



GIET UNIVERSITY, GUNUPUR, ODISHA

DEPARTMENT OF MECHANICAL ENGINEERING

SCHOOL OF ENGINEERING & TECHNOLOGY

Incorporated by Act 23 of Govt. of Odisha and under approval of UGC & AICTE

Accredited by NAAC with a CGPA of 3.28/4 at A⁺ Grade

Seven UG Programs CSE, ME, CHE, AEIE, ECE, BT & EEE Accredited by NBA

Gunupur - 765022 , Dist.- Rayagada, Odisha, INDIA

www.giet.edu

COURSE STRUCTURE AND SYLLABUS
FOR
POST GRADUATE DEGREE COURSE
IN
MACHINE DESIGN
REGULATION -2019



GIET UNIVERSITY, GUNUPUR, ODISHA

DEPARTMENT OF MECHANICAL ENGINEERING

SCHOOL OF ENGINEERING & TECHNOLOGY

Incorporated by Act 23 of Govt. of Odisha and under approval of UGC & AICTE

Accredited by NAAC with a CGPA of 3.28/4 at A⁺ Grade

Seven UG Programs CSE, ME, CHE, AEIE, ECE, BT & EEE Accredited by NBA

Gunupur - 765022 , Dist.- Rayagada, Odisha, INDIA

www.giet.edu

Structure of Postgraduate Engineering Program

SL. NO.	COURSE WORK - SUBJECTS AREA	CREDITS / SEMESTER								TOTAL CREDITS
		I	II	III	IV	V	VI	VII	VIII	
1	Humanities and Social Sciences including Management Courses	-	-	-	-					
2	Basic Science Courses	-	-	-	-					
3	Engineering Science Courses including workshop, drawing, basics of electrical mechanical/computer etc.	4	-	10	16					30
4	Professional Core Courses	8	12	-	-					20
5	Professional Elective Courses relevant to chosen specialization / branch	6	6	3	-					15
6	Open subjects - Electives from other technical and/or emerging Subjects	-	-	3	-					3
7	Project work, Seminar and Internship in industry or elsewhere	-								
8	Mandatory Courses [Environmental Sciences, Induction Training, Indian Constitution, Essence of Indian Traditional Knowledge]	-	-	-	-					
	TOTAL	18	18	16	16					68



GIET UNIVERSITY, GUNUPUR, ODISHA

DEPARTMENT OF MECHANICAL ENGINEERING

SCHOOL OF ENGINEERING & TECHNOLOGY

Incorporated by Act 23 of Govt. of Odisha and under approval of UGC & AICTE

Accredited by NAAC with a CGPA of 3.28/4 at A⁺ Grade

Seven UG Programs CSE, ME, CHE, AEIE, ECE, BT & EEE Accredited by NBA

Gunupur - 765022 , Dist.- Rayagada, Odisha, INDIA

www.giet.edu

SEMESTER WISE COURSE STRUCTURE

M.TECH (MACHINE DESIGN)

I SEMESTER [FIRST YEAR]

Sl. No.	Course Category	Course Code	Course Title	L	T	P	Credits
THEORY							
1	PC		Advanced Stress Analysis	3	0	0	3
2	PC		Machine Vibration	3	0	0	3
3	PC		Research Methodology and IPR	2	0	0	2
4	PE		Advanced Engineering Materials	3	0	0	3
			Mechanics of Composite Materials				
			Analysis and Synthesis of Mechanisms				
			Fatigue, Creep & Fracture				
5	PE		Mathematical Methods in Engineering	3	0	0	3
			Design for Manufacturing and Assembly				
			Advanced Machine Design				
			Advanced Mechanics Of Solids				
PRACTICAL / SESSIONAL							
6	ES		Engineering Software Lab	0	0	8	4
7	AUDIT		Audit -1	2	0	0	0
TOTAL				16		8	18



GIET UNIVERSITY, GUNUPUR, ODISHA

DEPARTMENT OF MECHANICAL ENGINEERING

SCHOOL OF ENGINEERING & TECHNOLOGY

Incorporated by Act 23 of Govt. of Odisha and under approval of UGC & AICTE

Accredited by NAAC with a CGPA of 3.28/4 at A⁺ Grade

Seven UG Programs CSE, ME, CHE, AEIE, ECE, BT & EEE Accredited by NBA

Gunupur - 765022 , Dist.- Rayagada, Odisha, INDIA

www.giet.edu

II SEMESTER [FIRST YEAR]

Sl. No.	Course Category	Course Code	Course Title	L	T	P	Credits
THEORY							
1	PC		Finite Element Method	3	0	0	3
2	PC		Applied Elasticity and Plasticity	3	0	0	3
3	PE		Tribology in Design	3	0	0	3
			Robotics				
			Advanced Mechanisms of Machines				
			Computer Aided Design				
4	PE		Dynamics of Rotors	3	0	0	3
			Instrumentation and Automatic Control Systems				
			Optimization Techniques in Design				
			Analysis and Design of Pressure Vessels and Piping				
PRACTICAL / SESSIONAL							
5	PC		Advanced Design Engineering Lab	0	0	8	4
6	CORE		Mini-Project	0	0	4	2
7	AUDIT		Audit -2	2	0	0	0
TOTAL				14	0	12	18



GIET UNIVERSITY, GUNUPUR, ODISHA

DEPARTMENT OF MECHANICAL ENGINEERING

SCHOOL OF ENGINEERING & TECHNOLOGY

Incorporated by Act 23 of Govt. of Odisha and under approval of UGC & AICTE

Accredited by NAAC with a CGPA of 3.28/4 at A⁺ Grade

Seven UG Programs CSE, ME, CHE, AEIE, ECE, BT & EEE Accredited by NBA

Gunupur - 765022 , Dist.- Rayagada, Odisha, INDIA

www.giet.edu

III SEMESTER [SECOND YEAR]

Sl. No.	Course Category	Course Code	Course Title	L	T	P	Credits
THEORY							
1	OE		Industrial Safety	3	0	0	3
			Human Resource Management				
			Project Management And Costing				
			Business Analytics				
2	PE		Basic Mechanical Handling Systems	3	0	0	3
			Computer Graphics And Visualization				
			Machine Tool Design				
			Mechatronics				
PRACTICAL / SESSIONAL							
3	ES		Dissertation Phase-I	0	0	20	10
TOTAL				6	0	20	16

IV SEMESTER [SECOND YEAR]

Sl. No.	Course Category	Course Code	Course Title	L	T	P	Credits
PRACTICAL / SESSIONAL							
1	ES		Dissertation Phase-II	0	0	32	16
TOTAL				0	0	32	16



GIET UNIVERSITY, GUNUPUR, ODISHA

DEPARTMENT OF MECHANICAL ENGINEERING

SCHOOL OF ENGINEERING & TECHNOLOGY

Incorporated by Act 23 of Govt. of Odisha and under approval of UGC & AICTE

Accredited by NAAC with a CGPA of 3.28/4 at A⁺ Grade

Seven UG Programs CSE, ME, CHE, AEIE, ECE, BT & EEE Accredited by NBA

Gunupur - 765022 , Dist.- Rayagada, Odisha, INDIA

www.giet.edu

Total Credits for the programme = 18 + 18 + 16 + 16 = 68

Audit course 1 & 2

1. English for Research Paper Writing
2. Disaster Management
3. Sanskrit for Technical Knowledge
4. Value Education
5. Constitution of India
6. Pedagogy Studies
7. Stress Management by Yoga
8. Personality Development through Life Enlightenment Skills.



GIET UNIVERSITY, GUNUPUR, ODISHA

DEPARTMENT OF MECHANICAL ENGINEERING

SCHOOL OF ENGINEERING & TECHNOLOGY

Incorporated by Act 23 of Govt. of Odisha and under approval of UGC & AICTE

Accredited by NAAC with a CGPA of 3.28/4 at A⁺ Grade

Seven UG Programs CSE, ME, CHE, AEIE, ECE, BT & EEE Accredited by NBA

Gunupur - 765022 , Dist.- Rayagada, Odisha, INDIA

www.giet.edu

I SEMESTER [FIRST YEAR]

Sl. No.	Course Category	Course Code	Course Title	L	T	P	Credits
THEORY							
1	PC		Advanced Stress Analysis	3	0	0	3
2	PC		Machine Vibration	3	0	0	3
3	PC		Research Methodology and IPR	2	0	0	2
4	PE		Advanced Engineering Materials	3	0	0	3
			Mechanics of Composite Materials				
			Analysis and Synthesis of Mechanisms				
			Fatigue, Creep & Fracture				
5	PE		Mathematical Methods in Engineering	3	0	0	3
			Design for Manufacturing and Assembly				
			Advanced Machine Design				
			Advanced Mechanics Of Solids				
PRACTICAL / SESSIONAL							
6	ES		Engineering Software Lab	0	0	8	4



GIET UNIVERSITY, GUNUPUR, ODISHA

DEPARTMENT OF MECHANICAL ENGINEERING

SCHOOL OF ENGINEERING & TECHNOLOGY

Incorporated by Act 23 of Govt. of Odisha and under approval of UGC & AICTE

Accredited by NAAC with a CGPA of 3.28/4 at A⁺ Grade

Seven UG Programs CSE, ME, CHE, AEIE, ECE, BT & EEE Accredited by NBA

Gunupur - 765022 , Dist.- Rayagada, Odisha, INDIA

www.giet.edu

7	AUDIT	Audit -1	2	0	0	0
TOTAL			16	8	18	

SUBJECT CODE	TITLE OF THE SUBJECT	L	T	P	C	QP
	ADVANCED STRESS ANALYSIS	3	0	0	3	

Pre -Requisite:

Course Outcomes: Upon successful completion of this course, students should be able to:

CO1	Solve the advanced practical problems related to the theory of elasticity, concepts of stress and strain
CO2	Analyze Strength and stiffness, deformations and displacements, strain energy, and load carrying capacity.
CO3	Propose materials and structural elements to the analysis of complex structures.
CO4	Identify, formulate and solve the structural problems using a range of analytical methods.

CO-PO & PSO Mapping

Cos	PROGRAMME OUTCOMES												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	2	3												
CO2	3	1												
CO3	2	1											2	
CO4	1	2												
Avg.	2	1.7											0.5	
		5												

SYLLABUS

UNIT:1 (12 Hours)
 Electrical Wire Resistance Strain Gauges: Strain sensitivity, strain gauge construction, temperature effects in bonded strain gauges. Gauge factor and gauge sensitivities. Determination of actual strain. Measurement of stress by a strain gauge, stress gauge, strain gauge Rosette.
 Measuring Circuits: The potentiometer circuit, circuit sensitivity of potentiometer, Wheatstone bridge circuit, Null-balance bridge, strain gauge applications.



GIET UNIVERSITY, GUNUPUR, ODISHA

DEPARTMENT OF MECHANICAL ENGINEERING

SCHOOL OF ENGINEERING & TECHNOLOGY

Incorporated by Act 23 of Govt. of Odisha and under approval of UGC & AICTE

Accredited by NAAC with a CGPA of 3.28/4 at A⁺ Grade

Seven UG Programs CSE, ME, CHE, AEIE, ECE, BT & EEE Accredited by NBA

Gunupur - 765022 , Dist.- Rayagada, Odisha, INDIA

www.giet.edu

UNIT:2	(13 Hours)
Moiré Fringe Method: Moiré method, geometry of moiré fringe, advantages and limitations of moiré method. Photo elasticity: Introduction, basic principle, stress and strain optic law, plane polariscope, circular polariscope, white light illumination.	
UNIT:3	(15 Hours)
Analysis of Photo elastic Data: Materials and properties of material for photo elastic models, stress loci, fractional fringe orders, methods of compensation, calibration techniques, the frozen stress method, Reflection polariscope, separation of principal stresses. Brittle Coating Method: Brittle coating, calibration of coating, application of failure theory to brittle coating, advantages and limitations.	
Teaching Methods: Chalk& Board/ PPT/Video Lectures/Lecture by Industry Expert.	
Text Books	
1. J.W. Dally and W.F. Riley, “Experimental stress Analysis”, McGraw Hill, 1991.	
2. Durelli, Augusto J., and William Franklin Riley. " Introduction to photo mechanics. Prentice-Hall, 1965.	
3. L.S.Srinath, M.R.Raghavan, K.Lingaiah, G.Gargesa, B.Pant and K.Ramachandra, “Experimental Stress Analysis, Tata McGraw Hill, 1984.	
Ref. Books	
1. Experimental Stress Analysis and Motion Measurement – R. C. Dove and P. H. Adams. PHI, 1965.	
2. Applied Stress Analysis – A. J. Durelli. PHI, 1970.	
3. Sadhu Singh, Experimental Stress Analysis, Khanna Publishers, 2009.	



