph W Kiefer and Jonathan Chipman "Remote Sensing and Image Interpretation", John Wiley & Sons, India Reference Books : B.Bhatta, Remote sensing and Geographic Information System, Oxford Publications.
Interpretation", John Wiley & Sons, India Reference Books : 1. B.Bhatta, Remote sensing and Geographic Information System, Oxford Publications.
Reference Books :1. B.Bhatta, Remote sensing and Geographic Information System, Oxford Publications.
1. B.Bhatta, Remote sensing and Geographic Information System, Oxford Publications.
2. Siddiqui, M.A.(2006), Introduction to Geographical Information System, ShardaPustak
Bhavan, Allahabad.
3. Curran, Paul J (1985), Principles of Remote Sensing, Longman, London.
4. Floyd F Sabins Jr., Remote Sensing Principles and Interpretation, Freeman and Co., San
Franscisco.

Web References:

1. www.nptel.ac.in/courses

Question Paper Pattern:

Sessional Exam:

The question paper for sessional examination is for 30 marks, covering half of the syllabus for first sessional and remaining half for second sessional exam. Question No. 1 which carries 6 marks contains three short answer questions of two marks each. The remaining three questions shall be EITHER/OR type questions carrying 8 marks each.

End Exam:

Question paper contains Six questions. Question 1 contains 5 short Answer questions each of 2 marks (Total 10 marks) covering one question from each unit. The remaining five questions shall be EITHER/OR type questions carrying 10 marks each. Each of these questions is from one unit and may contain sub-questions i.e. there will be two questions from each unit and the student should answer any one question.

OPTIMIZATION TECHNIQUES (OT)

VI Ser	VI Semester: B.Tech					Scheme: 2017					
Cours	e Code	Category	Hours / Week			Credits Maximum Marks			S		
OE308		Open Elective - 1	L	т	Р	С	Continuous Internal Assessment	End Exam	TOTAL		
		3	-	-	3	40	60	100			
Sessional Exam Duration: 2 Hrs							End Exam Duration: 3 Hrs				
Course	Outcom	es: At the end	of the	e cou	ırse stu	dents will	be able to				
CO1 :	Understa	and basics of c	perat	tions	resear	ch, linear	programming mo	odels			
CO2:	Solve tra	insportation re	lated	prol	blems						
CO 3:	Solve as	signment prob	lems	and	sequen	cing probl	ems				
CO 4 :	Solve qu	euing and gan	ne the	eory	related	problems					
CO 5:	Solve pro	oject managem	ient p	robl	ems						
					UNIT	– I					
					<u> </u>			1 . 0			

Introduction: Definition, Significance of Operations Research, Models in Operations Research, Application Areas of Operations Research

Linear Programming: Model Formulation, Graphical solution of L.P.P, Slack, Surplus and Artificial variables, Simplex method, Big M method, Degeneracy in L.P.P, Duality Concept

UNIT – II

Transportation Problems: Introduction balanced and unbalanced Transportation problems, Initial basic feasible solution using N-W corner rule, least cost method and Vogel's approximation method, Optimal Solution (MODI method), Degeneracy in Transportation Problem

UNIT – III

Assignment Problems: Introduction, The Assignment Algorithm (Hungarian Assignment method), Balanced and Unbalanced Assignment Problems, Travelling Salesman Problem as an Assignment Problem

Sequencing Models: Introduction, General assumptions, processing n jobs through 2 machines, processing 'n' jobs through m machines, Processing 2 jobs through m machines

UNIT – IV

Game Theory: Definitions and Terminology, Two Person Zero Sum Games, Pure Strategy Games (with Saddle Point), Principle of Dominance, Solution for Mixed Strategy Games (Games without Saddle Point) Graphical method

Queuing Theory: Introduction, single channel - poisson arrivals - exponential service times with infinite population, and Multi-channel - poisson arrivals - Exponential service times with infinite population.

UNIT – V

Project Management: Phases of project management, guidelines for network construction, critical path, forward and backward pass, floats and their significance, crashing for optimum duration.

Text Books:

1. Hamdy, A. Taha, Operations Research-An Introduction, Prentice Hall of India Pvt. Ltd

2. S.D. Sharma, Operations Research, Kedarnath, Ramnath& Co., Meerut,

3. R. Paneer Selvam, Operations Research , PHI Learning Pvt. Ltd., New Delhi

Reference Books:

- 1. Hillier Lieberman, Introduction to Operations Research, Tata McGraw Hill Edition
- 2. J.K. Sharma, Operations Research-Problems and Solutions, Macmillan India Ltd
- **3.** Billy E Gillett, Introduction to Operations Research A Computer Oriented Algorithmic Approach, Tata McGraw Hill Edition
- 4. V.K. Kapoor, Operation research, Sultan Chand & Sons

Question Paper Pattern:

Sessional Exam

The question paper for Sessional examination is for 30 marks, covering halfof the syllabus for first Sessional and remaining half for second Sessional exam. Question No 1 which carries 6 marks contains three short answer questions of two marks each. The remaining three questions shall be EITHER/OR type questions carrying 8 marks each

End Exam

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RENEWABLE ENERGY SYSTEMS (RES)

V Semest	V Semester: B.Tech Scheme: 2017										
Course Code	Categor	y	Hou	rs/W	eek	Credits	Maximum Marks				
OE309	Open Electi	ve - 1	L	Т	P	C	Continuous Internal Assessment	End Exam	TOTAL		
Sessional	Exam Dura	tion: 2	Hrs	U	U	3	End E	xam Dura	tion: 3 Hrs		
Course Outcomes: At the end of the course the student will be able to											
CO1: Understand the basics terms, definitions related to solar energy conversion, solar											
radiation measuring instruments.											
CO2: Und	lerstand diffe	rent typ	pes of	Solar	Colle	ectors and the	row types and i	lS.	aristics		
CO3 : UIC	nderstand the	e metho	ods to	har	ness	Electrical E	nergy from Ge	othermal	and Ocean		
energies.											
CO5: Und	lerstand the p	principl	es of t	oio co	nvers	sion, types, o	combustion cha	aracteristic	es and its		
	olications	-4 D u - 4			·		- Decel - elle - en é				
CO6: Und	ierstand Dire	ct Ener	gy Coi	nvers		$\frac{1}{1}$ - $\frac{1}{1}$	i Fuel cells and	I MHD gen	erators.		
Principle	c of The rol	e and r	otent	ial of	new	and renewo	hle source the	solar ene	roz option		
Seler	SOI THE IOI	The fole and potential of new and renewable source, the solar energy option,									
Solar De l'estim	EIIVIIOI	Environmental impact of solar power, physics of the sun, the solar constant,									
Radiation		extraterrestrial and terrestrial solar radiation, solar radiation on titled surface,									
	instrun	nents fo	or mea	surir.	ig sola	ar radiation	and sunshine,	solar radi	ation data.		
					UNI	(T - II					
Solar	Flat p	late ai	nd co	ncen	tratin	ng collector	s, classificatio	on of com	ncentrating		
Energy	collecto	ors, orie	ntatio	n ano	1 ther	mal analysi	s, advanced co	llectors.			
Collectio	n										
Solar	Differen	nt meth	ods, S	Sensi	ble, 1	atent heat	and stratified	storage, so	olar ponds.		
Energy	Solar A	Applicat	ions-	Solar	r hea	ting/cooling	g techniques. S	Solar disti	llation and		
Storage A	and drying,	photov	oltaic	energ	gy cor	nversion.					
Applicati	ons										
					UNI	T – III					
Wind	Source	s and p	otentia	als, h	orizo	ntal and ver	tical axis wind	mills, perfo	ormance		
Energy	charact	teristics	, Betz	crite	ria.						
Biomass	Princip	les of B	io-Cor	nvers	ion, A	naerobic/ae	erobic digestion	, types of I	Bio-gas		
	digeste	rs, gas	vield,	comb	ustio	n character	stics of bio-gas	s, utilizatio	n for		
	cooking	g, I. C. I	Engine	e opei	ration	and econor	nic aspects.				
		-	<u> </u>	•	UNI	T - IV	•				
Geothern	nal Resour	ces. tvn	es of v	wells	meth	nods of harn	essing the ener	rgy, potent	ial in		
Energy	India	, -, P		,			<u> </u>				
sy	muia.										

Ocean	OTEC, Principles utilization, setting of OTEC plants, thermodynamic cycles.							
Energy	Tidal and wave energy: Potential and conversion techniques, mini-hydel power							
	plants and their economics.							
UNIT - V								
Direct	MHD generators, principles, dissociation and ionization, Hall effect, magnetic							
Energy	flux, MHD accelerator, MHD Engine, power generation systems. Fuel cells,							
Conversion	ion principle. Faradays laws, thermodynamic aspects, selection of fuels and							
	operating conditions.							
Text Books:								
1.G.D. Rai , "N	on-Conventional Energy Sources". 2011							
2.Ramesh & K	umar, "Renewable Energy Technologies", Narosa. 1997							
Reference Bo	oks :							
1.Tiwari and C	hosal, "Renewable energy resources", Narosa.2005							
2.Ashok V Desai, "Non-Conventional Energy", Wiley Eastern.1990								
3.K Mittal ,"No	n-Conventional Energy Systems", Wheeler. 1997							
4.Sukhatme, "	Solar Energy". TMH, 2008							
Web Resource	S:							
1. <u>https://en.</u> w	/ikipedia.org/wiki/Solar_irradiance							
2. <u>http://sfera</u>	sollab.eu/downloads/Schools/Eduardo_Zarza_Basic_concepts.pdf							
3. <u>https://en.w</u>	/ikipedia.org/wiki/Solar_energy							
4. <u>https://en.</u> w	4. <u>https://en.wikipedia.org/wiki/Solar_energy</u>							
5.https://solarprofessional.com/articles/design-installation/solar-energy-storage								
6.https://www.energy.gov/science-innovation/energy-sources/renewable-energy/wind								
7.https://www.eia.gov/energyexplained/?page=biomass_home								
8.https://en.wikipedia.org/wiki/Geothermal_energy								
9. <u>https://www</u>	v.renewableenergyworld.com/ocean-energy/tech.html							
10. <u>http://www</u>	v.mhdenergy.com/							
Question Pap	er Pattern:							
Sessional Exa	m							
The question paper for sessional examination is for 30 marks, covering half of the syllabus for								

The question paper for sessional examination is for 30 marks, covering half of the syllabus for first sessional and remaining half for second sessional exam. Question No 1 which carries 6 marks contains three short answer questions of two marks each. The remaining three questions shall be EITHER/OR type questions carrying 8 marks each.