GIET UNIVERSITY, GUNUPUR, ODISHA

DEPARTMENT OF MECHANICAL ENGINEERING

SCHOOL OF ENGINEERING & TECHNOLOGY

Incorporated by Act 23 of Govt. of Odisha and under approval of UGC & AICTE

Accredited by NAAC with a CGPA of 3.28/4 at A⁺ Grade

Seven UG Programs CSE, ME, CHE, AEIE, ECE, BT & EEE Accredited by NBA

Gunupur - 765022 , Dist.- Rayagada, Odisha, INDIA

www.giet.edu

SUBJECT CODE	TITLE OF THE SUBJECT	L	T	P	C	QP								
	MACHINE VIBRATION	3	0	0	3									
Pre -Requisite:														
Course Outcomes: Upon successful completion of this course, students should be able to:														
CO1	Relate the causes and effects of vibration in mechanical systems.													
CO2	Develop schematic models for physical systems and formulate governing equations of motion.													
CO3	Able to know the various constraints of vibration system and its analysis.													
CO4	Analyze the vibrations of various generic components, its effect on balancing and the devices for its measurements.													
CO-PO & PSO Mapping														
Cos	PROGRAMME OUTCOMES												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	2	3												2
CO2	3	1												
CO3	2	1												2
CO4	1	2												1
Avg.	2	1.75												1.25
SYLLABUS														
UNIT:1 (12 Hours) Review of free and forced vibrations with and without damping. Hamilton's Principle. Isolation: Theory of oscillation of single degree freedom system with application to Vibration isolation and vibration measurement. Vibration isolation and transmissibility; Un-damped vibration absorbers.														



GIET UNIVERSITY, GUNUPUR, ODISHA

DEPARTMENT OF MECHANICAL ENGINEERING

SCHOOL OF ENGINEERING & TECHNOLOGY

Incorporated by Act 23 of Govt. of Odisha and under approval of UGC & AICTE

Accredited by NAAC with a CGPA of 3.28/4 at A⁺ Grade

Seven UG Programs CSE, ME, CHE, AEIE, ECE, BT & EEE Accredited by NBA

Gunupur - 765022, Dist.- Rayagada, Odisha, INDIA

www.giet.edu

UNIT:2	(15 Hours)
Multi degree of freedom system: Generalized coordinates and coordinate coupling; Orthogonality of modes, Free and forced vibration of multi-degree of freedom systems with and without viscous damping; Lagrange's equation; Holzer's method. Solution of Eigen value problem, transfer matrix and modal analysis. Multi-degree freedom system with application to measurement. Multiple degree of freedom systems with applications to dynamic vibration absorbers. Application of matrix to vibrational problems, General theory of small oscillation of conservative systems, principal frequencies and modes. Introduction of Rayleigh and Rayleigh-ritz Methods.	
UNIT:3	(13 Hours)
Continuous System: Transverse vibration of a string, longitudinal vibration of a bar, torsional vibration of a shaft, transverse vibration of a beam. Vibration of membranes and plates, Laplace Transforms and operational Methods.	
Teaching Methods: Chalk& Board/ PPT/Video Lectures/Lecture by Industry Expert.	
Text Books	
1. Mechanical Vibration : Theory and Applications - F.S. Tse, I.E. Morse and R.T. Hinkle. CBS Publishers, 2002.	
2. Theory of Vibration with Application - W.T. Thomson, PHI, 2008.	
Ref. Books	
1. Principles of Vibration Control - A. K. Mallick, East-West Press, 2014.	
2. Mechanical Vibrations - S. S. Rao. Pearson, 2017.	
3. Advanced Theory of Vibration - J.S. Rao. New Age Publication. 2009	
4. Introductory course on Theory and Practice of Mechanical Vibration - J.S.Rao and K. Gupta. New 2009	



GIET UNIVERSITY, GUNUPUR, ODISHA

DEPARTMENT OF MECHANICAL ENGINEERING

SCHOOL OF ENGINEERING & TECHNOLOGY

Incorporated by Act 23 of Govt. of Odisha and under approval of UGC & AICTE

Accredited by NAAC with a CGPA of 3.28/4 at A⁺ Grade

Seven UG Programs CSE, ME, CHE, AEIE, ECE, BT & EEE Accredited by NBA

Gunupur - 765022 , Dist.- Rayagada, Odisha, INDIA

www.giet.edu

SUBJECT CODE	TITLE OF THE SUBJECT	L	T	P	C	QP								
	RESEARCH METHODOLOGY AND IPR	2	0	0	2									
Pre -Requisite:														
Course Outcomes: Upon successful completion of this course, students should be able to:														
CO1	Understand research problem formulation and analyze research related information													
CO2	Understand that today's world is controlled by Computer, Information Technology, but tomorrow world will be ruled by ideas, concept, and creativity.													
CO3	Understanding that when IPR would take such important place in growth of individuals & nation, it is needless to emphasize the need of information about Intellectual Property Right to be promoted among students in general & engineering in particular.													
CO4	Understand that IPR protection provides an incentive to inventors for further research work and investment in R & D, which leads to creation of new and better products, and in turn brings about, economic growth and social benefits.													
CO-PO & PSO Mapping														
COs	PROGRAMME OUTCOMES												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3	1												
CO2	2	2	1											



GIET UNIVERSITY, GUNUPUR, ODISHA

DEPARTMENT OF MECHANICAL ENGINEERING

SCHOOL OF ENGINEERING & TECHNOLOGY

Incorporated by Act 23 of Govt. of Odisha and under approval of UGC & AICTE

Accredited by NAAC with a CGPA of 3.28/4 at A⁺ Grade

Seven UG Programs CSE, ME, CHE, AEIE, ECE, BT & EEE Accredited by NBA

Gunupur - 765022 , Dist.- Rayagada, Odisha, INDIA

www.giet.edu

CO3	3	2						1					
CO4	3		2					1					
Avg.	2.7	1.2	0.7					0.5					
	5	5	5										

SYLLABUS

UNIT:1 (14 Hours)
 Meaning of research problem, Sources of research problem, Criteria Characteristics of a good research problem, Errors in selecting a research problem, Scope and objectives of research problem.
 Approaches of investigation of solutions for research problem, data collection, analysis, interpretation, Necessary instrumentations Effective literature studies approaches, analysis Plagiarism, Research ethics,

UNIT:2 (13 Hours)
 Effective technical writing, how to write report, Paper Developing a Research Proposal, Format of research proposal, a presentation and assessment by a review committee.
 Nature of Intellectual Property: Patents, Designs, Trade and Copyright. Process of Patenting and Development: technological research, innovation, patenting, development. International Scenario: International cooperation on Intellectual Property. Procedure for grants of patents, Patenting under PCT.

UNIT:3 (13 Hours)
 Patent Rights: Scope of Patent Rights. Licensing and transfer of technology. Patent information and databases. Geographical Indications.
 New Developments in IPR: Administration of Patent System. New developments in IPR; IPR of Biological Systems, Computer Software etc. Traditional knowledge Case Studies, IPR and IITs.

Teaching Methods: Chalk& Board/ PPT/Video Lectures/Lecture by Industry Expert.

References:

1. Stuart Melville and Wayne Goddard, "Research methodology: an introduction for science & engineering students"2008
2. Wayne Goddard and Stuart Melville, "Research Methodology: An Introduction"2003
3. Ranjit Kumar, 2nd Edition, "Research Methodology: A Step by Step Guide for beginners"
4. Halbert, "Resisting Intellectual Property", Taylor & Francis Ltd ,2007.
5. Mayall , "Industrial Design", McGraw Hill, 1992.
6. Niebel , "Product Design", McGraw Hill, 1974.
7. Asimov , "Introduction to Design", Prentice Hall, 2008.
8. Robert P. Merges, Peter S. Menell, Mark A. Lemley, " Intellectual Property in New
9. Technological Age", 2016.



GIET UNIVERSITY, GUNUPUR, ODISHA

DEPARTMENT OF MECHANICAL ENGINEERING

SCHOOL OF ENGINEERING & TECHNOLOGY

Incorporated by Act 23 of Govt. of Odisha and under approval of UGC & AICTE

Accredited by NAAC with a CGPA of 3.28/4 at A⁺ Grade

Seven UG Programs CSE, ME, CHE, AEIE, ECE, BT & EEE Accredited by NBA

Gunupur - 765022, Dist.- Rayagada, Odisha, INDIA

www.giet.edu

SUBJECT CODE	TITLE OF THE SUBJECT	L	T	P	C	QP
	ADVANCED ENGINEERING MATERIALS	3	0	0	3	
Pre -Requisite:						
Course Outcomes: Upon successful completion of this course, students should be able to:						
CO1	Demonstrate an understanding of mechanics, physical and chemical properties of materials including metals, ceramics, polymers and composites					
CO2	Understand existence of imperfections and their effects on mechanical properties of materials and cause of failure					
CO3	Demonstrate understanding of phase diagrams and their use in predicting phase transformation and microstructure					
CO4	Understand and predict various types of failures using concept of fracture mechanics, creep and effect of impact.					



GIET UNIVERSITY, GUNUPUR, ODISHA

DEPARTMENT OF MECHANICAL ENGINEERING

SCHOOL OF ENGINEERING & TECHNOLOGY

Incorporated by Act 23 of Govt. of Odisha and under approval of UGC & AICTE

Accredited by NAAC with a CGPA of 3.28/4 at A⁺ Grade

Seven UG Programs CSE, ME, CHE, AEIE, ECE, BT & EEE Accredited by NBA

Gunupur - 765022 , Dist.- Rayagada, Odisha, INDIA

www.giet.edu

CO-PO & PSO Mapping														
COs	PROGRAMME OUTCOMES												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3	1											2	
CO2	2			3									1	
CO3	2	2		3									2	
CO4	3	1	1										2	
Avg.	2.5	1.0	0.2 5	1.5									1.7 5	

SYLLABUS	
UNIT:1 Introduction, Atomic Structure, Interatomic Bonding and Structure of Crystalline Solids: Historical perspective of Materials Science. Why study properties of materials? Classification of materials. Advanced Materials, Future materials and modern materials, Atomic structure. Atomic bonding in solids, Crystal structures, Crystalline and non-crystalline materials. Miller indices. Anisotropic elasticity. Elastic behavior of composites. Structure and properties of polymers. Structure and properties of ceramics.	(14 Hours)
UNIT:2 Imperfections in Solids and Mechanical Properties of Metals, Diffusion, Dislocations and Strengthening Mechanisms: Point defects. Theoretical yield point. Line defects and dislocations. Interfacial defects. Bulk or volume defects. Atomic vibrations; Elastic deformation. Plastic deformation. Interpretation of tensile stress-strain curves Yielding under multiaxial stress. Yield criteria and macroscopic aspects of plastic deformation. Property variability and design factors, Diffusion mechanisms. Steady and non-steady state diffusion. Factors that influence diffusion. Non-equilibrium transformation and microstructure, Dislocation and plastic deformation. Mechanisms of strengthening in metals. Recovery, recrystallization and grain growth. Strengthening by second phase particles. Optimum distribution of particles. Lattice resistance to dislocation motion.	(13 Hours)
UNIT:3 Phase Diagrams Equilibrium phase diagrams. Particle strengthening by precipitation. Precipitation reactions. Kinetics of nucleation and growth. The iron-carbon system. Phase transformations. Transformation rate effects and TTT diagrams. Microstructure and property changes in iron-carbon system. Failure: Fracture. Ductile and brittle fracture. Fracture mechanics. Impact fracture. Ductile brittle	(13 Hours)



GIET UNIVERSITY, GUNUPUR, ODISHA
DEPARTMENT OF MECHANICAL ENGINEERING
SCHOOL OF ENGINEERING & TECHNOLOGY

Incorporated by Act 23 of Govt. of Odisha and under approval of UGC & AICTE
 Accredited by NAAC with a CGPA of 3.28/4 at A⁺ Grade
 Seven UG Programs CSE, ME, CHE, AEIE, ECE, BT & EEE Accredited by NBA
 Gunupur - 765022 , Dist.- Rayagada, Odisha, INDIA
www.giet.edu

transition. Fatigue. Crack initiation and propagation. Crack propagation rate. Creep. Generalized creep behavior. Stress and temperature effects
Teaching Methods: Chalk& Board/ PPT/Video Lectures/Lecture by Industry Expert.
Text Books 1. Materials Science and Engineering, William D. Callister, Jr, John Wiley & sons, 07 2. Modern Physical Metallurgy and Material Engineering, Science, Process, application, Smallman R.E., Bishop R J, Butterworth Heinemann, Sixth Ed., 1999.

SUBJECT CODE	TITLE OF THE SUBJECT	L	T	P	C	QP
	MECHANICS OF COMPOSITE MATERIALS	3	1	0	4	
Pre -Requisite:						
Course Outcomes: Upon successful completion of this course, students should be able to:						
CO1	To understand the specifics of mechanical behavior of layered composites compared to isotropic materials.					
CO2	Apply constitutive equations of composite materials and understand mechanical					



GIET UNIVERSITY, GUNUPUR, ODISHA

DEPARTMENT OF MECHANICAL ENGINEERING

SCHOOL OF ENGINEERING & TECHNOLOGY

Incorporated by Act 23 of Govt. of Odisha and under approval of UGC & AICTE

Accredited by NAAC with a CGPA of 3.28/4 at A⁺ Grade

Seven UG Programs CSE, ME, CHE, AEIE, ECE, BT & EEE Accredited by NBA

Gunupur - 765022, Dist.- Rayagada, Odisha, INDIA

www.giet.edu

	behaviour.														
CO3	To determine stresses and strains in composites with apply failure criteria.														
CO4	An ability to use the ideas developed in the analysis of composites towards using composites in aerospace design.														
CO-PO & PSO Mapping															
COs	PROGRAMME OUTCOMES												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	
CO1	2	1												3	
CO2	2	2	1											2	
CO3	1	3	2											2	
CO4	2	1	2											1	
Avg.	1.7 5	1.1 5	1.2 5											2	
SYLLABUS															
<p style="text-align: center;">UNIT:1 (14 Hours)</p> <p>Introduction – Definition & classification of composites; Reinforcing fibers-Types, Characteristics & Selection; Natural fibers, Boron; Carbon; Ceramic; Glass; Arמידs; Particulate fillers; Matrices-Polymer; Graphite; Ceramic & Metal matrices; Fiber surface treatments; Fillers & additives; Fiber content; Short & continuous fiber reinforced composites. Processing – Pultrusion; Filament winding; Pre-page technology; Injection & compression moulding; Bag moulding; Resin transfer moulding; Other manufacturing processes.</p>															
<p style="text-align: center;">UNIT:2 (15 Hours)</p> <p>Processing – Pultrusion; Filament winding; Pre-page technology; Injection & compression moulding; Bag moulding; Resin transfer moulding; Other manufacturing processes. Processing of MMC- Diffusion bonding; Stir casting; Squeeze casting.</p> <p>Mechanics – Rule of mixture; Volume & mass fractions; Density & void content; Stress-strain relations for anisotropic materials; Generalized Hook's law; Stiffnesses, Compliances & engineering constants for orthotropic materials; Stress-strain relations for plane stress in orthotropic materials; Stress-strain relations for a lamina; Characteristics of fiber reinforced lamina.</p>															
<p style="text-align: center;">UNIT:3 (12 Hours)</p> <p>Analysis – Classical lamination theory; Stress analysis of composite laminates; Failure predictions – Maximum stress theory; Maximum strain theory; Tsai-Hill theory; Modes of failure of composites; First ply failure; Partial ply failure; Total ply failure.</p>															
<p>Text Books</p> <ol style="list-style-type: none"> 1. Mechanics of composite materials, R. M. Jones, Mc Graw Hill Book Co. 2. Mechanics of composite materials & structures, M Mukhopadhyay, Universities Press. 3. Fiber-Reinforced composite materials, Manufacturing & Design, P. K. Mallick, Marcel Dekken, Inc. New York & Basel. 															



GIET UNIVERSITY, GUNUPUR, ODISHA

DEPARTMENT OF MECHANICAL ENGINEERING

SCHOOL OF ENGINEERING & TECHNOLOGY

Incorporated by Act 23 of Govt. of Odisha and under approval of UGC & AICTE

Accredited by NAAC with a CGPA of 3.28/4 at A⁺ Grade

Seven UG Programs CSE, ME, CHE, AEIE, ECE, BT & EEE Accredited by NBA

Gunupur - 765022, Dist.- Rayagada, Odisha, INDIA

www.giet.edu

Ref. Books

1. Mechanics of Laminated Composite Plates and Shells – J. N. Reddy. CRC Press.
2. Stress Analysis of Fiber- Reinforced Composite Materials – M. W. Hyer. WCB McGrawHill.

SUBJECT CODE	TITLE OF THE SUBJECT	L	T	P	C	QP
	ANALYSIS AND SYNTHESIS OF MECHANISMS	3	0	0	3	

Pre -Requisite:

Course Outcomes: Upon successful completion of this course, students should be able to:



GIET UNIVERSITY, GUNUPUR, ODISHA

DEPARTMENT OF MECHANICAL ENGINEERING

SCHOOL OF ENGINEERING & TECHNOLOGY

Incorporated by Act 23 of Govt. of Odisha and under approval of UGC & AICTE

Accredited by NAAC with a CGPA of 3.28/4 at A⁺ Grade

Seven UG Programs CSE, ME, CHE, AEIE, ECE, BT & EEE Accredited by NBA

Gunupur - 765022 , Dist.- Rayagada, Odisha, INDIA

www.giet.edu

CO1	Students will have the confidence to analyze Simple and Complex Mechanisms.														
CO2	Students will have the ability to apply kinematic theories to real-world problems of mechanism design and synthesis														
CO3	Dynamic analysis , accuracy analysis and synthesis of cam profiles.														
CO4	Design of gears and gyroscopic elements in the field of mechanical engineering.														
CO-PO & PSO Mapping															
COs	PROGRAMME OUTCOMES												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	
CO1	3	2													
CO2	1	2	1												
CO3	1	2													
CO4	1	2	3												
Avg.	1.5	2	1												
SYLLABUS															
UNIT:1 (13 Hours) Basic concepts of kinematics and mechanisms-type, number and dimensions, kinematic pairs, chains and inversions, accuracy point and error analysis, velocity and acceleration analysis of different complex mechanism(I, II & III), gross motion in the 4-bar mechanisms.															
UNIT:2 (15 Hours) static and dynamic force analysis of mechanisms; Synthesis of coordinated positions, synthesis of mechanism to trace a curve or path generation, synthesis for function generation; Dimensional synthesis, method of approach and optimization of a solution; Equivalent and conjugate linkages, four bar chains, copular curves, Robert's Law chebycheve's polynomials, path curvature Euler -Savary equation, Polode curvature. ; Planer and spatial problems, graphical and analytical methods, finite displacements, analytical design of 4-bar mechanisms for coordinated motion.															
UNIT:3 (14 Hours) Cams: synthesis of cam profiles, advanced cam curves, dynamic analysis, accuracy analysis and design of cams; Gears andgyroscopes: Elements of different secondary space curves, conjugate action, general mechanism, non circular sensors , dynamics of gears, Gyro-dynamics, gyroscopic actions in machines.															
Teaching Methods: Chalk& Board/ PPT/Video Lectures/Lecture by Industry Expert.															
Text Books															
1. R.S. Hartenberg and J. Denavit, "Kinematic Synthesis of Linkages", McGraw-Hill, New York.2010															
2. Robert L. Norton ,"Design of Machinery', Tata McGraw Hill Edition 2011															
3. A. Ghosh & A.K. Mallik, Theory of Mechanism And Machines, Affiliated East-West Press: 2010															
Ref. Books															
1. Hamilton H. Mabie, "Mechanisms and Dynamics of Machinery", John Wiley and sons															



GIET UNIVERSITY, GUNUPUR, ODISHA

DEPARTMENT OF MECHANICAL ENGINEERING

SCHOOL OF ENGINEERING & TECHNOLOGY

Incorporated by Act 23 of Govt. of Odisha and under approval of UGC & AICTE

Accredited by NAAC with a CGPA of 3.28/4 at A⁺ Grade

Seven UG Programs CSE, ME, CHE, AEIE, ECE, BT & EEE Accredited by NBA

Gunupur - 765022 , Dist.- Rayagada, Odisha, INDIA

www.giet.edu

New York, 2009

2. S. B. Tuttle, "Mechanisms for Engineering Design" John Wiley and sons New York 2010

3. A. Ghosh and A.K. Mallik, "Theory of Machines and Mechanisms", Affiliated East-West Press, New Delhi, 2016.

4. A.G. Erdman and G.N. Sandor, "Mechanism Design – Analysis and Synthesis", (Vol. 1 and 2), Prentice Hall India, 2001.

5. A.S. Hall, "Kinematics and Linkage Design", Prentice Hall of India..2009



GIET UNIVERSITY, GUNUPUR, ODISHA

DEPARTMENT OF MECHANICAL ENGINEERING

SCHOOL OF ENGINEERING & TECHNOLOGY

Incorporated by Act 23 of Govt. of Odisha and under approval of UGC & AICTE

Accredited by NAAC with a CGPA of 3.28/4 at A⁺ Grade

Seven UG Programs CSE, ME, CHE, AEIE, ECE, BT & EEE Accredited by NBA

Gunupur - 765022 , Dist.- Rayagada, Odisha, INDIA

www.giet.edu

SUBJECT CODE	TITLE OF THE SUBJECT	L	T	P	C	QP
	FATIGUE, CREEP & FRACTURE	3	0	0	3	

Pre -Requisite:

Course Outcomes: Upon successful completion of this course, students should be able to:

CO1	Be familiar with the fatigue development and Influence of stress concentration under fatigue strength.
CO2	Understand and able to analyze Mechanism of creep and it effects in design components.
CO3	Interface various modes of fracture under different Theories.
CO4	Ability to conduct an experimental analysis on different materials subjected to creep, fatigue and fracture mechanisms.

CO-PO & PSO Mapping

COs	PROGRAMME OUTCOMES												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3	3												
CO2	3	3												
CO3	2	2												
CO4	2	2												
Avg.	2.5	2.5												

SYLLABUS

UNIT:1 (12 Hours)

Fatigue: Types of fatigue loading and failure, Fatigue test, endurance limit; Fatigue under combine stresses; Influence of stress concentration on fatigue strength, Notch sensitivity, Factors influencing fatigue behaviour.

UNIT:2 (12 Hours)

Creep: Creep-stress-time temperature relations, Mechanics of creep in tension, bending, torsion, creep buckling. Members subjected to creep and combined stresses.

UNIT:3 (12 Hours)

Fracture: Basic modes of fracture, Griffith of brittle fracture, Irwin's theory of fracture inelastic-plastic materials. Theories of linear elastic fracture mechanics, stress intensity factors, fracture toughness testing.

Teaching Methods: Chalk& Board/ PPT/Video Lectures/Lecture by Industry Expert.

Text Books

1. Strength and Resistance of Metals - J. M. Lessels, John Wiley and Sons, Inc..2008
2. Mechanical Behaviour of Engineering Materials - Joseph Marin, PHI.2010



GIET UNIVERSITY, GUNUPUR, ODISHA
DEPARTMENT OF MECHANICAL ENGINEERING
SCHOOL OF ENGINEERING & TECHNOLOGY

Incorporated by Act 23 of Govt. of Odisha and under approval of UGC & AICTE
Accredited by NAAC with a CGPA of 3.28/4 at A⁺ Grade
Seven UG Programs CSE, ME, CHE, AEIE, ECE, BT & EEE Accredited by NBA
Gunupur - 765022 , Dist.- Rayagada, Odisha, INDIA
www.giet.edu

3. Fatigue Testing and Analysis - Y. Lee, J.Pam, R.B. Hathaway & M.E. Barkey Elsevier Press, 2009

4. Engineering Fracture Mechanics - S. A. Meguid, Elsevier Press, 2004.

Ref. Books

1. Mechanical Metallurgy - G. E. Dieter, Mc-Graw Hill Book Co., 2017.

2. Mechanical Behaviour of Materials - N. E. Dowling, PHI, 2018.

3. Introduction to Fracture Mechanics - Kare Hellan, Mc-Graw Hill Book Co., 2005.

4. The Practical Use of Fracture Mechanics - David Broek, MN Publishers, 2015.



GIET UNIVERSITY, GUNUPUR, ODISHA

DEPARTMENT OF MECHANICAL ENGINEERING

SCHOOL OF ENGINEERING & TECHNOLOGY

Incorporated by Act 23 of Govt. of Odisha and under approval of UGC & AICTE

Accredited by NAAC with a CGPA of 3.28/4 at A⁺ Grade

Seven UG Programs CSE, ME, CHE, AEIE, ECE, BT & EEE Accredited by NBA

Gunupur - 765022 , Dist.- Rayagada, Odisha, INDIA

www.giet.edu

SUBJECT CODE	TITLE OF THE SUBJECT	L	T	P	C	QP								
	MATHEMATICAL METHODS IN ENGINEERING	3	0	0	3									
Pre -Requisite:														
Course Outcomes: Upon successful completion of this course, students should be able to:														
CO1	Solve an algebraic or transcendental equation using an appropriate numerical method													
CO2	Solve a differential equation using an appropriate numerical method													
CO3	Perform an error analysis for a given numerical method													
CO4	Calculate a definite integral using an appropriate numerical method													
CO-PO & PSO Mapping														
COs	PROGRAMME OUTCOMES												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	2	1										1		
CO2	3	2										1		
CO3	3	2										1		
CO4	3	3												
Avg.	2.7 5	2										0.7 5		
SYLLABUS														
UNIT:1 (12 Hours) Transcendental and Polynomial equations: Initial approximations, First Degree Equation, Iteration Methods Based on Second Degree equation, Multipoint iteration method, Rate of Convergence, Efficiency of a method. System of Linear Algebraic Equations: Effects of Round-off Error, Operations Counts, Standard Methods of Solutions, Convergence analysis Eigen values and Eigenvectors Interpolation: Lagrange Polynomial Interpolation, Cubic Spline Interpolation.														
UNIT:2 (12 Hours) Numerical Differentiation - Finite Differences: Construction of Difference Formulae. Accuracy of Finite Differences, Pade Approximations, Non-Uniform Grids. Numerical Integration: Trapezoidal and Simpson's Rules, Error Analysis, Integration and Extrapolation, Quadrature. Numerical Solution Of Ordinary Differential Equations: Initial Value Problems, Numerical Stability, Stability Analysis, Implicit, Runge-Kutta Methods, Multi-Step Methods, System Of First-Order Ordinary Differential Equations, Boundary Value Problems.														
UNIT:3 (12 Hours)														



GIET UNIVERSITY, GUNUPUR, ODISHA

DEPARTMENT OF MECHANICAL ENGINEERING

SCHOOL OF ENGINEERING & TECHNOLOGY

Incorporated by Act 23 of Govt. of Odisha and under approval of UGC & AICTE

Accredited by NAAC with a CGPA of 3.28/4 at A⁺ Grade

Seven UG Programs CSE, ME, CHE, AEIE, ECE, BT & EEE Accredited by NBA

Gunupur - 765022 , Dist.- Rayagada, Odisha, INDIA

www.giet.edu

Numerical Solution of Partial Differential Equations: Semi-Discretization, von Neumann Stability Analysis, Modified Wave number Analysis, Implicit Time Advancement, Accuracy, Implicit Methods in Higher Dimensions, Approximate Factorization, Stability of the Factored Scheme, Alternating Direction Implicit Methods, Mixed and Fractional Step Methods, Elliptic Partial Differential Equations

Discrete Transform Methods: Discrete Fourier series, Applications, Finite Differenced Elliptic Equations, Fourier Spectral Numerical Differentiation, Discrete Transform and Applications, Numerical Differentiation.