End Exam

Question Paper Contains Six Questions. Question 1 contains 5 short Answer questions each of 2 marks. (Total 10 marks) covering one question from each unit. The remaining five questions shall be EITHER/OR type questions carrying 10 marks each. Each of these questions is from one unit and may contain sub-questions. i.e there will be two questions from each unit and the student should answer any one question

INTRODUCTION TO JAVA

V Ser	nester	B.Tech						Scheme	: 2017				
Cours	e Code	Category	Hou	irs / \	Week	Credits	Maximum	Marks					
		_	_	_			Continuous Internal End Total						
OE	310	Open	L	Т	P	C	Internal	Exam	Total				
		Elective – I	•	1		2	Assessment	60	100				
Seccio	nol Evor	n Duration · ?	2 Ure	I	-	3	40 End Exam l	60	100 • 2 Hrs				
565510	llai Exai		ms					Juracion	. 5 1115				
Course Outcomes : At the end of the course, students will be able to													
CO1 :	Underst	tand fundamen	itals o	f oops	conce	pts, input	and output						
CO2: Understand the classes and objects													
CO3 :	CO3: Understand the Inheritance and interfaces												
CO4 :	Underst	tand the string	hand	ling m	ethods	5							
CO5 :	Underst	tand the except	tion h	andlin	g								
	I				UNI	Γ – Ι							
Objec	t orient	ted concepts	: Fu	ndam	entals,	, Overviev	w of Java, Data ty	vpes, var	riables,				
Opera	tors, cor	ntrol statemen	ts, Re	eading	g conso	ole input,	writing console outp	out, array	7 S				
	UNIT – II												
Introd	lucing	Classes: Clas	ss fu	ndam	entals	, declari	ng objects, introdu	icing me	thods,				
Const	ructors,	this keyword,	finali	ze									
-					UNIT	- III							
Inheri	itance:]	inheritance ba	asics,	usin	g supe	er, metho	d overriding, abstra	ict class,	using				
final w	vith inhe	ritance, Interf	aces:	Defin	ing int	terface, in	nplementing interfac	e					
Stains	Uandi	ng String of	mater	lotoro	UNIT	- IV	- anomationa abana	oton outn	action				
string		rison search	ing s	trings	mod	liftving st	rings StringBuffer		nd its				
motho	da		ing s	annge	, 11100	anynng St	ings. Sungduner	class a	nu no				
metho	as												
-		11	1	. 1	UNIT	$\Gamma - \mathbf{V}$, , 1 ,1	.1	C" 11				
Excep	tion Ha	naling: Fund	lamer	itals,	except	tion types	, try, catch, throw,	throws,	finally.				
Java t	ouilt-in e	exceptions, cre	eating	your	own e	xception s	subclasses						
Text E	Books:	<u></u>	1 1.	. 1 7	F1	1	<u>с і о тата</u>	MO					
1. Hei	bert Sch	11dt [2008], [9t	h Edi	tion], '	The Co	mplete Re	terence Java2, TATA	McGraw-	H1ll.				
2. EE	Salagurus	swamy [2007],	[3 rd	Editio	n], Pro	gramming	g with Java, A Primer,	ТАТА Мо	:Graw-				
H1l													
Refere	nce Boo	ks:	N.1.4.	-] /T ¹ '	1- 1								
I. Bru	ice Eckel	[2008], [2nd E	Laitioi	nj, Thi	nking :	in Java, P	earson Education						
2. H.N	A Dietel a	and P.J Dietel [2008	, [6th	Editio	n], Java H	ow to Program, Pears	on Ed.					
Web R	eference	s											

1. https://www.tutorialspoint.com/java/index.html

Question Paper Pattern:

Sessional Exam

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End Exam

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OBJECT ORIENTED PROGRAMMING THROUGH JAVA (OOP)

VI Semester: B	.Tech			Scheme: 2017						
Course Code	Category	Ηου	ırs/W	eek	Credits	Maximum Marks				
						Continuous				
OE 311	Open Flective -2	L	Т	Р	С	Internal	End	TOTAL		
	Elective -2			_		Assessment	Exam			
		3	0	0	3	40	60	100		
Sessional Ex	amDuration:2	Hrs				EndEx	amDuration	:3 Hrs		
Course Outco	mes: At the en	d of t	he coi	irse s	tudents w	ill be able to				
CO1: Underst	tand the basic r	orogra	ammir	ng con	structs ar	nd object orient	ed paradigms	s.		
CO2: Compre	hend the java o	conce	pts pa	ickage	es and inte	erfaces.	1 0			
CO3: Implem	ent programs o	n stri	ing ha	ndlin	g methods					
CO4: Underst	tand the funda	menta	als of e	except	tion handl	ing mechanism	•			
CO5: Implen	nent programs	on m	ultith	readin	ıg concept	s.				
			1 5	UNI	<u> </u>	1		1:		
Fundamentals of	of Object –Ori	entec	l Prog	gramn	ning: Intr	oduction, Object	ct-Oriented I	'aradigm,		
Basic Concepts o	of Object Orient	ed pr	ogram	ıming	, Benefits	of OOP, and Ap	plications of	OOP.		
Introduction to	Java: Overviev	v of ja	ava, Ja	ava Bi	uzzwords,	Data types, Var	riables, Oper	ators.		
Decision Makin	g-Branching &	Loo	ping:	simple	e if staten	nent, if-else sta	tement, nest	ed if-else,		
else if ladder, sv	vitch statement	t, Wh	ile, do	o-while	e, for state	ements, Arrays	, Classes, ob	jects and		
methods.								-		
				UNIT	`- II					
I/O: I/O Basics,	Reading Conso	ole inp	out, w	riting	Console o	utput.				
Inheritance: Ba	sic concepts, r	netho	od ove	rridin	g, super l	keyword, dynai	mic method	dispatch,		
Abstract class,	final keyword.									
	-			TINIT						
String Handlin	a String Cor	otruc	otors	Spec	- III iol String	Operations_S	tring Literal	s String		
	g . String Con	istiut		. Spec				s, Sumg		
Concatenation,	Character Extr	actio	n, Sti	ring (Compariso	ns. Searching	Strings, Mo	difying a		
string.										
	44 5 1	. 1		UNIT	– IV			.1		
Exception Hand	ling: Fundame	entals	s, Typ	es of	Exception	s, Usage of try	, catch, thro	w throws		
and finally keywo	ords.									
		4. •. •		UNIT	<u>- v</u>	1 1 .	1. 751 .			
Multithreading:	Concepts of m	ultitł	nreadi	ng, Ci	reating the	reads by extend	ling Thread	class and		
implementing R	Runnable inter	face,	isAli	ve()	and joir	n () method	s, Thread	Priorities,		
Synchronization,	, Inter thread co	ommı	unicat	ion.						
L										

TextBooks :

1. Herbert Schildt [2017], [10th Edition], Java -The Complete Reference, TATA McGraw-**ReferenceBooks :**

1. Bruce Eckel [2014], [2nd Edition], Thinking in Java, Pearson Education.

2.E.Balagurusamy, *Programming with Java: A primer, 5th Edition*, Tata McGraw-Hill, 2017. 3.H.M Dietel and P.J Dietel [2017], [11th Edition], Java How to Program, Pearson Ed.

WebReferences:

1. <u>https://nptel.ac.in/courses</u>

2. https://www.tutorialspoint.com/java/

3. <u>https://www.javatpoint.com</u>

Question Paper Pattern:

Sessional

Exam

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EndExam

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ETHICAL HACKING (EH)

VI Semester:	B.Tech				Scheme: 2017					
Course Code	Category	Hours	/Wee	k	Credit	Ma	aximum Mark	S		
						Continuo				
OE 312	Open	L	Т	Р	С	us	EndExam	TOTAL		
	Elective - 2					Internal				
		3	0	0	3	40	60	100		
Sessional E	xamDuration	:2 Hrs				Enc	lExamDuratio	on:3 Hrs		
Course Out	omes. At the	end of	the co	11100 01	udente v	vill be able to				
CO1: Under	stand the imp	ortance	$\frac{110}{0}$ of sec	curity a	and ethic	al hacking.				
CO2: Under	stand about fo	oot prin	ting a	nd type	es of atta	cks in social	engineering.			
CO3: Understand about sniffers and DoS attacks.										
CO4: Under	stand the imp	ortance	of Se	ssion I	Hijacking	types and So	QL Injection.			
CO5: Under	stand about b	uffer ov	rerflow	v attacl	ks and W	'ireless Hacki	ing Techniques	3.		
Introduction	to Ethical Ho	icking		•	-					
Introduction,	Ethical hackin	g termi	nology	, Type	s of hack	ing technolog	gies, phases of	ethical		
hacking										
Essential Ter	minologies-T	hreat, <i>A</i>	Attack	, Vuln	erabiliti	es, Target of	f Evaluation, I	Exploit.		
	U					, U		•		
Foot printing	,			UNIT-	- 11					
Footprinting. Ir	oformation Ga	thering	Metho	ndology	.Compe	titive Intellige	ence. DNS			
Enumeration,	Whois and AR	IN Look	ups, 7	Types of	of DNS R	ecords, How	Traceroute Is I	Used in		
Footprinting Co	ontents, How I	E-Mail T	racki	ng Wor	ks, Web	Spiders Worl	ζ.			
Social Engin	eering			0	,	1				
Social Enginee	ring, Types Of	Attack	s, Insi	der At	tacks, Ide	entity Theft, I	Phishing Attac	ks,		
Online Scams,	URL Obfuscat	ion, Soo	cial-Er	ngineer	ring Coui	ntermeasures	3.			
, 		,			III					
Sniffers										
Understand th	ie Protocols Si	ısceptik	le to S	Sniffing	g, Active	and Passive S	Sniffing, ARP F	oisoning,		
Ethereal Capt	ure and Displa	ay Filter	s, MA	C Floo	ding, DN	S Spoofing Te	echniques, Sni	ffing		
Countermeasu	ares.									
Denial of Serv	vice									
Denial of Servio	e, Types of Do	oS Attac	cks, H	ow DD	oS Attacl	ks Work, Hov	v BOTs/BOTN	ETs		
Work, "Smurf"	Attack, SYN F	looding	, DoS/	/DDoS	Counter	measures.				
				UNIT-	· IV					

Session Hijacking

Spoofing vs. Hijacking, Types of Session Hijacking, Sequence Prediction, Steps in Performing Session Hijacking, Describe How You Would Prevent Session Hijacking.

SQL Injection

SQL Injection, Steps to Conduct SQL Injection, SQL Server Vulnerabilities, SQL Injection Countermeasures.

UNIT- V

Buffer Overflows

Different Types of Buffer Overflow, Methods of Detection, Overview of Stack-Based Buffer Overflows, Overview of Buffer Overflow Mutation Techniques.

Wireless Hacking

Overview of WEP, WPA Authentication Mechanisms, and Cracking Techniques, Wireless

TextBooks:

1. Kimberly graves "CEHOfficial Certified Ethical Hacker Review Guide," Wiley

2. MichealGregg, "Certified ethical hacker (CEH) Cert guide", Pearson education, 2014. **ReferenceBooks :**

1. Network Security and Ethical Hacking, Rajat Khare, Luniver Press, 2006.

 Patrick Engebretson, "The Basics of Hacking and Penetration Testing: Ethical Hacking and Penetration Testing Made Easy", 2ed, Syngress Media, 2012.

WebReferences:

1. https://www.tutorialspoint.com/ethical_hacking/ethical_hacking_pdf_version.htm **QuestionPaperPattern:**

Sessional Exam:

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PRINCIPLES OF PROGRAMMING LANGUAGES (PPL)

VI Semester:	B.Tech						Scheme	e: 2017
Course Code	Category	Ho	urs/\	Week	Credits	Maximum Marks		
OE313	Open Elective - 2	L	Т	Р	С	Continuou s Internal Assessme	End Exam	TOTAL
		3	0	0	3	40	60	100
Sessional	Exam Duration:2	Hrs				End 1	Exam Duratio	on:3 Hrs
Course Outo	comes: At the end stand the importa	of tl nce	he co [.] of Pro	urse s ogram	students v ming Lan	will be able to guages.		
COO: Deser				<u> </u>		<u> </u>		

CO2: Describe the syntax and semantics of a programming language.