Teaching Methods: Chalk& Board/ PPT/Video Lectures/Lecture by Industry Expert.

Text Books

1. Numerical Methods for scientific & Engg Computation- M. K. Jain, S. R. K. Iyengar & Jain.2010
2. Numerical Methods for Engineers – S. C. Chapra and R. P. Canale. Mc GrawHill.2009

Ref. Books

1. Numerical Methods – S. S. Rao.2009
2. Numerical Methods in Science & Engg: A Practical Approach – S. Rajashekharan. Wheeler Pub.2008
3. Numerical Recipes – W. H. Press, S. A. Teukolosky, W. T. Vetterling and B. P. Flannery Cambridge University Press.2008



GIET UNIVERSITY, GUNUPUR, ODISHA

DEPARTMENT OF MECHANICAL ENGINEERING

SCHOOL OF ENGINEERING & TECHNOLOGY

Incorporated by Act 23 of Govt. of Odisha and under approval of UGC & AICTE

Accredited by NAAC with a CGPA of 3.28/4 at A⁺ Grade

Seven UG Programs CSE, ME, CHE, AEIE, ECE, BT & EEE Accredited by NBA

Gunupur - 765022 , Dist.- Rayagada, Odisha, INDIA

www.giet.edu

SUBJECT CODE	TITLE OF THE SUBJECT	L	T	P	C	QP								
	DESIGN FOR MANUFACTURING AND ASSEMBLY	3	0	0	3									
Pre -Requisite:														
Course Outcomes: Upon successful completion of this course, students should be able to:														
CO1	Know the manufacturing issues that must be considered in the mechanical engineering design process													
CO2	Understand the product development cycle and Know the principles of assembly to minimize the assembly time.													
CO3	Know the effect of manufacturing process and assembly operations on the cost of product (not included by others)													
CO4	Be familiar with tools and methods to facilitate development of manufactural mechanical designs													
CO-PO & PSO Mapping														
COs	PROGRAMME OUTCOMES												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3	1												
CO2	3	2												
CO3	3	2												
CO4	3	1												
Avg.	3.0	1.5												
SYLLABUS														
UNIT:1 (14 Hours) Introduction Need Identification and Problem Definition, Concept Generation and Evaluation, Embodiment Design, Selection of Materials and Shapes. Properties of Engineering Materials, Selection of Materials – I, Selection of Materials – II, Case Studies – I,														



GIET UNIVERSITY, GUNUPUR, ODISHA

DEPARTMENT OF MECHANICAL ENGINEERING

SCHOOL OF ENGINEERING & TECHNOLOGY

Incorporated by Act 23 of Govt. of Odisha and under approval of UGC & AICTE

Accredited by NAAC with a CGPA of 3.28/4 at A⁺ Grade

Seven UG Programs CSE, ME, CHE, AEIE, ECE, BT & EEE Accredited by NBA

Gunupur - 765022 , Dist.- Rayagada, Odisha, INDIA

www.giet.edu

Selection of Shapes, Co-selection of Materials and Shapes, Case Studies – II.	
UNIT:2	(13 Hours)
Selection of Manufacturing Processes, Review of Manufacturing Processes, Design for Casting, Design for Bulk Deformation Processes, Design for Sheet Metal Forming Processes, Design for Machining, Design for Powder Metallurgy, Design for Polymer Processing, Co -selection of Materials and Processes, Case-Studies – III	
UNIT:3	(13 Hours)
Design for Assembly, Review of Assembly Processes, Design for Welding – I, Design for Welding – II, Design for Brazing and Soldering, Design for Adhesive Bonding, Design for Joining of Polymers, Design for Heat Treatment, Case-Studies – IV.	
Teaching Methods: Chalk& Board/ PPT/Video Lectures/Lecture by Industry Expert.	
Text Books	
1. Timoshenko, S. and Goodier J.N. Theory of Elasticity, McGraw Hill Book Co., Newyork, 2010.	
2. J. Chakrabarty, Theory of Plasticity, McGraw-Hill Book Company, New York 2006.	
References:	
1. M F Ashby, Material Selection in Mechanical Design, Butterworth-Heinemann, 2011.	
2. T H Courtney, Mechanical Behavior of Materials, McGraw Hill, NY, 2005.	
3. K G Swift and J D Booker, Process selection: from design to manufacture, London: Arnold, 2002.	
4. S S Rao, Engineering Optimization: theory and practice, John Wiley, NY, 2009.	
5. G Boothroyd, P Dewhurst and W Knight, Product design for manufacture and assembly, John Wiley, NY: Marcel Dekkar, 2011.	



GIET UNIVERSITY, GUNUPUR, ODISHA

DEPARTMENT OF MECHANICAL ENGINEERING

SCHOOL OF ENGINEERING & TECHNOLOGY

Incorporated by Act 23 of Govt. of Odisha and under approval of UGC & AICTE

Accredited by NAAC with a CGPA of 3.28/4 at A⁺ Grade

Seven UG Programs CSE, ME, CHE, AEIE, ECE, BT & EEE Accredited by NBA

Gunupur - 765022 , Dist.- Rayagada, Odisha, INDIA

www.giet.edu

SUBJECT CODE	TITLE OF THE SUBJECT	L	T	P	C	QP								
	ADVANCED MACHINE DESIGN	3	0	0	3									
Pre -Requisite:														
Course Outcomes: Upon successful completion of this course, students should be able to:														
CO1	Understand the customers' need to design keys, cotters, couplings using theories of failures including springs.													
CO2	Analyze and design automobile components behavior subjected to loads and identify the failure criteria.													
CO3	Acquaintance with different types of gear drive designs.													
CO4	Ability to justify a design project in a formal report and develop design drawings.													
CO-PO & PSO Mapping														
COs	PROGRAMME OUTCOMES												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3	2												
CO2	3	3												
CO3	3	1												
CO4	3	2												
Avg.	3	2												
SYLLABUS														
UNIT:1 (14 Hours)														
Design of Keys, Shaft and Couplings: Classification of keys and pins, Design of keys and pins, Theories of failure, Design of shafts: based on strength, torsional rigidity and														



GIET UNIVERSITY, GUNUPUR, ODISHA
DEPARTMENT OF MECHANICAL ENGINEERING
SCHOOL OF ENGINEERING & TECHNOLOGY
Incorporated by Act 23 of Govt. of Odisha and under approval of UGC & AICTE
Accredited by NAAC with a CGPA of 3.28/4 at A⁺ Grade
Seven UG Programs CSE, ME, CHE, AEIE, ECE, BT & EEE Accredited by NBA
Gunupur - 765022 , Dist.- Rayagada, Odisha, INDIA
www.giet.edu

fluctuating load, ASME code for shaft design. Design of Coupling: Types of shaft coupling, design of flange coupling, flexible bush coupling. Design of Mechanical Springs: Types of helical springs, Design of Helical springs, bulking of spring, spring surge, end condition of springs, Design of leaf springs: nipping.	
UNIT:2	(14 Hours)
Design of Flywheel: Functions, Coefficient of fluctuation of energy and Coefficient of fluctuation of speed, energy storage in flywheel, stresses in flywheel, design of flywheel. Design of clutch: Friction clutch, Cone clutch and Centrifugal clutch, Design of Brake: Block & Band brake, Internal expanding shoe brake. Design of Gears: Review of kinematics of gears & terminology, interference, tooth profiles, formative number of teeth etc. Design of Spur Gear drive, Helical Gear drive.	
UNIT:3	(12 Hours)
Design of Bevel Gear Drive: Types of bevel gear, proportions of bevel gear, force analysis of bevel gear drive, design of bevel gear drive. Design of Worm Gear Drive: Worm Gearing—AGMA Equation; Worm-Gear force analysis Designing a Worm-Gear Mesh; Buckingham Wear Load.	
Teaching Methods: Chalk& Board/ PPT/Video Lectures/Lecture by Industry Expert.	
Text Books	
1. Machine Design, Maleev & Hartman, CBS publishers. 2009 2. Machine Design, P.H. Black, TMH.2010 3. Mechanical Engg. Design, Shigley, TMH.2010	
Ref. Books	
1. Hand book of Machine Design, Shigley & Mischke, McGraw Hill. 2. Mechanical Engineering Hand book Vol 1 & 2, Kent, John Willey & Sons. 3. Machine Tool Design Data Book, CMTI.	
DESIGN DATA HAND BOOKS	
1. Design Hand Book by S.M.Jalaluddin ; Anuradha Agencies Publications 2. P.S.G.Design Data Hand Book, PSG College of Tech Coimbatore 3. Machine Design Data Book, K.Lingaih, Tata Mcgraw Hill	



GIET UNIVERSITY, GUNUPUR, ODISHA

DEPARTMENT OF MECHANICAL ENGINEERING

SCHOOL OF ENGINEERING & TECHNOLOGY

Incorporated by Act 23 of Govt. of Odisha and under approval of UGC & AICTE

Accredited by NAAC with a CGPA of 3.28/4 at A⁺ Grade

Seven UG Programs CSE, ME, CHE, AEIE, ECE, BT & EEE Accredited by NBA

Gunupur - 765022 , Dist.- Rayagada, Odisha, INDIA

www.giet.edu

SUBJECT CODE	TITLE OF THE SUBJECT	L	T	P	C	QP								
	ADVANCED MECHANICS OF SOLIDS	3	0	0	3									
Pre -Requisite: Knowledge about elasticity, stress and strain														
Course Outcomes: Upon successful completion of this course, students should be able to:														
CO1	Apply principles of elasticity theory to determine stresses and strains													
CO2	Apply theory of elasticity and formulate plane stress and plane strain problems													
CO3	To solve for stresses and deflection of beams under unsymmetrical bending and to locate shear Centre of thin wall beams.													
CO4	To analyze solid mechanics problem using classical methods and energy methods.													
CO-PO & PSO Mapping														
COs	PROGRAMME OUTCOMES												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3	3												
CO2	3	2												
CO3	3	2												
CO4	2	2												
Avg.	2.7 5	2.2 5												
SYLLABUS														



GIET UNIVERSITY, GUNUPUR, ODISHA
DEPARTMENT OF MECHANICAL ENGINEERING
SCHOOL OF ENGINEERING & TECHNOLOGY
Incorporated by Act 23 of Govt. of Odisha and under approval of UGC & AICTE
Accredited by NAAC with a CGPA of 3.28/4 at A⁺ Grade
Seven UG Programs CSE, ME, CHE, AEIE, ECE, BT & EEE Accredited by NBA
Gunupur - 765022 , Dist.- Rayagada, Odisha, INDIA
www.giet.edu

UNIT:1	(14 Hours)
Shear center and unsymmetrical bending. Beam columns; Beams on elastic foundations; curved beams, rotating discs and thick cylinders. Virtual work; Minimum potential energy; Hamilton's Principle. Plate theory: Formulation by Hamilton's principle: Bending and buckling of homogenous and Sandwich Plates.	
UNIT:2	(14 Hours)
Shell theory: Introduction to theory of surface; Formulation by Hamilton's Principle; membrane, bending and buckling analysis of shells of revolution. Stress-strain relations for linearly elastic solids, Generalized Hooke's law. Analysis of three dimensional stresses and strains. Tensor character of stress. Strain-displacement relations, equilibrium equations, compatibility conditions and Airy's stress function.	
UNIT:3	(14 Hours)
Plane stress and plane strain, simple problems in Cartesian and polar co-ordinates. Solution of axisymmetric problems, Bending of beams and plates, Kirchhoff and Mindlin concept. Torsion problem with St.Venant's approach-Prandtl's approach - Torsion of thin walled open and closed sections & thermal stress..	
Teaching Methods: Chalk& Board/ PPT/Video Lectures/Lecture by Industry Expert.	
Text Books	
1. Advanced Mechanics of Materials - F. B. Seely and J. O. Smith. John Wiley and Sons Inc, 6 th edition, 2003.	
2. Advanced Mechanics of Materials, 5 th edition A. P. Boresi and O. M. Sidebottom. John Wiley and Sons, 1993.	
3. Advanced Mechanics of Solids - L. S. Srinath. Tata Mc-Graw Hill Co., 2005	
Ref. Books	
1. Elementary Mechanics of Solids - P.N. Singh and P.K. Jha. New Age International, 2002.	
2. Mechanics of Solids (Vol. 1 & 2) - R. Baidyanathan, P.Perumal and S. Lingeswari. Scitch Publications.	
3. Timoshenko, S. and Goodier J.N. Theory of Elasticity, McGraw Hill Book Co., Newyork, 2012.	
4. J. Chakrabarty, Theory of Plasticity, McGraw-Hill Book Company, New York 2006.	
5. Irving H.Shames and James,M.Pitarresi, Introduction to Solid Mechanics,Prentice Hall of India Pvt. Ltd., New Delhi -2002.	
6.E.P. Popov, Engineering Mechanics of Solids, 2nd Ed., Prentice Hall India, 2015.	
7. W.F.Chen and D.J.Han., Plasticity for structural Engineers., Springer-Verlag., NY., 2001.	



GIET UNIVERSITY, GUNUPUR, ODISHA
DEPARTMENT OF MECHANICAL ENGINEERING
SCHOOL OF ENGINEERING & TECHNOLOGY

Incorporated by Act 23 of Govt. of Odisha and under approval of UGC & AICTE
 Accredited by NAAC with a CGPA of 3.28/4 at A⁺ Grade
 Seven UG Programs CSE, ME, CHE, AEIE, ECE, BT & EEE Accredited by NBA
 Gunupur - 765022 , Dist.- Rayagada, Odisha, INDIA
www.giet.edu

TITLE OF THE Subject															
SUBJECT CODE		ENGINEERING SOFTWARE LAB										L	T	P	C
														8	4
Pre-requisite: Knowledge about Numerical Method															
Course Outcome: Upon successful completion of this course, students should be able to:															
CO1		Determine optimum solution for numerical methods by using MAT LAB programme													
CO2		Develop 2D and 3D models for different mechanical components by modeling programmes													
CO3		Analyze different CFD analysis for various engineering problems													
CO4		Analyze different finite element methods for various engineering problems													
CO-PO & PSO Mapping															
COs		PROGRAMME OUTCOMES										PSOs			
		1	2	3	4	5	6	7	8	9	10	11	12	1	2



GIET UNIVERSITY, GUNUPUR, ODISHA

DEPARTMENT OF MECHANICAL ENGINEERING

SCHOOL OF ENGINEERING & TECHNOLOGY

Incorporated by Act 23 of Govt. of Odisha and under approval of UGC & AICTE

Accredited by NAAC with a CGPA of 3.28/4 at A⁺ Grade

Seven UG Programs CSE, ME, CHE, AEIE, ECE, BT & EEE Accredited by NBA

Gunupur - 765022 , Dist.- Rayagada, Odisha, INDIA

www.giet.edu

CO1		1		2	1								
CO2				1	2					2			
CO3				1	2								
CO4					2					2			
Avg.		.25		1	1.75					1			

SYLLABUS:

MINIMUM TWO FROM GROUP A, B AND C)

(A) NUMERICAL COMPUTATION.

(Using MATLAB or other software/language)

1. Basics of MATLAB or similar software/language
2. Finding solution by Numerical Methods (including graphics) for the following: a. Bisection Method
- b. Newton-Raphson Method
- c. Secant Method
- d. Gauss Elimination Method
- e. Initial-Value Problems (e.g. Runge-Kutta Method)
- f. Boundary Value Problem (eg. Shooting Method)
- g. Eigen Value Problem

(B) SOLIDS MODELING

(Using Solid Modelling software eg. AUTOCAD/ProE/CATIA/SolidWorks/ UNIGRAPHICS etc.)

1. Learning the Basics of Solid Modelling Software
2. Modelling in 2D and image scanning.
3. Modelling in 3D of machine tool parts like gear details, machine tool beds, Tailstocks and assembly drawings of machine tools like lathe machine components, power drives, jigs & fixtures, power presses etc. Use of various types of surfaces in 3D modelling, animation features and other editing entities in machine tool assemblies.

(C) ANALYSIS ON FINITE ELEMENT METHODS OR COMPUTATIONAL FLUID DYNAMICS PROBLEMS

(Using any software/language ANSYS, NASTRAN, CFD etc.)

1. Learning the Basics of ANALYSIS SOFWARES.
2. Analyze different FEM Techniques by using ANSYS.
3. Analyze different CFD problems.



GIET UNIVERSITY, GUNUPUR, ODISHA

DEPARTMENT OF MECHANICAL ENGINEERING

SCHOOL OF ENGINEERING & TECHNOLOGY

Incorporated by Act 23 of Govt. of Odisha and under approval of UGC & AICTE

Accredited by NAAC with a CGPA of 3.28/4 at A⁺ Grade

Seven UG Programs CSE, ME, CHE, AEIE, ECE, BT & EEE Accredited by NBA

Gunupur - 765022 , Dist.- Rayagada, Odisha, INDIA

www.giet.edu

II SEMESTER [FIRST YEAR]

Sl. No.	Course Category	Course Code	Course Title	L	T	P	Credits
THEORY							
1	PC		Finite Element Method	3	0	0	3
2	PC		Applied Elasticity and Plasticity	3	0	0	3
3	PE		Tribology in Design	3	0	0	3
			Robotics				
			Advanced Mechanisms of Machines				
			Computer Aided Design				
4	PE		Dynamics of Rotors	3	0	0	3
			Instrumentation and Automatic Control Systems				



GIET UNIVERSITY, GUNUPUR, ODISHA

DEPARTMENT OF MECHANICAL ENGINEERING

SCHOOL OF ENGINEERING & TECHNOLOGY

Incorporated by Act 23 of Govt. of Odisha and under approval of UGC & AICTE

Accredited by NAAC with a CGPA of 3.28/4 at A⁺ Grade

Seven UG Programs CSE, ME, CHE, AEIE, ECE, BT & EEE Accredited by NBA

Gunupur - 765022 , Dist.- Rayagada, Odisha, INDIA

www.giet.edu

			Optimization Techniques in Design				
			Analysis and Design Of Pressure Vessels And Piping				
PRACTICAL / SESSIONAL							
5	ES		Advanced Design Engineering Lab	0	0	8	4
6	CORE		Mini-Project	0	0	4	2
7	AUDIT		Audit -2	2	0	0	0
TOTAL				14	0	12	18

SUBJECT CODE	TITLE OF THE SUBJECT	L	T	P	C	QP								
	FINITE ELEMENT METHOD	3	0	0	3									
Pre -Requisite:														
Course Outcomes: Upon successful completion of this course, students should be able to:														
CO1	Identify the application and characteristics of FEA elements such as bars, beams, plane and isoparametric elements, and 3-D element													
CO2	Develop element characteristic equation procedure and generation of global stiffness equation will be applied.													
CO3	Able to apply Suitable boundary conditions to a global structural equation, and reduce it to a solvable form.													
CO4	Able to identify how the finite element method expands beyond the structural domain, for problems involving dynamics, heat transfer, and fluid flow.													
CO-PO & PSO Mapping														
COs	PROGRAMME OUTCOMES												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3	1												



GIET UNIVERSITY, GUNUPUR, ODISHA

DEPARTMENT OF MECHANICAL ENGINEERING

SCHOOL OF ENGINEERING & TECHNOLOGY

Incorporated by Act 23 of Govt. of Odisha and under approval of UGC & AICTE

Accredited by NAAC with a CGPA of 3.28/4 at A⁺ Grade

Seven UG Programs CSE, ME, CHE, AEIE, ECE, BT & EEE Accredited by NBA

Gunupur - 765022 , Dist.- Rayagada, Odisha, INDIA

www.giet.edu

CO2	2	2											
CO3	3	3											
CO4	2	2											
Avg.	2.5	2											

SYLLABUS

UNIT:1 (15 Hours)

1. Introduction: Role of the Computer, General Steps of the Finite Element Method, Applications of the Finite Element Method, Advantages of the Finite Element Method.
2. Introduction to the Stiffness (Displacement) Method: Definition of the Stiffness Matrix, Derivation of the Stiffness Matrix for a Spring Element, Example of a Spring Assemblage, Assembling the Total Stiffness Matrix by Superposition (Direct Stiffness Method), Boundary Conditions, Potential Energy Approach to Derive Spring Element Equations.
3. Development of Truss Equations: Derivation of the Stiffness Matrix for a Bar Element in Local Coordinates, Selecting Approximation Functions for Displacements, Transformation of Vectors in Two Dimensions, Global Stiffness Matrix, Computation of Stress for a Bar in the x-y Plane, Solution of a Plane Truss.
4. Energy Approach to Derive Bar Element Equations: Potential Energy Approach to Derive Bar Element Equations, Comparison of Finite Element Solution to Exact Solution for Bar, Galerkin's Residual Method and Its Use to Derive the One-Dimensional Bar Element Equations, Other Residual Methods and Their Application to a One-Dimensional.

UNIT:2 (15 Hours)

5. Development of Beam Equations: Derivation of the Beam Stiffness matrices, Distributed Loading, Potential Energy Approach to Derive Beam Element Equations, Galerkin's Method for Deriving Beam Element Equations.
6. Development of the Plane Stress and Plane Strain Stiffness Equations: Basic Concepts of Plane Stress and Plane Strain, Derivation of the Constant-Strain Triangular Element Stiffness Matrix and Equations, Treatment of Body and Surface Forces.
7. Development of the Linear-Strain Triangle Equations: Derivation of the Linear-Strain Triangular Element Stiffness Matrix and Equations.
8. Axisymmetric Elements: Derivation of the Stiffness Matrix, Solution of an Axisymmetric Pressure Vessel, Applications of Axisymmetric Elements.

UNIT:3 (12 Hours)

9. Isoparametric Formulation: Isoparametric Formulation of the Bar Element Stiffness Matrix, Rectangular Plane Stress Element, Gaussian and Newton-Cotes Quadrature (Numerical Integration), Evaluation of the Stiffness Matrix and Stress Matrix by Gaussian Quadrature.
10. Three-Dimensional Stress Analysis: Three-Dimensional Stress and Strain, Tetrahedral Element.
11. Plate Bending Element: Basic Concepts of Plate Bending, Derivation of a Plate Bending Element Stiffness Matrix and Equations.



GIET UNIVERSITY, GUNUPUR, ODISHA

DEPARTMENT OF MECHANICAL ENGINEERING

SCHOOL OF ENGINEERING & TECHNOLOGY

Incorporated by Act 23 of Govt. of Odisha and under approval of UGC & AICTE

Accredited by NAAC with a CGPA of 3.28/4 at A⁺ Grade

Seven UG Programs CSE, ME, CHE, AEIE, ECE, BT & EEE Accredited by NBA

Gunupur - 765022 , Dist.- Rayagada, Odisha, INDIA

www.giet.edu

Teaching Methods: Chalk& Board/ PPT/Video Lectures/Lecture by Industry Expert.
Text Books 1. Finite Element Method: Its Basis and Fundamentals. O. C. Zienkiewicz, R. L. Taylor and J. Z. Zhu. Elseiver, 2005. 2. Finite Element Methods – J. N. Reddy. Tata Mc GrawHill. 3. Introduction to the Finite Element Method – C. S. Desai and J. F. Abel. East West Pvt. Ltd., 2013.
Ref. Books 1. Concepts & Applications of finite Element Analysis–R. D. Cook, John Wiley & Sons. 2. The Finite Element Method in Engineering –S.S.Rao.Butterworth-Heinemann, 2010. 3. Finite Element Analysis – H. V. Lakshminarayan, University Press. 4. Finite Element Methods vs. Classical Methods–H.S.Govind Rao,New Age Pub.,2007. 5. Finite Element Analysis – T. Chandrupatla, University Press. 6. Energy & Finite Element Methods in structural Mechanics–Irving H. Shames & Clive Dym, New Age Publications, 2006.

SUBJECT CODE	TITLE OF THE SUBJECT	L	T	P	C	QP
	APPLIED ELASTICITY AND PLASTICITY	3	0	0	3	
Pre -Requisite:						
Course Outcomes: Upon successful completion of this course, students should be able to:						
CO1	Explain the concept of elasticity, and the difference between stress and strain					
CO2	Explain the terms: isotropic, orthotropic and anisotropic, as applied to materials					
CO3	Conduct the transformation of plane stress or plane strain components using Mohr's circle, the method of eigenvalues and eigenvectors, the method of quadratic form of ellipsoids, and the method of stress or strain trajectories					
CO4	Use the concepts of principal stress and principal strains					
CO-PO & PSO Mapping						
COs	PROGRAMME OUTCOMES					PSOs



GIET UNIVERSITY, GUNUPUR, ODISHA

DEPARTMENT OF MECHANICAL ENGINEERING

SCHOOL OF ENGINEERING & TECHNOLOGY

Incorporated by Act 23 of Govt. of Odisha and under approval of UGC & AICTE

Accredited by NAAC with a CGPA of 3.28/4 at A⁺ Grade

Seven UG Programs CSE, ME, CHE, AEIE, ECE, BT & EEE Accredited by NBA

Gunupur - 765022, Dist.- Rayagada, Odisha, INDIA

www.giet.edu

	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3	2												
CO2	3	3												
CO3	2	2												
CO4	3	3												
Avg.	2.75	2.5												

SYLLABUS

UNIT:1 (14 Hours)

Stress-strain relations for linearly elastic solids, Generalized Hooke's law. Analysis of three-dimensional stresses and strains. Tensor character of stress. Strain-displacement relations, equilibrium equations, compatibility conditions and Airy's stress function, Plane stress and plane strain, simple problems in cartesian and polar co-ordinates,

UNIT:2 (13 Hours)

Solution of axisymmetric problems, Bending of beams and plates, Kirkhhof and Mindlin concept. Torsion problem with St.Venant's approach-Prandtl's approach - Torsion of thin walled open and closed sections & thermal stress.