CO3: Understand programming constructs and data types.

CO4: Develop Programs in Lisp and prolog.

CO5: Understand and adopt a new programming language.

UNIT– I

Preliminaries

Reasons for studying concepts of programming languages, Programming domains, Language Evolution criteria, Influences on Language Design, Language categories, Language Design Trade-offs, Implementation methods, Programming Environments.

UNIT- II

Syntax and Semantics

Introduction, The general problem of Describing Syntax, Formal methods of describing syntax, Attribute Grammars, Describing the Meanings of programs-Dynamic Semantics, Lexical analysis, Parsing problem, Recursive Descent parsing, Bottom up parsing.

UNIT- III

Names, Binding, Type checking, Scopes and Data Types

Introduction, Names, Variables, The concept of binding, Type checking, Strong Typing, Type Compatibility, Scope, Scope and Lifetime, Referencing Environments, Named constants, Data types, Primitive data types, Character string types, User defined ordinal types, Array types, Associative arrays, Record types, Union types, Pointer and reference types.

UNIT- IV

Functional Programming Languages

Introduction, Mathematical functions, Fundamentals of functional programming languages, LISP, An Introduction to Scheme, ML, Haskell.

UNIT- V

Logic Programming Languages

Introduction, A brief introduction to Predicate calculus, Predicate calculus and Proving theorems, An Overview of logic programming, The origins of prolog, Basic elements of prolog, The deficiencies of prolog, Applications of logic programming.

Text Books :

1.Robert W. Sebesta, [Eighth Edition], "Concepts of Programming Languages", Addison Wesley, 2007.

Reference Books :

1. Allen B Tucker, Robert E Noon,[2nd Edition], "Programming Languages, Principles & Paradigms", TMH.

Web References:

1. https://cs.fit.edu/~ryan/cse4250/

Question Paper Pattern:

Sessional

Exam

The question paper for sessional examination is for 30 marks, covering half of the syllabus for first Sessional and remaining half for second sessional exam. Question No1 which carries 6 marks contains three short answer questions of two marks each. The remaining three questions shall be EITHER/OR type questions carrying 8 marks each.

End Exam

ADVANCED INFORMATION SYSTEMS (AIS)

VI Semester:	B.Tech						Schem	e: 2017
CourseCode	Category	Ho	ours/V	Week	Credit	Maxi	mum Mark	S
						Continuous	End	
OE314	Open Elective - 2	L	Т	Р	С	Internal	Exam	TOTAL
02011	opon 200000 2					Assessment		
		3	0	0	3	40	60	100
Sessional E	xamDuration:2 Hr	S				EndE	xamDuratio	n:3 Hrs
0	1	6 (1)				11 1 1 1		
CO1: Demo	comes: At the end o	of th	e cou	rse st	to	will be able to		
CO2: Intern	ret different types o	$\frac{11011}{f In1}$	herita	nce a	nd Polyn	nornhism		
CO3: Class	ify layer functional	ities	of O	SI ref	erence n	nodel and TCP I	Protocol suit	e
CO4: Sumr	narize the concepts	of in	ntern	etwor	king, sec	curity and IP ad	ldressing	
CO5: Demo:	nstrate different typ	es c	of prot	tocols	and web	o contents used	l in web des	ign
				UNIT-	- I			
Introduction	to Object Orie	ntee	d Co	oncep	ts:Introc	luction, Progra	amming Te	chniques,
Introduction t	to Object Oriented	Conc	cepts,	Cond	cept of S	Structured Proc	edural Prog	gramming,
Class, Object								
Characterist	ics of Objects: Da	ta A	bstra	action	, Classif	ication, Encaps	sulation and	l Message
Passing. Acces	ss Specifiers in Clas	s, U	ML C	lass I	Diagram	8.		
			l	UNIT-	· II			
Advanced Co	ncepts in Object O	rie	nted	Tech	nology:	Relationships, l	Inheritance-	Protected
Access Specif	ier, Multiple and	Mul	tileve	l Inh	eritance,	Generalization	n and Spec	cialization,
Abstract class	es, Polymorphism, l	[mp]	lemer	ntation	n of OOC	through C++.		
			U	JNIT–	III			
Introduction	to computer Ne	etwo	orks:	Introd	uction,	Network Topo	ology, OSI	Reference
Model,TCP Pro	otocol Suite, Routing	g De	evices	, Туре	es of Net	works.		
			τ	JNIT-	IV			
Internetworki	ng: Protocols for I	nter	rnetw	orkinį	g, Intern	net Address an	d Domains,	Packets,
Packet Switche	d Networks, Virtual	Pri	vate N	Vetwo	rk, Work	ing of Internet.		
			I	UNIT-	- V			
Introduction	to Web Technolog	y:	Introd	luctio	n, Hype	r Text Transfer	r Protocol(H	TTP), File
Transfer Protoc	col (FTP), Domain N	ame	e Serv	ver(DN	IS), Web	Applications, T	ypes of Web	o Content,
Multi-Tier Web	Applications, Perfor	rma	nce o	f Web	Applica	tions.		

TextBooks:

1. Campus Connect Foundation Programme - Object Oriented Concepts - System

- 2. Campus Connect Foundation Programme Computer Hardware and System Software Concents
- 3. Campus Connect Foundation Programme Relational Database Management System,

Client Server

- E.Balaguruswamy, Object Oriented programming with C++, 2017 4.
- 5. Data Communications & Networking, Forouzan, Tata McGrawHill, Fifth edition, 2017

Reference Books :

Herbert Schildt , The Complete Reference C++, McGraw Hill Education, Seventh 1.

2. M.P. Bhave and S.A. Patekar, Object Oriented Programming with C++, Pearson Education,

Andrew S. Tenenbaum, Computer networks, Pearson education, Fifth edition, 2013

Web References:

- https://www.tutorialspoint.com/cplusplus/ 1.
- https://www.geeksforgeeks.org/computer-network-tutorials/ 2.

Question Paper Pattern:

Sessional

Exam

The question paper for sessional examination is for 30marks, covering half of the syllabus for firstsessional and remaining half for second sessional exam.QuestionNo1which carries 6marks contains three short answer questions of two marks each. The remaining three questions shall be EITHER/OR type questions carrying8marks each.

EndExam

Question Paper Contains Six Questions. Question 1 contains 5 short Answer questions each of 2marks. (Total10marks) covering one question from each unit. The remaining five questions shall be EITHER/OR type questions carrying 10markseach. Each of these questions is from one unit and may contain sub-questions. i.e.; there will be two questions from each unit and the student should answer any one question.

Note:

- 1. Wireshark tool can be used to demonstrate ISO/OSI model in UNIT-III
- 2. Assignment Questions to be given from UNIT-II that maps POs like PO2, PO3.

SCIENTIFIC PROGRAMMING WITH PYTHON (SCIPY)

VI Semester:	B.Tech					Scheme: 2017				
CourseCode	Category	Ho	urs/	Week	Credit	Ma	ximum Mark	5		
						Continuou				
OE315	Open	L	Т	Р	С	s Internal	EndExam	TOTAL		
	Elective - 2	3	0	0	3	40	60	100		
Sessional E	xamDuration:2 Hr	S				End	ExamDuratio	on:3 Hrs		
0	A (1 1	0.1.				1 1. 1				
CourseOutc	omes: At the end of	of	rours	estua	ents will	be able to	ne Liste Tun	100		
CO2:Unders	tand Arithmetic Rel		$\frac{10g}{10g}$	seignt	nent Loc	rical Biturise	Membershin Io	lentity		
CO3:Impart	Functions, Scope c	of va	$\frac{1}{riable}$	es. Mo	dules. P	ackages.	weinbersnip, ic	icituty		
CO4:Compr	ehend Concepts of Fi	ile I/	O, Ez	xceptio	on Handl	ing, Classes ar	nd Objects.			
CO5:Develo	p general scientific	prog	gramr	ning t	hrough 1	Matplotlib, Nu	amPy and Scil	y		
							-	-		
	_			UNII	<u>- I</u>					
Introduction										
History of Pyth	hon, Features, Adva	inta	ges, I	Enviro	onment s	etup and Inte	eraction using	Command		
prompt, IDL	E, Script mode, IPyt	hon	Note	book.						
Basic Syntax:	Keywords, Identifie	ers,	Varia	bles.						
Data Types: S	trings, Numbers, Bo	oolea	ans, I	Date a	and Time	, Lists, Tuples	s, Dictionaries	\$		
				UNIT	- 11					
Operators: At	rithmetic Operators	, Co	mpa	rison	(Relation	nal) Operators	s, Assignment	Operators,		
Logical Operat	tors, Bitwise Operat	ors,	Mem	bersh	nip Opera	ators, Identity	Operators.			
Conditional S	Statements: if, if-el	if-els	se							
Loops: for, wh	nile									
Control State	ments: break, conti	nue.	pass	8						
				UNIT-	- III					
Functions: De	efining Functions, C	Callin	ng a I	Funct	ion, Fun	ction Argume	nts: Required	arguments,		
Keyword argu	ments, Default Arg	gume	ents,	Varia	ble-leng	th arguments	, Anonymous	Functions,		
The Return St	atement, Scope of t	he V	'ariat	oles in	a Funct	ion - Global a	and Local Vari	ables.		
Modules: Def	ining module, nam	lespa	acing	, Imp	orting n	nodules and	module attrib	utes, from.		
Import statem	ent, Module built-ir	ı fur	nctior	ıs, Int	roductio	n to Packages	3.			
				UNIT	- IV					

Error and Exceptions: Difference between an error and Exception, Detecting and Handling Exceptions, Raising Exceptions, Assertions, Built-in Exceptions, User Defined Exceptions Classes and Objects: Overview of OOP terminology, Creating Classes, Creating Instance Objects, Inheritance, Overriding Methods, Overloading Methods, Operators, Data hiding.

Files and Input/ Output: Opening and Closing Files, Reading and Writing Files, Renaming and Deleting Files, Directories in Python.

UNIT-V

Simple plotting with pylab: Basic plotting, Labels, legends and customization, More advanced plotting

Matplotlib: Matplotlib basics, Contour plots, heatmaps and 3D plots.

NumPy: Basic array methods, Reading and writing an array to a file, Statistical methods,

Polynomial, Linear algebra, Matrices, Random sampling, Discrete Fourier transforms

SciPy: Physical constants and special functions, Integration and ordinary differential

equations, Interpolation, Optimization, data-fitting and root-finding.

General scientific programming: Floating point arithmetic, Stability and conditioning, Programming techniques and software development.

TextBooks:

1. Learning To Program With Python- 2011 Richard L. Halterman

2. Learning Scientific Programming with Python, Christian Hill, Cambridge University **ReferenceBooks**:

1. Python Programming-An Introduction to Computer Science 2nd edition-John Zelle

2. Python -The Ultimate Beginner's Guide!, Andrew Johansen

3. Core Python Programming, Wesley J. Chun, Pearson.

WebReferences:

- 1. https://www.tutorialspoint.com/python3/
- 2. https://realpython.com/

QuestionPaperPattern:

Sessional Exam

The question paper for sessional examination is for 30marks, covering half of the syllabus for firstsessional and remaining half for second sessional exam. Question No1 which carries 6marks contains three short answer questions of two marks each. The remaining three questions shall be EITHER/OR type questions carrying8marks each.

EndExam

Question Paper Contains Six Questions. Question 1 contains 5 short Answer questions each of 2marks. (Total10marks) covering one question from each unit. The remaining five questions shall be EITHER/OR type questions carrying 10markseach. Each of these questions is from one unit and may contain sub-questions. i.e.; there will be two questions from each unit and the student should answer any one question.

Note: 1. Python IDLE, Ipython notebook tools can be used to develop programs in UNIT-1& UNIT-5.

FUZZY LOGIC & NEURAL NETWORKS (FLNN)

VI Semester	:B.Tech				Scheme	: 2017			
Course	Course	Hour	s/W	'eek	Credits	Maxir	num Marks		
Code	Category								
OE316	Open Elective - 2	L	Т	Р	С	Continuous Internal Assessment	End Exam	TOTAL	
		3	0	0	3	40	60	100	
Sessional l	Exam Duration: 2	Hrs			End Exam Duration: 3				
	Hrs								
Course Outco	omes: At the end o	f the c	ours	se the	e student v	will be able to			
CO1: To Expo	ose the students to	the co	nce	ots of	f Neural n	etworks			
CO2: To provi	ide adequate know	edge a	abou	t Sup	pervised L	earning feedbacl	k networks		
CO3: To provi	ide adequate know	edge a	abou	t Uns	supervised	l Learning feedb	ack network	S	
CO4: To teac	h about the conce	ept of	fuzz	zines	s involved	l in various sys	tems and to	o provide	
adequate kno	wledge about fuzzy	set th	neory	7					
CO5: To provi	O5: To provide adequate knowledge of application in Neural Networks &fuzzylogic to real								
time systems.	me systems.								

UNIT – I

Introduction to Neural Networks and its Basic Concepts

Biological neurons and McCulloch and Pitts models of neuron, Types of activation functions, Neural networks architectures, Linearly separable and linearly non-separable systems and their examples, Features and advantages of neural networks over statistical techniques, Knowledge representation, learning process, error-correction learning, concepts of supervised, learning, and unsupervised learning

UNIT – II

Supervised Learning Neural Networks:

Single layer perception and multilayer perceptron neural networks, their architecture, Error back propagation algorithm, generalized delta rule, learning factors, step learning, Momentum learning, Concept of training, testing and cross-validation data sets for design and validation of theNetworks

UNIT – III

Unsupervised Learning Neural Networks:

Competitive Learning networks, kohonen self-organizing networks, K-means and LMS algorithms, RBF neural network, its structure and Hybrid training algorithm for RBF neural networks, Comparison of RBF and MLP networks Learning, Hebbian learning, Hopfield networks.

$\mathbf{UNIT}-\mathbf{IV}$

Fuzzy logic

Basic Fuzzy logic theory, sets and their properties, Operations on fuzzy set, Fuzzy relation and operations on fuzzy relations and extension principle, Fuzzy membership functions and linguistic variables, Fuzzy rules and fuzzy reasoning, Fuzzification and defuzzification and their methods, Fuzzy inference systems

UNIT – V

Applications:

Applications of Neural Networks: Pattern classification, Handwritten character recognition, Face recognition, Image compression and decompression

Applications of Fuzzy Logic & Fuzzy System: Fuzzy pattern recognition, Fuzzy image processing, Simple applications of Fuzzy knowledge-based controllers like washing machines, traffic regulations, and lift control

Text Books :

1. Timothy J. Ross, Fuzzy Logic with Engineering Applications, John Wiley and sons, III Ed, 2010.

- 2. S. Haykin, "Neural Networks, A Comprehensive Foundation", Pearson Education Inc., III Ed 2008.
- 3. Jacek. M. Zurada, "Introduction to Artificial Neural Systems", Jaico Publishing House, 2006.

4. LaureneFausett, Fundamentals of Neural Networks-Architectures, algorithms and applications, Pearson Education Inc., 2004.

5. J.S.R. Jang, C.T. Sun, E. Mizutani,, "Neuro Fuzzy and Soft Computing - A computational Approach to Learning and Machine Intelligence", Pearson Education Inc., 2002..

6. Laurence Fausett, -Fundamentals of Neural Networks|, Pearson Education

7. Bart Kosko, -Neural networks and Fuzzy Systems", Pearson Education

Reference Books :

- 1. S. Rajsekaran and G. A. VijaylakshmiPai, –Neural Networks, Fuzzy Logic, and Genetic Algorithms^I, PHI
- 2. N. Sivanandam, S. Sumathi, and S. N. Deepa, –Introduction to Neural Network Using MATLAB", Tata McGraw-Hill Publications
- 3. S.N.Sivanandam. M.PaulRaj, Introduction to Artificail Neural Networks, Vikas Publication House Pvt.Ltd, New Delhi.

Question Paper Pattern:

Sessional Exam:

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End Exam:

BUILDING INFORMATION MODELLING (BIM)

VI Semester :							Scheme	: 2017
Course Code	Category	Ηου	ırs / W	leek	Credits	Maxim	um Marks	3
OE317	Open Elective - 2	L	Т	Р	С	Continuous Internal Assessment	End Exam	Total
		1	2	-	3	40	60	100
Sessional Exam	Duration: 2 Hrs					End Exam	Duration	: 3 Hrs
Course Outcome	s: At the end of	the co	ourse s	tuder	nts will be a	able to		
CO1: Understand	l the basics of BI	M an	d their	appli	cations			
CO2: Understand	the usage of BI	M too	ls and	Toolb	ar			
CO3:Use advance	ed editing tools	s in :	making	g a 3	BD model	of any reside	ential/com	mercial
building								
CO4: Prepare ten	nplates, create b	asic v	valls, o	curtai	n walls an	d also edit the	walls like	divide,
creating op	enings, etc.							
CO5: Apply tool	s like creating fl	oors,	roofs,	walls	, etc. in m	aking 3D mod	els of any	type of
structure.								
			UN	I T - I				
Introduction: Th	ne Basics of BI	M - 1	What	is Re	vit? - Une	derstanding a	BIM Wor	kflow –
Leveraging BIM p	rocesses - Visua	lizing	– Ana	lyzing	; - Strategi	zing - Focusing	g Your Inve	estment
in BIM - Staffing	for BIM - Unders	tandi	ng Pro	ject R	loles - Esta	blishing a BIM	I Execution	n Plan -
Accessing and Us	ing the Applicati	on Me	enu - L	Jsing	the Quick	Access Toolbar	· - Getting	toKnow
the Ribbon - Defin	ning Project Orga	nizat	ion - Ir	ntrodu	ucing Datu	m Objects (Rela	ationships).
			UN	IT - I	I			
The Basics of Elements - Selec	the Toolbox: Section Options -	electi Filter	ng, M ing Yo	odifyi our Se	ng, and I election -	Replacing Elen Using Selectio	nents - S on-based F	electing Filters -

Selecting All Instances – Using the Properties Palette - Matching Properties – Using the Context Menu – Editing Elements Interactively - Moving Elements - Copying Elements – Rotating and Mirroring Elements - Arraying Elements - Scaling Elements – Aligning Elements - Trimming or Extending Lines and Walls - Splitting Lines and Walls - Offsetting Lines and Walls.

UNIT - III

Exploring Advanced Editing Tools:Keeping Elements from Moving - Using the Join Geometry Tool - Using the Split Face and Paint Tools - Copying and Pasting from the Clipboard – Using the Create Similar Tool - Using Keyboard Shortcuts (Accelerators) - Double-click to Edit - Modelling Site Context - Using a Toposurface - Cut/Fill Schedules.

UNIT - IV

Extended Modelling Techniques:Creating Walls and Curtain Walls - Using Extended Modelling Techniques for Basic Walls - Creating Basic Wall Types - Adding Wall Articulation - Modelling Techniques for Basic Walls - Creating Custom In-Place Walls - Creating Stacked Walls - Creating Simple Curtain Walls - Designing a Curtain Wall - Dividing the Surface - Dividing the Surface with Intersects - Applying Patterns - Editing the Pattern Surface.

Configuring Templates and Standards: Introducing Project Templates - Customizing Project - Settings for Graphic Quality - Discovering Object Styles - Using Line Settings – Defining Materials - Defining Fill Patterns – Pre-configuring Colour Schemes - Increasing Efficient view Management - Organizing Views –Saving Work - Saving at Intervals.

UNIT - V

Modelling Floors, Ceilings, and Roofs: Understanding Floor Types - Modelling a Floor -Creating a Structural Floor - Sketching for Floors, Ceilings, and Roofs - Modelling Slab Edges - Creating a Custom Floor Edge - Modelling Floor Finishes - Modelling Thick Finishes -Creating Ceilings - Creating a Roof by Face - Creating a Sloped Glazing - Using Slope Arrows -Using Additional Roof Tools - Using Advanced Shape Editing with Floors and Roofs.

Text Books :

1. Karen Kensek, Douglas Noble, *Building Information Modelling*: BIM in Current and Future Practice.

2. Danelle Briscoe [2015], *Beyond BIM - Architecture Information Modelling*, Routledge Publication, ISBN: 9781317668107.

Reference Books :

- Chuck Eastman, Paul Teicholz, Rafael Sacks, Kathleen Liston; BIM Handbook: A Guide to Building Information Modeling for Owners, Managers, Designers, Engineers, and Contractors, John Wiley & Sons, Inc.
- 2. Bimal Kumar, A Practical Guide to Adopting BIM in Construction Projects.

Web References:

- 1. https://www.youtube.com/watch?v=LACe3vtc8dY
- 2. https://www.youtube.com/watch?v=LQdHkuG4do4

Question Paper Pattern:

Sessional Exam:

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End Exam:

PRODUCT LIFE CYCLE MANAGEMENT (PLM)

VI Sen	nester:	B.T	'ech			Scheme :2017				
Course	e Code	Category	Hours	s / We	ek	Credits	Maxi	mum Mar	ks	
OF	318	Open	L	Т	Р	С	Continuous Internal	End		
U E	510	Elective - II					Assessment	Exam	TOTAL	
			3	-	-	3	40	60	100	
Sessiona	al Exam I	Duration : 2 Hrs			L		End Exa	am Duratio	on: 3 Hrs	
						I				
Course	Outcome	s:At the end of the	course stu	udents	will	be able to				
CO1	Understand basic concepts of Java such as operators, classes, objects, inheritance, packages									
COI	Enumera	tion and various key	words							
C02	Understa	nd product lifecycle	e manage	ement	proc	ess & diff	erent steps in I	Product dev	velopment	
02	process									
CO3	Get know	wledge on Product d	ata mana	gemen	t					
CO4 :	Understa	nd the implementati	ion of PL	M and	its i	mpact on t	he organization	l		
CO5 :	Understa	nd concept of PLM	architect	ure an	d inf	ormation a	uthoring tools			
				UNIT	' – I					
Introduc	tion to Ja	wa (background, fa	cts, editi	ons),	JVM	, Program	Structure (bas	sics of clas	ss, object,	
member	variables	s, methods, naming	g conven	tions,	stati	c, System	n), Installing J	ava, Settin	ng PATH,	
Compili	ng & Ru	nning a minimal p	program.	Primi	tive	data type	s, cast, NaN,	Two's con	mplement,	
Variable	es (rules, t	ypes), Operators, Co	ontrol Str	uctures	5					