UNIT:3 (13 Hours)

Theoretical concepts of plasticity, Yield criteria - Tresca and Von Mises criterion of yielding, Plastic stress strain relationship, Elastic plastic problems in bending and torsion.

Teaching Methods: Chalk& Board/ PPT/Video Lectures/Lecture by Industry Expert.

Text Books

1. M F Ashby and K Johnson, Materials and Design - the art and science of material selection in product design, Butterworth-Heinemann, 03.
2. G Dieter, Engineering Design - a materials and processing approach, McGraw Hill, NY,

SUBJECT CODE	TITLE OF THE SUBJECT	L	T	P	C	QP
	TRIBOLOGY IN DESIGN	3	0	0	3	

Pre -Requisite:

Course Outcomes: Upon successful completion of this course, students should be able to:

CO1	Understand the fundamental science, technology and application of interacting lubricated surfaces in relative motion.
CO2	Learn how to use the latest analysis techniques to model lubrication problems in tribology.
CO3	Analyze mathematical approach of hydrodynamic and hydrostatic lubrication.
CO4	Describe the concept of idealized journal bearing and slider bearing under



GIET UNIVERSITY, GUNUPUR, ODISHA

DEPARTMENT OF MECHANICAL ENGINEERING

SCHOOL OF ENGINEERING & TECHNOLOGY

Incorporated by Act 23 of Govt. of Odisha and under approval of UGC & AICTE

Accredited by NAAC with a CGPA of 3.28/4 at A⁺ Grade

Seven UG Programs CSE, ME, CHE, AEIE, ECE, BT & EEE Accredited by NBA

Gunupur - 765022 , Dist.- Rayagada, Odisha, INDIA

www.giet.edu

	different load carrying conditions.													
CO-PO & PSO Mapping														
COs	PROGRAMME OUTCOMES												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3	3												
CO2	2	3												
CO3	1	2												
CO4	2	2												
Avg.	2	2.5												
SYLLABUS														
UNIT:1 (14 Hours) FRICION and WEAR: Friction - Laws of friction - Friction classification - Causes of friction, Theories of Dry Friction, Friction Measurement, Stick-Slip Motion and Friction Instabilities, Wear - Wear classification - Wear between solids - Wear between solid and liquid - Factors affecting wear - Measurement of wear, Theories of Wear, Approaches to Friction Control and Wear Prevention, Boundary Lubrication, Bearing Materials and Bearing Construction. Selection of rolling element bearings: Nominal life, static and dynamic capacity - Equivalent load, probabilities of survival - cubic mean load - bearing mounting details, pre loading of bearings, conditioning monitoring using shock pulse method.														
UNIT:2 (14 Hours) Hydrodynamic bearings: Fundamentals of fluid formation – Reynold's equation; Hydrodynamic journal bearings – Sommerfield number - performance parameters – optimum bearing with maximum load capacity – Friction – Heat generated and Heat dissipated. Hydrodynamic thrust bearings; Raimondi and Boyd solution for hydrodynamic thrust bearings - fixed tilting pads, single and multiple pad bearings - optimum condition with largest minimum film thickness. Hydrostatic Bearings: Thrust bearings – pad coefficients - restriction - optimum film thickness - journal bearings – design procedure – Aerostatic bearings; Thrust bearings and Journal bearings – design procedure.														
UNIT:3 (14 Hours) Dry rubbing Bearings: porous metal bearings and oscillatory journal bearings – qualitative approach only. Lubrication: Choice of lubricants, types of oil, Grease and solid lubricants - additives - lubrication systems and their selection – selection of pump, filters, piping design - oil changing and oil conservation.														
Teaching Methods: Chalk& Board/ PPT/Video Lectures/Lecture by Industry Expert.														



GIET UNIVERSITY, GUNUPUR, ODISHA

DEPARTMENT OF MECHANICAL ENGINEERING

SCHOOL OF ENGINEERING & TECHNOLOGY

Incorporated by Act 23 of Govt. of Odisha and under approval of UGC & AICTE

Accredited by NAAC with a CGPA of 3.28/4 at A⁺ Grade

Seven UG Programs CSE, ME, CHE, AEIE, ECE, BT & EEE Accredited by NBA

Gunupur - 765022 , Dist.- Rayagada, Odisha, INDIA

www.giet.edu

Text Books

1. Introduction to Tribology of Bearings - B.C.Majumdar, Wheeler Publication, 2008.
2. Lubrication of bearing by E. I. Radzimogky (John Willey)
3. Lubrication in Practice by W. L. Robertson (CRC)

Ref. Books

1. Friction & Wear of Materials - E. Rabinowicz, John Wiley & Sons Inc. ISBN 0-471-83084-4, 1995.
2. Tribology : Friction, Lubrication and Wear - Z. Andras Szeri, ISBN 0070626634.
3. Principles and Applications of tribology - Bharat Bhusan, Hardcover, 2013.
4. Engineering Tribology (Tribology Series, 24) - G.W. Stachowiak, A.W. Batchelor, ISBN 0444892354.
5. Engineering Tribology - Prasant Sahoo, PHI Pvt. Ltd.
6. Fundamentals of Tribology - S.K. Basu, S.N. Sengupta, B.B. Ahuja, PHI Pvt. Ltd.
7. Tribology in Industries – S. K. Srivastava. S. Chand and Company Ltd., New Delhi.

SUBJECT CODE	TITLE OF THE SUBJECT	L	T	P	C	QP
	ROBOTICS	3	0	0	3	



GIET UNIVERSITY, GUNUPUR, ODISHA
DEPARTMENT OF MECHANICAL ENGINEERING
SCHOOL OF ENGINEERING & TECHNOLOGY
 Incorporated by Act 23 of Govt. of Odisha and under approval of UGC & AICTE
 Accredited by NAAC with a CGPA of 3.28/4 at A⁺ Grade
 Seven UG Programs CSE, ME, CHE, AEIE, ECE, BT & EEE Accredited by NBA
 Gunupur - 765022 , Dist.- Rayagada, Odisha, INDIA
www.giet.edu

Pre -Requisite:														
Course Outcomes: Upon successful completion of this course, students should be able to:														
CO1	Classify robots based on joints and arm configurations.													
CO2	Compute forward and inverse kinematics of robots and determine trajectory plan.													
CO3	Program robot to perform typical tasks including Pick and Place, Stacking and Welding.													
CO4	Design and select robots for Industrial and Non-Industrial applications.													
CO-PO & PSO Mapping														
COs	PROGRAMME OUTCOMES												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3													
CO2	1	3												
CO3	2	2												
CO4	3													
Avg.	2.2 5	1.2 5												
SYLLABUS														
UNIT:1 (14 Hours)														
Fundamentals of Robotics: Introduction Automation & Robotics robot applications robotic systems, robot anatomy and robot configurations, Joint types used in robots, robot wrists, joint notation schemes, work value for various robot anatomies, robot specifications, introduction to robot arm dynamics.														
Robots end-effectors-classification of end-effectors, mechanical grippers, hooking or lifting grippers, grippers for molten metal's, plastics, vacuum cups, magnetic grippers, electrostatic grippers, multiple grippers, internal & external grippers, drive systems for grippers, active & passive grippers.														
UNIT:2 (14 Hours)														
Robot Kinematics - Forward & reverse kinematics, forward and reverse transformation of two DOF & three DOF 2-D manipulator, homogeneous transformations. Robot drives & control-pneumatic power drives, hydraulic systems, electric drives, robot controllers-servo and non servo systems, motion control of robots, point to point and continuous path control, teaching of robots, robot programming methods. Basic control system models, slew motion, joint-interpolated motion and straight line motion.														
Robot Sensors: Scheme of robotic sensors, contact type sensors, force, torque, touch, position, velocity sensors, non-contact type sensors, electro-optical imaging sensors,														



GIET UNIVERSITY, GUNUPUR, ODISHA

DEPARTMENT OF MECHANICAL ENGINEERING

SCHOOL OF ENGINEERING & TECHNOLOGY

Incorporated by Act 23 of Govt. of Odisha and under approval of UGC & AICTE

Accredited by NAAC with a CGPA of 3.28/4 at A⁺ Grade

Seven UG Programs CSE, ME, CHE, AEIE, ECE, BT & EEE Accredited by NBA

Gunupur - 765022 , Dist.- Rayagada, Odisha, INDIA

www.giet.edu

proximity sensors, range imaging sensors, robot environment and robot input/output interfaces, machine intelligence, safety measures in robots.

UNIT:3

(14 Hours)

Robot cell layouts, multiple robots and machine interface, other considerations in work cell design, work cell control, interlocks, error detection and recovery, work cell controller, robot cycle time analysis.

Quantitative Techniques for economic performance of robots: Robot investment costs, robot operating expenses. General considerations in robot material handling, material transfer applications, pick and place operations, palletizing and related operations, machine loading and unloading, die casting, plastic moulding, forging, machining operations, stamping press operations using robots.

Teaching Methods: Chalk& Board/ PPT/Video Lectures/Lecture by Industry Expert.

Text Books

1. Robotics Technology & Flexible Automation, S. R. Deb, Tata McGraw Hill. 2003
2. Industrial Robotics, M. P. Groover, McGraw Hill.2008
3. Robotics for Engineers, Y. Koren, McGraw Hill. 2008

Ref. Books

1. Robots & Manufacturing Automation by Asfahal C. Ray, John Wiley. 2006
2. Robotic Engineering, Richard D. Klaffer, PHI. 2005
3. Robots & Control, Mittal & Nagrath, Tata McGraw Hill.2005



GIET UNIVERSITY, GUNUPUR, ODISHA

DEPARTMENT OF MECHANICAL ENGINEERING

SCHOOL OF ENGINEERING & TECHNOLOGY

Incorporated by Act 23 of Govt. of Odisha and under approval of UGC & AICTE

Accredited by NAAC with a CGPA of 3.28/4 at A⁺ Grade

Seven UG Programs CSE, ME, CHE, AEIE, ECE, BT & EEE Accredited by NBA

Gunupur - 765022 , Dist.- Rayagada, Odisha, INDIA

www.giet.edu

SUBJECT CODE	TITLE OF THE SUBJECT	L	T	P	C	QP
	ADVANCED MECHANISMS OF MACHINES	3	0	0	3	

Pre -Requisite:

Course Outcomes: Upon successful completion of this course, students should be able to:

CO1	Classify the steering mechanisms and gyroscopic effects on various dynamic objects.
CO2	Develop a cam profile to meet desired needs within realistic constraints, calculate the inertia forces in reciprocating and rotating masses along with turning moments in flywheels.
CO3	Analyze static and dynamic balancing of rotating and reciprocating masses, classify the various kinds of governors, recognise the effect of controlling force.
CO4	Analyze the effect of vibration in desired systems, determine the natural frequency of a vibration system.

CO-PO & PSO Mapping

COs	PROGRAMME OUTCOMES												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3	2												
CO2	2	3												
CO3	3	2												
CO4	2	3												
Avg.	2.5	2.5												

SYLLABUS

UNIT:1

(14 Hours)

Review of determination of velocity & acceleration of points & links in mechanisms – Analytical & graphical methods; Synthesis of Mechanisms - Function generation; Overlay's method; Cognate linkages; Two position & three position synthesis of 4 - bar linkages & slider crank mechanisms; Coupler curve synthesis; Intermittent rotary motion - Geneva mechanism. Static & Dynamic Force Analysis – Forces, Couples, Conditions of equilibrium – Free body diagram; Analysis of 4 - bar linkages & slider crank mechanisms; Spur, Helical & Bevel gear force analysis; Static force analysis with friction.

UNIT:2

(12 Hours)

Dynamic force analysis – Centroid & Centre of mass; Moment of inertia; D' Alembert's principle; Rotation about a fixed centre; Dynamic analysis of 4 - bar



GIET UNIVERSITY, GUNUPUR, ODISHA

DEPARTMENT OF MECHANICAL ENGINEERING

SCHOOL OF ENGINEERING & TECHNOLOGY

Incorporated by Act 23 of Govt. of Odisha and under approval of UGC & AICTE

Accredited by NAAC with a CGPA of 3.28/4 at A⁺ Grade

Seven UG Programs CSE, ME, CHE, AEIE, ECE, BT & EEE Accredited by NBA

Gunupur - 765022 , Dist.- Rayagada, Odisha, INDIA

www.giet.edu

mechanism. Balancing – Primary balancing, Secondary balancing, Balancing of 2 - cylinder & multi - cylinder engines, V - engines.

UNIT:3 (14 Hours)

Gyroscope – Motion of a rigid body in 3 - dimensions; Rigid body in spheric motion; Euler's equation; Euler's modified equation; Simple precession of a symmetrical rotor.