UNIT – II

Arrays, Constructors, String class, Inheritance, Packages, Access modifiers, Relational Databases, SQL and JDBC

UNIT – III

PLM Introduction-Organization Business Models(MTS, MTO, CTO, ETO Etc), Basics of Enterprise Systems (PLM, ERP, MES), Background, Overview, Need, Benefits, and Concept of Product Life Cycle, Components / Elements of PLM, Emergence of PLM, Significance of PLM, Differences between PLM and PDM Integrated Product development process-Conceive-Specification, Concept design, Design- Detailed design, Validation and analysis (Simulation), Tool design , Realize-Plan manufacturing, Manufacture, Build/Assemble, Test(quality check)

UNIT – IV

PLM Components - Workflow Processes, Design Collaboration, Processes Management, Document Management, Visualization, Bill of Materials (BOM) Management, Engineering Change Control, Configuration Management, Manufacturing Process Management, Variant Management, Classification

UNIT – V

PLM Technologies - PLM Architecture, Various PLM tools, Data Modelling, Security management, CAD Integrations, Information authoring tools (e.g., MCAD, ECAD, Technical publishing), Core functions (e.g., data vaults), Data Flow to Other systems such as Supply chain and ERP systems

Text Books:

1. Grieves, Michael, Product Lifecycle Management, McGraw-Hill

2. Antti Saaksvuori, AnselmiImmonen, Product Life Cycle Management - Springer

3. Kari Ulrich and Steven D. Eppinger, Product Design & Development, McGraw Hill

Reference Books:

1. Java - The Complete Reference (English) 9th Edition-herbert-schildt-Mcgraw Hill Education

2. Head First Java (English) 2 Edition- Kathy-Sierra-Publisher: O' Reilly

3. Burden, Rodger PDM: Product Data Management, Resource Publications

Question Paper Pattern:

Sessional Exam

The question paper for Sessional examination is for 30 marks, covering halfof the syllabus for first Sessional and remaining half for second Sessional exam. Question No 1 which carries 6 marks contains three short answer questions of two marks each. The remaining three questions shall be EITHER/OR type questions carrying 8 marks each

End Exam

SIMULATION OF ENGINEERING SYSTEMS (SES)

VI Semester:B.Tech				Scheme : 2017						
Course Code	Category	Hou	ırs/W	eek	Credits	Maxim	um Marl	KS		
OE319	Open Elective - 2	L	Т	Р	С	Continuous Internal Assessment	End Exam	Total		
		0	0	3	3	40	60	100		
Sessional Exam Duratio	on:2 Hrs		I			End Exam l	Duration	a: 3Hrs		
Course Outcomes: At th	e end of the course st	udents	s will	be ab	le to					
CO1: Understand the bas	ic features and progra	ammin	ıg in N	MATI	LAB.					
CO2: Understand control	statements, functions	s and p	olottin	lg in l	MATLAB					
CO3 : Understand developing simulation model using simulink library.										
CO4: Understand the gra	phical user interface i	n MA	TLAI	3.						
CO5: Understand various	CO5: Understand various tool boxes used in solving engineering problems.									
UNIT-I										
MATLAB	Introduction to S	Simula	tion-l	nstal	lation of	MATLAB-H	History-U	Jse of		
Environment	MATLAB-Key feat	MATLAB-Key features.								
	Introduction to M	Introduction to MATLAB Software- MATLAB window- Command								
	window-Workspace	-Com	mand	his	tory-Curre	ent directory	Setting	g-Basic		
	commands-Assignin	ıg vari	ables	-Oper	ations wit	h variables.				
Data types and	Character and string	- Arra	ys an	d vec	tors- Colu	mn vectors-Ro	w vector	s.		
Operators	Arithmetic Operato	ors- R	elatio	nal (Operators-	Logical Operation	ators- O	perator		
	Precedence- BODM	IAS I	Rules	- Sol	ving arith	metic equation	ons.			
Basic Operations	Trigonometric func	tions-	Com	plex	numbers-	Fractions &	Real nu	mbers-		
	Complex numbers									
		UNI	Г-II							
MATLAB	Working with scrip	t tool	s- Wr	iting	Script file	e- Executing s	script file	s- The		
Programming	MATLAB Editor- o	pening	g and	savin	g editor.					
	Creating M files, S	Saving	m-fi	les- 1	Errors and	l Warnings- T	ypes of	errors-		
	error handling- MA	ATLA	B D	ebugg	ger- Settir	ng Break Poin	nts- Exa	mining		
	Variables- Stepping	throu	ugh c	ode-	ending th	e debug sessi	ion- Deb	ugging		
	from command line.									
Loops and	Loops: for loop- nes	sted fo	or loop	p- wh	ile loop-					
Conditional	Branch Control St	ructu	re: if	cont	rol statem	ents, switch s	tatement	- break		

Statements	statement- continue statement- error statement- try catch structure- Program
	Termination — return
Functions	Writing functions, Writing user defined functions- Built in Function-
	Function calling-Return Value- Types of Functions-Global Variables.
	String Functions- Input/Output Functions.
Plotting	Plots: Plotting vector and matrix data- Plot labeling, curve labeling and
	editing.
	2D Plots: Basic Plotting Functions-Creating a Plot-Plotting Multiple Data
	Sets in One Graph-Specifying Line Styles and Colors- Graphing Imaginary
	and Complex Data-Figure Windows-Displaying Multiple Plots in One
	Figure-Controlling the Axes-Subplots
	3Dplots: Use of mesh grid function- Mesh plot-Surface plot
	UNIT-III
Simulink	Introduction to Simulink- Simulink Environment & Interface- Study of
	Library-Object Oriented Design-Equation Oriented Design Fixed Step
	continuous solvers- Variable step continuous solver- Data Import/ Export-
	Creating and masking a Subsystem- Getting help for Simulink.
	Simulation of Numerical Integration, Linear Algebra, Roots of
	Polynomials, Algebraic equations, Differential Equations-Transforms
	(Fourier, Laplace).
	UNIT-IV
Graphical User	Introduction of Graphical User Interface- GUI Function Property- GUI
Interface Design	Component Design- GUI Container- Writing the code of GUI Callback-
	Dialog Box- Menu Designing- Creating a database-Applications.
	UNIT-V
Applications with	Image Processing: Importing and Visualizing Images- Importing and
MATLAB	displaying images- Converting between image types- Exporting images-
	Interactive Exploration of Images- Obtaining pixel intensity values- Extracting
	a region of interest- Computing pixel statistics-Measuring object sizes.
	MATLAB Applications in Control Systems, Neural Networks- Machine
	Learning, Digital Signal Processing, Communication Systems and Fuzzy
	Logic Systems.

Text Books:

1. Raj Kumar Bansal, Ashok Kumar Goel and Manoj Kumar Sharma, "MATLAB and its Applications in Engineering", Dorling Kindersly India pvt. Ltd, Pearson, 5th Edition 2012.

2.Agam Kumar Tyagi, "MATLAB and Simulink for Engineers", Oxford University Press, 2nd Edition,2012.

3.Jaydeep Chakravarthy, "Introduction to MATLAB Programming, Tool Box and Simulink", Universities Press, 2014.

Reference Books:

1. MiszaKalechman, "Practical MATLAB Basics for engineers", CRC Press, Taylor & Francis

group,1st Edition, 2012.

2.Rizwan Butt, "An Introduction to differential equations on MATLAB", Narosa Publishing house, 2016.

Web References:

1.<u>https://matlabacademy.mathworks.com/</u>

2. https://www.edx.org/course/matlab-octave-beginners-epflx-matlabeoctavebeginnersx

Question Paper Pattern:

Sessional Exam:

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End Exam

INDUSTRIAL SAFETY (IS)

VI Sea	mester	B.Tech						Scheme	: 2017
Cours	e Code	Category	Hou	irs / V	Week	Credits	Maximum	Marks	
OE	320	Open Elective - II	L	Т	Р	С	Continuous Internal Assessment	End Exam	Total
			3	-	-	3	40	60	100
Sessio	nal Exar	n Duration : 2	Hrs				End Exam I	Duration	: 3 Hrs
Course		nes: At the end	of th	- cours	se stu	dents will	he able to		
CO1:	To Und	lerstand the p	rinci	oles of	f safet	y manage	ement including safe	ty audit,	safety
	educati	on and acciden	t inve	stigati	on		C	5	5
CO2 :	To und	erstand about	fire	and ex	xplosio	n and th	e methods of preven	tion of fi	re and
	explosic	ons			1		1		
CO3 :	CO3: To understand Machine and construction safety assessment and safeguarding methods								
CO4 :	CO4: To understand the effect of realising of toxic substances and hazardous chemicals								
CO5 :	CO5: To understand the electrical safety and handling electrical hazards								
					UNI	Г — I			
Safety	in Engi	neering Indus	try - 1	need, (Genera	l hazards	and control measure	s in engi	neering
indust	ry, Four	Significant Disa	asters	happe	ened in	the world	l, Safety Audit- Procee	lure	
Accide	ent Inve	stigation- Lear	ming	from a	accider	nt, Layered	d investigations, inves	stigation 1	process
and su	Immary								
					UNIT	` – II			
Fire a	Safety:	The fire tria	ngle,	Distin	nction	between	fire and explosions	s, Flamr	nability
charac	teristics	of liquids and	l vap	ours,	Fire P	rotection	Techniques, Fire ext	inguisher	rs, Fire
hazard	and ana	alysis, preventi	on of	fire, s	teps a	fter occur	rence of fire, fire dete	ction, fire	e alarm
and fir	efighting	systems							
					UNIT	– III			
Machi	ne Safet	y: Machine Gu	Jardir	ng, Ma	chine	Guarding	Assessment, Safegua	arding Ma	achines
and Eq	luipment	, Guards, Safe	guard	ing De	vices,	Other Pote	ential Safeguards		
Const	ruction \$	Safety: Scope,	Safet	y in -u	nderg	round wor	ks, above ground wor	rks, unde	r water
works,	demoliti	on works.							
					UNIT	- IV			
Chemi	cal Safe	ty: Hazardous	Che	micals	, Defir	nition of a	Hazardous Chemica	1, Toxic	Effects,
Workir	ng with 7	Toxins, Storing	Haza	rdous	Chem	icals, Tra	nsportation of Hazard	lous Che	micals,
Chemi	cal Was	ste Managem	ent,	Hazar	dous	Chemica	1 Emergency Proce	dures,	Worker
Contar	nination,	Chemicals and	l Wor	ker He	alth				
					UNIT	• - V			
Electr	ical Safe	ty: Electrical l	Dange	ers, Ele	ectrica	l Pathway	s, Result of Electrical	Contact,	Shock
versus	Electro	cution, Electri	cal B	urns,	Hand	ling Elect	rical Hazards, Contr	olling El	ectrical

Hazards, Training, Safety and Health Program

Text Books:

- 1. L. M. Deshmukh. Industrial Safety and Management. McGraw Hill Education (India)
- **2.** D.A. Crowl and J.F. Louvar, Chemical Process Safety (Fundamentals with Applications), Prentice Hall, 2011.
- **3.** Reese, Charles D. Industrial Safety and Health for People-oriented Services. CRC Press, 2008.
- **4.** M.P. Poonia, S. C. Sharma. Industrial Safety and Maintenance Management. Khanna Book Publishing, 2019.

Reference Books:

- **1.** Reese, Charles D. Industrial Safety and Health for Infrastructure Services. CRC Press, 2009.
- **2.** R. K. Jain, Sunil S. Rao, Industrial Safety and Health and Environment Management Systems, Khanna Book Publishing, 2000.
- **3.** K. U. Mistry. Fundamentals of Industrial safety and Health, Siddharth Prakashan Publisher, 2008.

Question Paper Pattern:

Sessional Exam

The question paper for Sessional examination is for 30 marks, covering half of the syllabus for first Sessional and remaining half for second Sessional exam. Question No 1 which carries 6 marks contains three short answer questions of two marks each. The remaining three questions shall be EITHER/OR type questions carrying 8 marks each

End Exam

MECHANICAL VIBRATIONS (MV)

VII Se	mester:	Mechanical E	ngin	eerin	g			Schen	ne : 2017	
Cours	e Code	Category	H	ours Week	/	Credits	Maximu	m Marks		
OE	401	Open Elective – III	L	т	Р	С	Continuous Internal Assessment	End Exam	TOTAL	
			2	1	-	3	40	60	100	
Session	al Exam	Duration : 2 Hrs					End Exa	am Duratio	n : 3 Hrs	
Course	Outcome	s : At the end of t	he co	ourse	stuc	lents will h	be able to			
	Understa	and theory of vib	ratior	n, clas	ssice	l method	and energy method to	find the eq	uation of	
CO1	vibrating	g system, viscous	s dar	nping	, ur	nder damp	oing, critical damping	, over dam	ping and	
	solve rela	ated problems								
	Understa	and the concep	ots	of m	otio	n excitat	ion, transmissibility,	isolation,	seismic	
CO2	2 instruments, accelerometer ,vibrometer									
CO 3 :	0 3 : Compute natural frequencies and mode shapes for two degree freedom systems									
	Solve problems on multi degree freedom systems using Influence co-efficient method. Stodola									
CO 4 :	method, Holzer's method and Matrix iteration method									
	Estimate	e natural frequen	icy o	f tran	sver	se vibratio	ons of simply support	ed beam w	ith point	
CO 5 :	load and	l Uniformly distri	bute	d load	l usi	ng Rayleig	gh's and Dunkerley's r	nethods, an	d critical	
	speed of	a shaft with and	with	out da	ampi	ng				
					UN	IT – I				
Single	Degree F	reedom System	s: U	ndam	ped	free vibra	ation: Classical meth	od, Energy	method,	
equivale	nt system	IS.								
Dampeo	i Free V	ibration: Viscou	ıs d	ampir	ıg,	under da	mping, critical damp	oing, over	damping,	
equivale	nt dampii	ng coefficient, Sin	nple p	proble	ms.					
					UN	IT – II				
Single I	Degree Fr	eedom Systems	with	Forc	ed V	/ibration:	Steady state force	ed Vibration	, sources	
of excita	tion, imp	ressed harmonic	force	, and i	impı	ressed force	e due to unbalance			
Support	t Excitati	on: Motion excita	tion,	trans	smis	sibility an	d isolation, performane	ce of differen	nt type of	
isolators	s. General	theory of seismic	e inst	rumei	nts,	accelerom	eter and vibrometer			
					UN!	IT – III				
Two De	gree Free	edom Systems:	Natu	ral fre	eque	ncies and	modes of vibration by	v classical n	nethod of	
spring-r	nass syst	em, forced vibra	tion,	semi	def	inite syste	ems, Coupled systems	, dynamic	vibration	
absorbe	r									
					UN	IT – IV				
Multi I	egree Fr	eedom Systems	: Inf	luence	e co	-efficient	method, Matrix metho	od, Stodola	method,	
Holzer's	method, I	Matrix iteration n	netho	d, ort	hogo	onality of r	node shapes			

UNIT – V

Transverse Vibrations: Natural frequencies of beams- Simply supported beam with point load and uniformly distributed load. Rayleigh's and Dunkerley's methods

Critical Speed of the shaft: Whirling of shafts, critical speed of shafts, and critical speed of shafts with and without damping

Text Books:

1. G. K. Grover, Mechanical Vibrations, New Chand and Bro's Publishers, Roorkee

2. V.P. Singh, Mechanical Vibrations, Dhanpat Rai and Sons Publishers, New Delhi

Reference Books:

- 1. Thomson William T, Vibration Theory and Applications, Pearson Education, New Delhi
- 2. J. S. Rao and K. Guptha, Theory and Practice of Mechanical Vibrations, WEL Publishers, New Dehi
- **3.** Timoshenko SP and Young DH, Introductory Course on Vibration Problems in Engineering, John Wiley and Sons Publishers, Singapore
- 4. Singiresu S. Rao, Mechanical Vibrations, Pearson Education, New Delhi

Question Paper Pattern:

Sessional Exam

The question paper for Sessional examination is for 30 marks, covering half of the syllabus for first Sessional and remaining half for second Sessional exam. Question No 1 which carries 6 marks contains three short answer questions of two marks each. The remaining three questions shall be EITHER/OR type questions carrying 8 marks each

End Exam

COMPUTATIONAL FLUID DYNAMICS (CFD)

VII Ser	mester:	Mechanical E	ngin	eerin	g			Schem	e:2017
Cours	e Code	Category	H	ours	/	Credits	Maximum	n Marks	
			1	Week			Continuous		1
		0	L	т	Р	С	Internal	End	
OE	402	Open Elective – III				_	Assessment	Exam	TOTAL
			3	-	-	3	40	60	100
Session	al Exam l	Duration : 2 Hrs					End Exa	m Duratior	a : 3 Hrs
Course	Outcome	s : At the end of t	he co	ourse	stud	ents will t	be able to		
CO1	Apply nu	umerical methods	for s	olving	g alge	ebraic equ	ations		
CO2	Solve con	nduction and con	vectio	on pro	obler	ns using fi	inite difference method		
CO 3 :	Solve hy	perbolic and ellip	tic ec	uatio	ns a	nd unders	tand fundamentals of f	luid flow mo	odeling
CO 4 : Understand both flow physics and mathematical properties of governing Navier-Stokes equations									
CO 5 :	Analyze	CFD techniques ι	ısing	softw	vare				
					UN	IT – I			
Applied	Applied Numerical Methods: Solution of a system of simultaneous Linear Algebraic Equations,								
iterative	iterative schemes of Matrix Inversion, Direct Methods for Matrix inversion, Direct Methods for banded								
matrices	5								
					UN	IT – II			
Finite I	Difference	e Applications in	Неа	t con	duc	tion and (Convention: Heat cond	luction, stea	ady heat
conduct	ion in a ve heat tr	rectangular geon ansfer, closure	netry	, tran	sien	t heat co	nduction , finite differ	ence applic	ation in
					UNI	T – III			
Fluid fl	ow mode	lling: Introductio	n e	lemen	tarv	finite diff	erence quotients impl	ementation	aspects
of finite-	-difference	e equations, consi	isten	cv. ext	plicit	t and impl	icit methods. Errors an	d stability a	analysis.
introduc	ction, first	order wave equa	tion,	stabil	ity o	f hyperbol	ic and elliptic equation	s, fundamer	ntals of
fluid flow	w modellir	ng, conservative p	rope	rty, th	ie up	wind sche	eme	,	
					UN	T – IV			
Governi	ing Equat	tions of Fluid Flo	w an	d Hea	at T	ransfer: Ir	ntroduction, conservation	on of mass l	Newton's
second	law of mo	otion, expanded f	orms	of Na	avier	-stokes ec	quations, conservation	of energy p	orinciple,
and spe	and special forms of the Navier-stokes equations								
					UN	IT – V			
Simple	CFD Tech	nniques, viscous	flow	s con	serv	ation forn	n space marching, rel	ocation tec	hniques,
viscous	flows, co	onservation from	spa	.ce m	arch	ing relova	ation techniques, artii	ficial viscos	sity, the
alternat	ing directi	ion implicit techn	iques	s, pres	ssure	e correctio	n technique. Computer	graphic tec	chniques
used in	CFD, Qu	asi one dimensio	nal f	low tl	nrou	gh a nozz	le, turbulence models,	standard a	and high
Reynold	s number	models and their	appl	licatio	ns.				

Text Books:

- John.Anderson, Computational Fluid Dyanamics -The basics with applications, Mc Graw Hil Publishers, New York
- Suhas V, Patankar Hema, Numerical Heat Transfer and Fluid Flow, Shava Publishers and Mc Graw Hill, New Delhi

Reference Books:

1. Muralidharan, Computational Fluid Flow and Heat Transfer, Narosa Publications, New Delhi

2. Tapan K. Sengupta, Fundamentals of Computational Fluid Dynamics, Universities Press, New Delhi

Question Paper Pattern:

Sessional Exam

The question paper for Sessional examination is for 30 marks, covering half of the syllabus for first Sessional and remaining half for second Sessional exam. Question No 1 which carries 6 marks contains three short answer questions of two marks each. The remaining three questions shall be EITHER/OR type questions carrying 8 marks each

End Exam

EXPERIMENTAL STRESS ANALYSIS (ESA)

VII Se	mester:	Mechanical E	ngin	eerin	g			Schen	ne : 2017
Cours	e Code	Category	H	ours Week	/	Credits	Maximur	m Marks	
OE	403	Open Elective – III	L 2	T	P	C 3	Continuous Internal Assessment 40	End Exam 60	TOTAL 100
Session	ol Exam	Duration : 2 Hrs	-	-		•	Fnd Fy	om Duratio	n · 2 Urs
Session		Duration : 2 Hrs					End Ex	am Duratio	n : 3 His
Course	Outcome	s: At the end of t	he co	nirse	stuc	lents will l	be able to		
course	Underst	and the principle	s of 1	mech	anic	al ontical	pneumatic acoustic	electrical r	resistance
CO1	and sem	liconductor strain	gaug	ges fo	r str	ain measu	rement		constance
CO2	Underst	and basic princip	le of j	photo	elas	ticity, crys	stal optics and phase d	liagrams	
CO 3 :	Understa bright fie stresses	and principles of eld arrangements at a point	stres , and	s opti isocl	ic la inic	w, plane P and isoch	Polaris cope, circular p romatic fringe order fo	olar scope, or obtaining	dark and principle
CO 4 :	Analyze and bi-re	coating stress, cr efringent Coating	ack d techi	letect: nique	ion,	and crack	propagation test data	using brittl	le coating
CO 5 :	Analyze the in plane, out of plane displacement fields and slope measurements using Moire- Fringes method								
					UN	IIT – I			
Strain	Measurer	nent: Introduction	on- 1	necha	anica	al, optical	, pneumatic, acoustic	methods	of strain
measure	ement. Ele	ectrical resistance	e stra	in ga	uges	- gauge fa	actor, types, properties	of a gauge	material,
backing	material	, adhesive mater	ial, p	protec	tive	coatings;	method of bonding s	train gauge	es, strain
gauges	lead wire a	and connections,	semi	condu	ictor	strain ga	uges		
					UN	IT – II			
Photo	Elasticity	r: Nature of ligh	t-har	moni	c wa	ave, phase	e amplitude, polarisat	tion. Crysta	al optics-
passage	of light th	hrough crystalline	e meo	lia, al	bsolı	ute and re	lative phase difference	, quarter wa	ave plate,
half way	ve plate, p	roduction of plan	e pola	arized	ligh	ıt			
					UN	IT – III			
Two-dir	nensiona	l photo elasticit	y: Sti	ress c	ptic	law, plane	e Polaris cope, isochro	matics and	isoclinic,
circular	polarisco	pe, dark fields an	d bri	ght fi	eld a	arrangeme	nts, isoclinic and isocl	romatic fri	nge order
at a poi	nt								
					UN	IT – IV			
Bi-refri	ngent Coa	atings: Introducti	ion to	Bi-re	efrin	gent coati	ng theory and Reflectio	on Polarisco	pe. Moire
techniqu	ues pheno	menon, Moire fri	nge a	nalys	is, M	loire techn	iques for in plane prot	olems	
Brittle	coatings:	Introduction, coa	ating	stres	ses,	failure the	eories, brittle coating c	rack patter	ns, crack
detectio	n, cerami	ic based brittle o	coatir	ngs, r	resin	based b	rittle coatings, test p	rocedures f	or brittle
coatings	s analysis,	, calibration proce	edure	s, ana	alysi	s of brittle	coating data		
					UN	IT – V			
Moire M	lethods:	Introduction, me	chani	ism o	f for	mation of	Moire fringes, the geor	metrical app	proach to
Moire-F	ringe ana	alysis, the displa	acem	ent fi	eld	approach	to Moire-Fringe ana	alysis, out	of plane

displacement measurements, out of plane slope measurements, sharpening and multiplication of Moire-Fringes, experimental procedure and techniques