Analysis of Cams – Basic curves; Cam size determination; Cam profile determination - Analytical & graphical methods; Advanced cam curves; Analytical cam design.

Cam Dynamics – Response of undamped cam mechanisms; Follower response - Phase plane method; Numerical method; Jump & Cross-over shock.

Teaching Methods: Chalk & Board/ PPT/Video Lectures/Lecture by Industry Expert.

Text Books

1. Theory of Machines and Mechanisms – J. E. Shigley and Jr. J. J. Uicker. Mc GrawHill Inc.
2. Theory of Mechanisms and Machines – Amitava Ghosh and Mallik. EWP, New Delhi.

Ref. Books

1. Mechanism Synthesis Analysis – A. H. Soni, Mc GrawHill Co, New York.
2. Kinematics Analysis of Mechanisms - J. E. Shigley. Mc GrawHill Co, New York.
3. Mechanics of Machines – V. Ramamurti. Narosa Publishing House.



GIET UNIVERSITY, GUNUPUR, ODISHA

DEPARTMENT OF MECHANICAL ENGINEERING

SCHOOL OF ENGINEERING & TECHNOLOGY

Incorporated by Act 23 of Govt. of Odisha and under approval of UGC & AICTE

Accredited by NAAC with a CGPA of 3.28/4 at A⁺ Grade

Seven UG Programs CSE, ME, CHE, AEIE, ECE, BT & EEE Accredited by NBA

Gunupur - 765022 , Dist.- Rayagada, Odisha, INDIA

www.giet.edu

SUBJECT CODE	TITLE OF THE SUBJECT	L	T	P	C	QP								
	COMPUTER AIDED DESIGN	3	0	0	3									
Pre -Requisite:														
Course Outcomes: Upon successful completion of this course, students should be able to:														
CO1	Integrate the role of graphic communication in the engineering design process													
CO2	Generate and interpret engineering technical drawings of parts and assemblies according to engineering design standards													
CO3	Use CAD software to generate a computer model and technical drawing for a simple, well-defined part or assembly.													
CO4	Communicate effectively the geometry and intent of design features.													
CO-PO & PSO Mapping														
COs	PROGRAMME OUTCOMES												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	2	1												
CO2	2													
CO3	2	3												
CO4	2	2												
Avg.	2	1.5												
SYLLABUS														
UNIT:1 (12 Hours) Introduction: The design process, elements of CAD; Principles of Software Design: Characteristics of good software, data structures, algorithm design, flow chart, coding, top down programming, modular programming, structural coding, testing of the software.														
UNIT:2 (12 Hours) Computer Graphics: Graphics display, transformations, visualizations, computer animation. 3D Modelling and Viewing: Coordinate systems, sketching and sketch planes; Modelling aids and tools; Layers, grids, clipping, arrays, editing. Curves Modelling: Analytical and synthetic curves, curve manipulations. Surface Modelling: Surface														



GIET UNIVERSITY, GUNUPUR, ODISHA

DEPARTMENT OF MECHANICAL ENGINEERING

SCHOOL OF ENGINEERING & TECHNOLOGY

Incorporated by Act 23 of Govt. of Odisha and under approval of UGC & AICTE

Accredited by NAAC with a CGPA of 3.28/4 at A⁺ Grade

Seven UG Programs CSE, ME, CHE, AEIE, ECE, BT & EEE Accredited by NBA

Gunupur - 765022 , Dist.- Rayagada, Odisha, INDIA

www.giet.edu

representation and surface analysis, analytical and synthetic surfaces, surface manipulations, NURBS.

UNIT:3 (12 Hours)

SOLID MODELING: Geometry and topology, solid entities, solid representation, fundamental of solid modelling, half spaces, boundary representation, constructive solid geometry, sweeps, solid manipulations. Features: Feature entities, feature representation, three-dimensional sketching, parametric, relations, constraints, feature manipulation. Mass properties: Geometric and mass properties evaluation, assembly modelling, product data exchange.

Teaching Methods: Chalk& Board/ PPT/Video Lectures/Lecture by Industry Expert.

Text Books

1. Zeid I., "Mastering CAD/CAM", Tata McGraw Hill. 2007
2. Onwubiko C., "Foundation of Computer Aided Design", West Publishing Company.

Ref. Books

1. Hsu T. R. and Sinha D. K., "Computer Aided Design: An Integrated Approach", West Publishing Company. 2018
2. Dimarogonas, A. D., "Computer Aided Machine Design", Prentice Hall.
3. Mortenson, M. E., "Geometric Modeling", 3rd Ed., Industrial Press. 2006.



GIET UNIVERSITY, GUNUPUR, ODISHA

DEPARTMENT OF MECHANICAL ENGINEERING

SCHOOL OF ENGINEERING & TECHNOLOGY

Incorporated by Act 23 of Govt. of Odisha and under approval of UGC & AICTE

Accredited by NAAC with a CGPA of 3.28/4 at A⁺ Grade

Seven UG Programs CSE, ME, CHE, AEIE, ECE, BT & EEE Accredited by NBA

Gunupur - 765022 , Dist.- Rayagada, Odisha, INDIA

www.giet.edu

SUBJECT CODE	TITLE OF THE SUBJECT	L	T	P	C	QP								
	INSTRUMENTATION AND AUTOMATIC CONTROL SYSTEMS	3	0	0	3									
Pre -Requisite:														
Course Outcomes: Upon successful completion of this course, students should be able to:														
CO1	An understanding of and an ability to apply analytical and computer-aided methods for solution of electrical circuits.													
CO2	An understanding of basic measuring devices including transformers, transducers, and pressure, flow rate, and temperature measurement devices.													
CO3	Methods for rating instrument devices including dynamic range, resolution, accuracy and precision, bandwidth.													
CO4	An understanding of the elementary concepts and elements of automatic and feedback control system.													
CO-PO & PSO Mapping														
COs	PROGRAMME OUTCOMES												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3	3												
CO2	3	2												
CO3	3	1												
CO4	1	3												
Avg.	2.5	2.2 5												
SYLLABUS														
UNIT:1 (12 Hours) Closed loop & open loop systems; Linear & non-linear systems; Proportional, Derivative & integral controller; Laplace transform method; Transfer function & Block diagrams;														



GIET UNIVERSITY, GUNUPUR, ODISHA

DEPARTMENT OF MECHANICAL ENGINEERING

SCHOOL OF ENGINEERING & TECHNOLOGY

Incorporated by Act 23 of Govt. of Odisha and under approval of UGC & AICTE

Accredited by NAAC with a CGPA of 3.28/4 at A⁺ Grade

Seven UG Programs CSE, ME, CHE, AEIE, ECE, BT & EEE Accredited by NBA

Gunupur - 765022, Dist.- Rayagada, Odisha, INDIA

www.giet.edu

Deriving transfer functions of physical systems; Block diagram reduction; Signal flow graphs; Construction of signal flow graphs from block diagram; Mason's gain formula. First order systems; Second order systems; Higher order systems;	
UNIT:2	(12 Hours)
Steady-state error & error constants; Routh stability criterion; Bode plot; Gain margin & Phase margin. Root locus method; Nyquist criterion; Closed loop frequency response; M-circle & N-circle; Lag & lead compensation.	
UNIT:3	(12 Hours)
State space analysis - State variables; State - space representation; State equations; Relationship between state equations & transfer functions; Characteristics equation; Eigen values & Eigen vectors; State diagram; Solution of state equation; State transition matrix & its properties; Transfer matrix.	
Teaching Methods: Chalk& Board/ PPT/Video Lectures/Lecture by Industry Expert.	
Text Books	
1. Mechanical Measurements - T.G. Beckwith, N.L. Buck, R.B. Marangoni. Narosa Publishing House 5 th Edition, 2007	
2. Measurements System : Application and Design - Ernest O. Doebelin, Mc-Graw Hill Books Co.	
3. Modern Control Engineering - K. Ogata, PHI, 3 rd Edition, 2000.	
Ref. Books	
1. Theory and Application of Automatic Controls - B.C.Nakra, New Age International Pvt. Ltd., New Delhi, 2017.	
2. Transducers and Instrumentation, PHI, New Delhi, 2006.	
3. Sensors and Transducers - D. Patranabis, Wheeler Publishing, ND, 2003.	
4. Instrumentation-Devices and Systems - C.S.Rangan, G.R.Sarma and V.S.V.Mani, TMH, New Delhi, 2011.	
5. Vibration Measurement and Analysis - B.C.Nakra, G.S.Yadava and L. Thuestad, National Productivity Council, New Delhi, 2002.	



GIET UNIVERSITY, GUNUPUR, ODISHA

DEPARTMENT OF MECHANICAL ENGINEERING

SCHOOL OF ENGINEERING & TECHNOLOGY

Incorporated by Act 23 of Govt. of Odisha and under approval of UGC & AICTE

Accredited by NAAC with a CGPA of 3.28/4 at A⁺ Grade

Seven UG Programs CSE, ME, CHE, AEIE, ECE, BT & EEE Accredited by NBA

Gunupur - 765022 , Dist.- Rayagada, Odisha, INDIA

www.giet.edu

SUBJECT CODE	TITLE OF THE SUBJECT	L	T	P	C	QP								
	DYANAMICS OF ROTORS	3	0	0	3									
Pre -Requisite:														
Course Outcomes: Upon successful completion of this course, students should be able to:														
CO1	Understand principles of rotor bearing systems.													
CO2	Analyze dynamic behavior of rotor bearing system													
CO3	Predict the response of a rotor bearing system through analytical and computational models.													
CO4	Identify the malfunctions in rotating machinery using vibration measurements													
CO-PO & PSO Mapping														
COs	PROGRAMME OUTCOMES												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	2	-												
CO2	2	2												
CO3	2	3												
CO4	2	3												
Avg.	2	2												
SYLLABUS														
UNIT:1 (14 Hours)														
Rudiments of Rotor Dynamics, Rotor Dynamic considerations in machinery design, critical														



GIET UNIVERSITY, GUNUPUR, ODISHA
DEPARTMENT OF MECHANICAL ENGINEERING
SCHOOL OF ENGINEERING & TECHNOLOGY
 Incorporated by Act 23 of Govt. of Odisha and under approval of UGC & AICTE
 Accredited by NAAC with a CGPA of 3.28/4 at A⁺ Grade
 Seven UG Programs CSE, ME, CHE, AEIE, ECE, BT & EEE Accredited by NBA
 Gunupur - 765022 , Dist.- Rayagada, Odisha, INDIA
www.giet.edu

speeds and unbalance response. Factors affecting them such as gyroscopic action, internal damping, fluid film bearings. Methods for analysis such as Transfer Matrix, FEM etc.	
UNIT:2	(12 Hours)
Vibration of Discs, disc gyroscopic, synchronous and non-synchronous whirl, analysis of rotors mounted on hydrodynamic bearings, application to two spool and multispool rotors.	
UNIT:3	(12 Hours)
Analysis of asymmetric shafts. Parametric excitation and instability due to fluid film forces and hysteresis. Effect of support nonlinearities. Rigid rotor balancing. Torsional vibration. Balancing of rotors. Concepts of condition monitoring.	
Teaching Methods: Chalk& Board/ PPT/Video Lectures/Lecture by Industry Expert.	
Text Books	
1. Rotor Dynamics – J. S. Rao. New Age International Publications, 3rd Edition.	
Ref. Books	
1. Dynamics of Rotor Bearings Systems – M. J. Goodwin. Unwin Hyman	
2. A Matrix Method in Elastomechanics – E. C. Petal and F. A. Leckie. Mc Graw Hill Book Co.	
3. Rotor Dynamics – E. K. Kramer. Springer Verlag.	

SUBJECT CODE	TITLE OF THE SUBJECT	L	T	P	C	QP
	OPTIMIZATION TECHNIQUES IN DESIGN	3	0	0	3	

Pre -Requisite:

Course Outcomes: Upon successful completion of this course, students should be able to:

CO1	To Understand the concepts of operations research modeling approaches.
CO2	Formulate and solve engineering and managerial situations as LPP.
CO3	Formulate and solve non linear programming problem
CO4	To understand advanced optimization techniques.