Text Books:

1. L.S. Srinath, M.R. Raghavan, K. Lingaiah, G. Gargesh, K. Ramachandra and B. Pant, Experimental Stress Analysis, TMH Publications, New Delhi

2. Dally and Riley, Experimental Stress Analysis, McGraw Hill Publishers, New York

Reference Books:

- 1. Durelli Philips and Tsao, Theoretical and Applied Stress Analysis, McGraw Hil Publishers, New York
- 2. Sadhu Singh, Experimental Stress Analysis, Khanna Publishers, New Delhi
- 3. Abdul Mubeen, Experimental Stress Analysis, Dhanpat Rai and Sons, New Delhi

Question Paper Pattern:

Sessional Exam

The question paper for Sessional examination is for 30 marks, covering half of the syllabus for first Sessional and remaining half for second Sessional exam. Question No 1 which carries 6 marks contains three short answer questions of two marks each. The remaining three questions shall be EITHER/OR type questions carrying 8 marks each

End Exam

PRODUCT DESIGN AND DEVELOPMENT (PDD)

VII Semester:		Mechanical E	ngin	eerin	g			Schem	e : 2017	
Cours	e Code	Category	H	ours Week	/	Credits	Maximur	n Marks		
OE	404	Open Elective – III	L	Т	Р	С	Continuous Internal Assessment	End Exam	TOTAL	
			3		-	3	40	60	100	
Session	Sessional Exam Duration : 2 Hrs End Exam Duration : 3 Hrs									
Course	Outcom	es : At the end of	f the	cours	se st	udents wi	ll be able to			
CO1	Utilize b	asic concepts of	prod	uct d	esig	n and dev	elopment process			
CO2	Select a	Select an appropriate design process for a given application								
CO 3 :	Select a	ppropriate design	n me	thodo	logy	with resp	pect to cost and societ	al factors		
CO 1 ·	Apply t	he principles o	f val	ue e	ngin	eering ar	nd ergonomics in p	roduct des	ign and	
CO T .	develop	ment								
CO 5 :	Use app	ropriate compute	er aio	led to	ols	for produc	ct design and develop	ment		
	I				UN	IT – I				
Introdu	i ction : C	Classification, Sp	pecifi	catio	ns d	of Produc	ts, Product life cycl	le. Introdu	ction to	
product	design, I	Modern product	devel	opme	nt p	process, In	novative thinking, Mo	orphology of	f design	
					UN	IT – II				
Concep	tual Des	ign : Generation,	seled	ction	& en	nbodimen	t of concept, Product	architectur	e,	
Industr	ial desig	n : Process, Need	•							
Robust	Design :	Taguchi Method	of pa	irame	ter l	Design				
					UN	IT – III				
Designi	ing for	Manufacturing	8 5	Asser	nbly	r: Method	ls of designing for	Manufactu	uring &	
Assemb	ly, Desig	n for Maintaina	bility	, Des	ign	for Envir	onment, Product Cos	sting, Legal	Factors	
and Soc	al Issues	s, Engineering El	thics							
¥7-1 F	\		19	. D.C	UN	$\Gamma - IV$	1.1 O	Decension in a		
	tive & Ou	antitative	19818	: Den	muc		dology, Case studies,	ECONOMIC 8	marysis:	
France	mics / A	esthetics: Hum	an Fr	actors	in	Design A	nthronometry Man-N	lachine inte	eraction	
Concepts of size and texture colour Comfort criteria Psychological & Physiological										
conside	rations.		c, c		,				101081041	
Creativity Techniques : Creative thinking, conceptualization, brain storming, primary design										
drawing	, simulat	- ion, detail desigr	ı			-			<i>J ,</i>	
					UN	IT – V				
Concur	rent Eng	ineering, Rapid	l pro	totyp	ing	, Tools fo	r product design - I	Drafting / N	Modeling	

software, CAM Interface.

Intellectual Property Rights- Classification- Indian Context

Text Books:

1. Karl T Ulrich, Steven D Eppinger, Product Design & Development, Tata Mc Grawhill, New Delhi

2. A. K. Chitale and R. C. Gupta, Product Design and Manufacturing, Pentice Hall of India

Reference Books:

1. David G Ullman, The Mechanical Design Process, Mc Graw hill Inc, Singapore

- 2. P. Kumar, Product Design: Creativity, Concept and Usability, Pentice Hall of India
- 3. L D Miles. Value Engineering, McGraw Hill
- 4. Kevin Otto, Kristin Wood, Product Design, Pearson Education

Question Paper Pattern:

Sessional Exam

The question paper for Sessional examination is for 30 marks, covering half of the syllabus for first Sessional and remaining half for second Sessional exam. Question No 1 which carries 6 marks contains three short answer questions of two marks each. The remaining three questions shall be EITHER/OR type questions carrying 8 marks each

End Exam

ADDITIVE MANUFACTURING TECHNOLOGY (ADMT)

VII Semester:		Mechanical E	Engineering				Scheme : 20				
Cours	e Code	Category	H	ours Week	/	Credits	Maximun	n Marks			
OE	405	Open Elective – IV	L	Т	Р	С	Continuous Internal Assessment	End Exam	TOTAL		
			3	-	-	3	40	60	100		
Sessional Exam Duration : 2 Hrs End Exam Duration : 3 Hrs											
Course	Outcome	s : At the end of t	he co	ourse	stud	lents will t	be able to				
CO1	CO1 Understand prototyping, and the phases of Rapid prototyping										
CO2	Understa	and the rapid pro	totyp	ing pı	roces	ss chain					
CO 3 :	Understa	and the functioni	ng of	Liqui	d ba	sed rapid	prototyping systems				
CO 4 :	Understa	and the functioni	ng of	Powd	er b	ased rapid	prototyping systems				
CO 5 :	Understa	and the Direct me	ethod	s of T	oolir	ng and Ind	irect methods of Toolin	ıg			
					UN	IT – I					
Introdu	ction: His	storical Developm	ent,	Defini	ition	of prototy	pe, types of prototypes	s, Role of pr	ototypes,		
Three p	hases of	development lea	ading	to F	Rapio	1 prototyp	ing, Fundamentals of	f rapid pro	totyping,		
Applicat	ions and	advantages of rap	oid pr	ototy	ping						
					UN	IT – II					
Rapid p	rototypii	ng process chair	1 - 31) moo	delliı	ng, data co	onversion and transmi	ssion, chec	king and		
preparir	ıg, Buildiı	ng and post proce	essin	g. Liq	uid 1	based rapi	d prototyping systems	- Stereo Litl	hography		
Apparat	us (SLA),	applications, ad	lvant	ages :	and	disadvant	ages of Stereo lithogr	aphy. Solic	1 ground		
curing p	process, s	steps in solid gro	und	curin	g, A	pplication	s of solid ground curi	ing, advanta	ages and		
disadvai	ntages of a	Solia grouna curi	ng, b	uila ti	ime		1				
Solid by	and rani	d prototyping a			omi	$\frac{11 - 111}{100}$	oot Manufacturing (IC	\mathbf{M} throat	hassa of		
	ased rapi	a protocyping sy		and d	Janni Janni	maleu Obj	fiom	, unee p	mases of		
Fusion	Deposition	n Modelling- Prin	rinle	nroce	15au 288	application	n LOM	sadvantages	s of FDM		
Multi Je	t Modellir	ng Systems	orpro,	proce	,	appnoado	is, advantages and ar	auvanagee	, 01 1 2 101,		
					UN	IT – IV					
Powder	based R	apid prototypin	g sy:	stems	5 - 3	Selective I	Laser Sintering (SLS),	Materials	for SLS,		
Principle	e, Process	s, Applications, a	dvan	tages	and	l disadvan	tages of SLS, Three D	Dimensional	Printing		
(3DP), P	rinciple, F	Process, Application	ons, a	advan	tage	s and disa	dvantages of 3DP				
Laser E	ngineered	1 Net Shaping (LENS	S) – F	Princ	ciple, Proc	ess steps, Applicatior	ns, Advanta	ages and		
disadva	ntages of I	LENS									
					UN	IT – V					
STA file	format,	Types of Errors									
Direct r	nethods	of rapid tooling	: AIM	l tooli	ng, S	SLS rapid	steel, Direct Laser Met	al Sintering	g (DMLS),		

Laminate tooling

Indirect methods of rapid Tooling: RTV silicon rubber moulds, Vacuum casting, Reaction injection Moulding(RIM),Wax Injection moulding, Spray metal tooling, 3D kelt tool

Text Books:

- 1. Chua C.K., Leong.K.F, and Lim C,C.S., Rapid Prototyping Principles and Applications, World Scientific Publishing Co. Pte. Ltd
- **2.** D.T.Pham and S.S.Dimov, Rapid manufacturing The technologies and applications of rapid Prototyping and rapid tooling. Springer Publications

Reference Books:

1. Terry Wholers, Wholers report, Wholers Associates

2. I. Gibson D. W. Rosen and B. Stucker., Additive manufacturing technologies, Springer Publication

Question Paper Pattern:

Sessional Exam

The question paper for Sessional examination is for 30 marks, covering half of the syllabus for first Sessional and remaining half for second Sessional exam. Question No 1 which carries 6 marks contains three short answer questions of two marks each. The remaining three questions shall be EITHER/OR type questions carrying 8 marks each

End Exam

INTELLIGENT MANUFACTURING SYSTEMS (IMS)

VII Semester:		Mechanical E	nical Engineering					Schem	ie : 2017	
Cours	e Code	Category	H	ours Week	/	Credits	Maximur	n Marks		
OE406Open Elective - IVLTPCContinuous InternalEnd Exam							End Exam	TOTAL		
			3	-	-	3	40	60	100	
Sessional Exam Duration : 2 Hrs End Exam Duration : 3 Hrs										
Course	Outcome	s : At the end of t	he co	ourse	stud	lents will b	be able to			
CO 1	Understa based sy	and the parts of stem	Intel	ligent	Ma	nufacturin	g Systems and compo	onents of K	nowledge	
CO2	Understa Intelliger	and the researc	ch g	oals,	tech	nniques a	nd programming lar	nguage of	Artificial	
CO 3 :	Understa	and the Conceptu	ial lea	arning	g ano	l Neural ne	etworks			
CO 4 :	Understa	and the different	types	of set	nsor	s in intellig	gent manufacturing			
CO 5 :	Understa	and the use of Ar	tificia	1 Inte	llige	nce in indu	ıstries			
					UN	IT – I				
Intellig	ent man	ufacturing syst	ems:	com	pone	ents syste	ems, architecture and	d data flor	w-system	
operatio	n.									
Expert	Systems:	Expert system pr	roces	s, cha	ract	eristics an	d components of exper	t systems.		
Knowle	dge Base	d Systems –Intro	oduct	ion ,	Kno	wledge Re	presentation- First-ord	ler logic, Pr	oduction	
rules, S	emantic I	Networks; Compa	rison	ot K	now	ledge Repi	resentation Schemes,	Interference	: Engine,	
Knowled	ige acquis	iuon- Protocol Al	laiysi	S	TIN	17 II				
Artificio	1 Intollia	roman. Introducti	ion I	20000	roh	$\frac{11 - 11}{20010 + 1001}$	niquos trovulados ro	aracantation	agarah	
Technia	ues progr	camming languag	e-US	P and	l nro	blems	iniques-knowledge rej	Jiesemanoi	i, scarcii	
		anning hangung		- 4110		T – III				
Machin	e Learni	ng: Introductio	n, C	Concer	otua	1 Learnin	g-examples of learn	ing, comp	utational	
complex	ity of lear	ning; Neural netw	vorks	, lean	ning	in neural	networks	8,F		
					UN	IT – IV				
Sensors	for Inte	lligent Manufac	turin	g: Pr	incir	oles, classi	fications and charact	eristics of s	sensors –	
electrica	l, magnet	ic, optical, acous	tic, p	neum	atic	, magnetic	, electro-optical and vi	sion sensor	rs, role of	
sensors	in intellig	ent manufacturir	ng							
UNIT – V										
Industr	ial Applic	cations of AI: Ir	ntellig	gent	sy	vstem f	for design, equi	pment s	selection,	
schedul	ing, mat	erial selection,	main	itenar	nce,	facility pla	nning and process con	trol		
Text Bo	oks:									
1. And	rew Kusia	k, Intelligent Mar	nufac	turing	g Sys	stems, Prei	ntice Hall Publications			
2. H.K	Tonshoff	and I.Inasaki, S	Senso	r App	olica	tions Vol	1, Sensors in Manufa	acturing, W	'iley-VCH	

Publications

3. Ramachandran Nagarajan, Introduction to Industrial Robotics, Pearson publications

Reference Books:

1. Simons, G.L. , Introducing artificial intelligence, NCC publications

2. B.Vegnanarayana , Artificial neural networks., PHI publications

Question Paper Pattern:

Sessional Exam

The question paper for Sessional examination is for 30 marks, covering half of the syllabus for first Sessional and remaining half for second Sessional exam. Question No 1 which carries 6 marks contains three short answer questions of two marks each. The remaining three questions shall be EITHER/OR type questions carrying 8 marks each

End Exam

ADVANCED MATERIALS TECHNOLOGY (AMT)

VII Sea	mester:	Mechanical E	ngin	leerin	g			Schem	e : 2017		
Cours	e Code	Category	H	ours Week	/	Credits	Maximur	n Marks			
OE	407	Open Elective – IV	L	Т	Р	С	Continuous Internal Assessment	End Exam	TOTAL		
			3	-	-	3	40	60	100		
Session	Sessional Exam Duration : 2 Hrs End Exam Duration : 3 Hrs										
Course	Outcome	s : At the end of t	he co	ourse	stud	lents will b	be able to				
CO1	Identify	Identify the properties of fiber and matrix materials used in commercial composites, as well									
COI	as some common manufacturing techniques										
CO2	Understa	and manufacturin	ng me	ethods	s and	d their elas	stic properties of lamin	a			
CO 3 :	Analyse	the Hooke's law f	or dif	fferent	typ	e of mater	ials				
CO 4 :	Understa	and the elastic be	havio	our of	the	unidirectio	onal composite				
CO 5 :	Analyze	a laminated plate	in b	endin	g, in	cluding fir	nding laminate propert	ies from lam	lina		
					UN	IT – I					
Basic c	oncepts	and characteris	tics:	Geon	netri	c and Phy	ysical definitions, nat	ural and m	an-made		
composi	tes, Aeros	pace and structu	ral a	pplica	tion	s, types ar	nd classification of com	posites.			
Reinfor	cements:	Fibers- Glass,	Silica	ı, Kev	lar,	carbon, b	ooron, silicon carbide,	and boron	carbide		
fibers. F	Particulate	e composites, Pol	ymer	com	posit	tes, Therm	oplastics, Thermosett	s, Metal ma	atrix and		
ceramic	composite	es									
					UN	IT – II	1.11 1 0.1				
Manufa	cturing n	nethods: Autocla	ave, 1	tape p	orod	uction, m	oulding methods, filai	nent windir	ig, hand		
Iayup, p		, RIM Unidirectional c	omn	osites	0.01	natituent r	noterials and properti	es electio p	roperties		
of a lan	nina pror	erties of typical	com	nosite	, coi ma	terials lar	ninate characteristics	and config	urations		
Charact	erization o	of composite prop	ertie	s	ma						
				-	UN	IT – III					
Coordin	ate tran	sformations: Ho	oke's	s law	for	different	types of materials, H	looke's law	for two		
dimensi	onal unid	irectional lamina,	, Trai	nsforn	natio	on of stress	s and strain, Numerica	al examples	of stress		
strain transformation											
					UN	IT – IV					
Elastic	behavior	of unidirection	al co	ompos	sites	Elastic	constants of lamina, 1	elationship	between		
engineer	engineering constants and reduced stiffness and compliances, analysis of laminated composites,										
constitu	tive relation	ons									
					UN	IT – V					
Analysi	s of lamin	nated composite	plat	es: In	trod	luction, th	in plate theory, specia	lly orthotrop	pic plate,		

cross and angle ply laminated plates, problems using thin plate theory

Text Books:

1. R.M.Jones, Mechanics of Composite Materials Mc Graw Hill Company, New York

2. Isaac and M.Daniel, Engineering Mechanics of Composite Materials Oxford University Press

3. Madhujit Mukhopadadhyay ,Mechanics of composite materials and structures Universities Press

Reference Books:

1. L. R. Calcote, Analysis of Laminated Composite Structures Van Nostrand Rainfold

2. B. D. Agarwal and L. J. Broutman, Analysis and performance of fibre Composites Wiley-Interscience, New York

Question Paper Pattern:

Sessional Exam

The question paper for Sessional examination is for 30 marks, covering half of the syllabus for first Sessional and remaining half for second Sessional exam. Question No 1 which carries 6 marks contains three short answer questions of two marks each. The remaining three questions shall be EITHER/OR type questions carrying 8 marks each

End Exam

DESIGN FOR MANUFACTURING (DFM)

VII Ser	mester:	Mechanical E	ngin	eerin	g			Schem	e:2017
Cours	e Code	Category	H	ours Week	/	Credits	Maximur	n Marks	
OE	408	Open Elective – IV	L	т	Р	С	Continuous Internal Assessment	End Exam	TOTAL
			3	-	-	3	40	60	100
Session	al Exam I	Duration : 2 Hrs					End Exa	am Duration	a : 3 Hrs
0	0.4		1		4 1		11 /		
Course Outcomes : At the end of the course students will be able to									
CO1	Understa	and general desig	gn ru	les foi	r ma	nufacture	ability and criteria for	material sel	ection
CO2	Illustrate	e machining proc	esses	and t	toler	ance aspec	cts in machining		
CO 3 :	Understa	and the design co	onsid	eratio	ns fo	or casting			
CO 4 :	Understa	and the design co	nside	eration	ns fo	r joining			
CO 5 ·	Understa	and the conceptu	al de	sign fa	actor	rs to be con	nsidered in forging, ext	rusion and	
	Sheet me	etal work							
					UN	IT – I			
Introdu	ction: De	sign philosophy-	steps	in de	esign	process-g	general design rules fo	r manufactı	1rability-
basic pr	inciples o	f designing for eco	onom	ical p	rodu	iction-crea	tivity in design.		
Materia	ls: Selecti	ion of materials f	or de	sign-o	deve	lopments i	in material technology	-criteria for	material
selection	n-material	selection interrel	latior	iship '	with	process se	election-process selection	on charts	
76 1			6	•	UN	rr – n	1.1. •	1 0	<u></u>
Machini	ing proce	esses: Overview o	t var:	ious r	nach	nning proc	cesses-general design	rules for ma	ichining-
compon	ents for	machining ease	with	n suit	ness table	evample	oi macmini – cas s General design re	e – Teuesi	tions for
machine	ed parts	inactining case	witt	1 541	aon	, example	5. General design re	commentat	10115 101
					UNI	T – III			
Metal c	asting: A	oppraisal of vario	us ca	asting	pro	cesses, se	election of casting pro	cess,-genera	al design
consider	rations for	r casting-casting	tolera	ance-i	ise c	of solidifica	ation, simulation in cas	sting design	-product
design r	ules for sa	and casting							-
					UN	IT – IV			
Metal jo	oining: Ap	opraisal of various	s wel	ding p	roce	esses, facto	ors in design of weldme	ents – genera	al design
guidelin	es-pre an	d post treatment	of w	elds-e	ffect	s of therm	al stresses in weld joi	nts-design o	of brazed
joints									
					UN	IT – V			
Forging	: design f	actors for forging	– clo	sed d	ie fo	rging desi	gn – parting lines of di	es – drop fo	rging die
design –	general d	lesign recommend	latio	ns					
Extrusio	on & She	et metal work: D	Desig	n guid	le lir	ies extrude	ed sections-design prir	nciples for p	unching,
blanking	g, bendin	g, deep drawing	-Keel	ler Go	oodn	nan forgin	ıg line diagram – co	mponent de	esign for

blanking

Text Books:

1. John cobert, Design for manufacture Adisson Wesley

2. Geoffrey Boothroyd et. al, Product Design for Manufacture and Assembly, CRC Press

3. George Dieter and Linda Schmidt, Engineering Design, Mc Graw Hill.

Reference Books:

1. A.K Chitale and R.C Gupta, Product design and manufacturing Prentice-Hall of India

- **2.** Surender kumar and Goutham Sutradhar, Design and manufacturing, Oxford & IBH publishing Co.Pvt.Ltd., New Delhi
- 3. Kevin Otto and Kristin Wood, Product design, Pearson Education

Question Paper Pattern:

Sessional Exam

The question paper for Sessional examination is for 30 marks, covering half of the syllabus for first Sessional and remaining half for second Sessional exam. Question No 1 which carries 6 marks contains three short answer questions of two marks each. The remaining three questions shall be EITHER/OR type questions carrying 8 marks each

End Exam