CO-PO & PSO Mapping

COs	PROGRAMME OUTCOMES												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3	3												
CO2	3	3												
CO3	2	2												
CO4	2	2												
Avg.	2.5	2.5												

SYLLABUS



GIET UNIVERSITY, GUNUPUR, ODISHA

DEPARTMENT OF MECHANICAL ENGINEERING

SCHOOL OF ENGINEERING & TECHNOLOGY

Incorporated by Act 23 of Govt. of Odisha and under approval of UGC & AICTE

Accredited by NAAC with a CGPA of 3.28/4 at A⁺ Grade

Seven UG Programs CSE, ME, CHE, AEIE, ECE, BT & EEE Accredited by NBA

Gunupur - 765022, Dist.- Rayagada, Odisha, INDIA

www.giet.edu

UNIT:1	(12 Hours)
Introduction: Classification of optimization problems, mathematical models in engineering optimization. Concepts in linear optimization: General simplex method, revised simplex method, duality, decomposition principle, integer programming, branch and bound technique and the Gomory algorithm, post optimality analysis.	
UNIT:2	(12 Hours)
Non linear programming without constraints: Local and global maxima, minima, Hessian matrix, Fibonacci method, Golden section method, random search method, steepest descent method and conjugate gradient method. Non linear programming with constraints: Lagrange multipliers, Kuhn - Tucker conditions, quadratic programming.	
UNIT:3	(12 Hours)
Wolfe's and Beale's method, sequential linear programming approach, penalty methods. Interior and exterior penalty function method. Advanced optimization techniques: Concepts of multi - objective optimization, genetic algorithms and simulated annealing.	
Teaching Methods: Chalk& Board/ PPT/Video Lectures/Lecture by Industry Expert.	
Text Books	
1.S.S.Rao, Optimization- Theory and Applications, ,Wiley Eastern, New Delhi, 2009	
2.J.C.Pant, Introduction to Optimization, Jain Brothers, New Delhi, 2004	
3. Kanthi Swaroop, et.at., Operations Research, S. Chand & Co., New Delhi,	
4.Kalyanmoy Deb, Optimization for Engineering Design Algorithms and Examples, Prentice Hall of India, New Delhi, 2005.	
5. Kalyanmoy Deb, Multi objective Optimization –An evolutionary Algorithmic Approach, John Wiley & Sons, New York.	
Ref. Books	
1.J.S. Arora, Introduction to optimum design, McGraw Hill, New York, 2009.	
2.R.L. Fox, Optimization Methods for Engineering Design, Addison Wesley, New York, 2004.	
3. D.E. Goldberg, Genetic Algorithms in Search, Optimization and Machine, Barnen, Addison Wesley, New York.	



GIET UNIVERSITY, GUNUPUR, ODISHA

DEPARTMENT OF MECHANICAL ENGINEERING

SCHOOL OF ENGINEERING & TECHNOLOGY

Incorporated by Act 23 of Govt. of Odisha and under approval of UGC & AICTE

Accredited by NAAC with a CGPA of 3.28/4 at A⁺ Grade

Seven UG Programs CSE, ME, CHE, AEIE, ECE, BT & EEE Accredited by NBA

Gunupur - 765022 , Dist.- Rayagada, Odisha, INDIA

www.giet.edu

SUBJECT CODE	TITLE OF THE SUBJECT	L	T	P	C	QP								
	ANALYSIS AND DESIGN OF PRESSURE VESSELS AND PIPING	3	0	0	3									
Pre -Requisite:														
Course Outcomes: Upon successful completion of this course, students should be able to:														
CO1	Understand the concepts and principles applied to members under various loadings and the effects of these loadings.													
CO2	Analyze and design structural members subjected to stresses.													
CO3	Analyze columns and pressure vessels under various loadings.													
CO4	Apply proper techniques and a working knowledge of pipe work design .													
CO-PO & PSO Mapping														
COs	PROGRAMME OUTCOMES												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	1											1		
CO2	1		3									1		
CO3	1	3										1		
CO4	1		2									1		
Avg.	1	.75	1.25									1		



GIET UNIVERSITY, GUNUPUR, ODISHA
DEPARTMENT OF MECHANICAL ENGINEERING
SCHOOL OF ENGINEERING & TECHNOLOGY
Incorporated by Act 23 of Govt. of Odisha and under approval of UGC & AICTE
Accredited by NAAC with a CGPA of 3.28/4 at A⁺ Grade
Seven UG Programs CSE, ME, CHE, AEIE, ECE, BT & EEE Accredited by NBA
Gunupur - 765022 , Dist.- Rayagada, Odisha, INDIA
www.giet.edu

SYLLABUS	
UNIT:1	(12 Hours)
Introduction: Methods for determining stresses –Terminology and Ligament Efficiency – Applications. Stresses in Pressure Vessels: Introduction –Stresses in a circular ring, cylinder – Membrane stress Analysis of Vessel Shell components –Cylindrical shells, torspherical Heads, conical heads –Thermal Stresses –Discontinuity stresses in pressure vessels.	
UNIT:2	(12 Hours)
Design of Vessels: Localized stresses and their significance – stress concentration – at a variable Thickness transition section in a cylindrical vessel, about a circular hole, elliptical openings. Theory of Reinforcement –pressure vessel Design. Supports for Vessels: introduction, bracket or lug supports, leg supports, skirt supports, saddle supports.	
UNIT:3	(12 Hours)
Buckling and Fracture Analysis in Vessels:Buckling phenomenon – Elastic Buckling of circular ring and cylinders under external pressure – collapse of thick walled cylinders or tubes under external pressure. Buckling: Effect of supports on Elastic Buckling of Cylinders – Buckling under combined External pressure and axial loading. Piping: Introduction – Flow diagram – piping layout and piping stress Analysis.	
Teaching Methods: Chalk& Board/ PPT/Video Lectures/Lecture by Industry Expert.	
Text Books	
1. John F.Harvey, Theory and Design of Pressure Vessels,CBS Publishers and Distributors. 2.M.V. Joshi, Process Equipment Design,Macmillan India Ltd.	
Ref. Books	
1. Henry H.Bedner, Pressure Vessels , Design Hand Book, CBS Publishers and Distributors, 2. Stanley, M.Wales, Chemical process equipment, selection and Design, Butterworths series in Chemical Engineering. 3. William J., Bees, Approximate Methods in the Design and Analysis of Pressure vessels and Piping Pre ASME Pressure Vessels and Piping Conference.	



GIET UNIVERSITY, GUNUPUR, ODISHA

DEPARTMENT OF MECHANICAL ENGINEERING

SCHOOL OF ENGINEERING & TECHNOLOGY

Incorporated by Act 23 of Govt. of Odisha and under approval of UGC & AICTE

Accredited by NAAC with a CGPA of 3.28/4 at A⁺ Grade

Seven UG Programs CSE, ME, CHE, AEIE, ECE, BT & EEE Accredited by NBA

Gunupur - 765022 , Dist.- Rayagada, Odisha, INDIA

www.giet.edu

SUBJECT CODE	TITLE OF THE SUBJECT	L	T	P	C	QP								
	ADVANCED DESIGN ENGINEERING LAB	3	0	0	3									
Pre -Requisite:														
Course Outcomes: Upon successful completion of this course, students should be able to:														
CO1	Analyze the behaviour of the solid bodies subjected to various types of loading.													
CO2	Ability to determine the behaviour of structural elements, such as bars, beams and columns subjected to vibration and strain by means of experiments.													
CO3	Able to determine the behaviour of Journal bearing and Roller bearing.													
CO4	Write individual and group reports present objectives, describe test procedures and results, synthesize and discuss the test results, present conclusions.													
CO-PO & PSO Mapping														
COs	PROGRAMME OUTCOMES												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	1			3								1		
CO2	1			3								1		
CO3	1			3								1		



GIET UNIVERSITY, GUNUPUR, ODISHA

DEPARTMENT OF MECHANICAL ENGINEERING

SCHOOL OF ENGINEERING & TECHNOLOGY

Incorporated by Act 23 of Govt. of Odisha and under approval of UGC & AICTE

Accredited by NAAC with a CGPA of 3.28/4 at A⁺ Grade

Seven UG Programs CSE, ME, CHE, AEIE, ECE, BT & EEE Accredited by NBA

Gunupur - 765022 , Dist.- Rayagada, Odisha, INDIA

www.giet.edu

CO4	1			1							1		
Avg.	1			2.5							1		
SYLLABUS													
1. (a) Tensile Test (UTM) (b) Compression Test 2. Izod and Charpy Tests 3. Fatigue Test 4. Hardness Test 5. Vibration Mode Shape Study and determination of damping coefficient 6. Experiment on vibration meter. 7. Measurement of component strain by using strain rosette 8. Measurement of strain by strain gauge 9. Study of bearings and bearings characteristics (Journal bearing and Roller bearing) 10. Calibration of LVDT using Indicator/CRO.													

III SEMESTER [SECOND YEAR]

Sl. No.	Course Category	Course Code	Course Title	L	T	P	Credits
THEORY							
1	OE		Industrial Safety	3	0	0	3
			Human Resource Management				
			Project Management And Costing				
			Business Analytics				
2	PE		Basic Mechanical Handling Systems	3	0	0	3
			Computer Graphics And Visualization				
			Machine Tool Design				



GIET UNIVERSITY, GUNUPUR, ODISHA

DEPARTMENT OF MECHANICAL ENGINEERING

SCHOOL OF ENGINEERING & TECHNOLOGY

Incorporated by Act 23 of Govt. of Odisha and under approval of UGC & AICTE

Accredited by NAAC with a CGPA of 3.28/4 at A⁺ Grade

Seven UG Programs CSE, ME, CHE, AEIE, ECE, BT & EEE Accredited by NBA

Gunupur - 765022 , Dist.- Rayagada, Odisha, INDIA

www.giet.edu

			Mechatronics				
PRACTICAL / SESSIONAL							
3	ES		Dissertation Phase-I	0	0	20	10
TOTAL				6	0	20	16

SUBJECT CODE	TITLE OF THE SUBJECT	L	T	P	C	QP
	INDUSTRIAL SAFETY	3	0	0	3	
Pre -Requisite:						
Course Outcomes: <i>Upon successful completion of this course, students should be able to:</i>						
CO1	Define Industrial safety: Accident, causes, types, results and control					
CO2	Understand the fundamentals of maintenance engineering					
CO3	Analyze wear and corrosion and their prevention: Wear- types, causes, effects, wear reduction methods					
CO4	Apply the principle and factors affecting the corrosion with application lubrication					
CO-PO & PSO Mapping						



GIET UNIVERSITY, GUNUPUR, ODISHA

DEPARTMENT OF MECHANICAL ENGINEERING

SCHOOL OF ENGINEERING & TECHNOLOGY

Incorporated by Act 23 of Govt. of Odisha and under approval of UGC & AICTE

Accredited by NAAC with a CGPA of 3.28/4 at A⁺ Grade

Seven UG Programs CSE, ME, CHE, AEIE, ECE, BT & EEE Accredited by NBA

Gunupur - 765022, Dist.- Rayagada, Odisha, INDIA

www.giet.edu

COs	PROGRAMME OUTCOMES												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3	3	2											
CO2	3	1	1											
CO3	2	2	1											
CO4	2	2	1											
Avg.	2.5	2	1.25											

SYLLABUS

UNIT-I (12 Hours)

Industrial safety: Accident, causes, types, results and control, mechanical and electrical hazards, types, causes and preventive steps/procedure, describe salient points of factories act 1948 for health and safety, wash rooms, drinking water layouts, light, cleanliness, fire, guarding, pressure vessels, etc, Safety color codes. Fire prevention and firefighting, equipment and methods.

UNIT-II (12 Hours)

Fundamentals of maintenance engineering: Definition and aim of maintenance engineering, Primary and secondary functions and responsibility of maintenance department, Types of maintenance, Types and applications of tools used for maintenance, Maintenance cost & its relation with replacement economy, Service life of equipment.

UNIT-III (12 Hours)

Wear and Corrosion and their prevention: Wear- types, causes, effects, wear reduction methods, lubricants-types and applications, Lubrication methods, general sketch, working and applications, i. Screw down grease cup, ii. Pressure grease gun, iii. Splash lubrication, iv. Gravity lubrication, v. Wick feed lubrication vi. Side feed lubrication, vii. Ring lubrication, Definition, principle and factors affecting the corrosion. Types of corrosion, corrosion prevention methods.

Teaching Methods: Chalk & Board

Text Book:

1. Maintenance Engineering Handbook, Higgins & Morrow, Da Information Services.
2. Maintenance Engineering, H. P. Garg, S. Chand and Company.

Reference Book:

1. Pump-hydraulic Compressors, Audels, Mcgrew Hill Publication.
2. Foundation Engineering Handbook, Winterkorn, Hans, Chapman & Hall London.



GIET UNIVERSITY, GUNUPUR, ODISHA

DEPARTMENT OF MECHANICAL ENGINEERING

SCHOOL OF ENGINEERING & TECHNOLOGY

Incorporated by Act 23 of Govt. of Odisha and under approval of UGC & AICTE

Accredited by NAAC with a CGPA of 3.28/4 at A⁺ Grade

Seven UG Programs CSE, ME, CHE, AEIE, ECE, BT & EEE Accredited by NBA

Gunupur - 765022 , Dist.- Rayagada, Odisha, INDIA

www.giet.edu

SUBJECT CODE	TITLE OF THE SUBJECT	L	T	P	C	QP
	HUMAN RESOURCE MANAGEMENT	3	0	0	3	
Pre -Requisite:						
Course Outcomes: <i>Upon successful completion of this course, students should be able to:</i>						
CO1	Discuss strategically plan for the human resources needed to meet organizational goals and objectives.					



GIET UNIVERSITY, GUNUPUR, ODISHA
DEPARTMENT OF MECHANICAL ENGINEERING
SCHOOL OF ENGINEERING & TECHNOLOGY
 Incorporated by Act 23 of Govt. of Odisha and under approval of UGC & AICTE
 Accredited by NAAC with a CGPA of 3.28/4 at A⁺ Grade
 Seven UG Programs CSE, ME, CHE, AEIE, ECE, BT & EEE Accredited by NBA
 Gunupur - 765022 , Dist.- Rayagada, Odisha, INDIA
www.giet.edu

CO2	Define the process of job analysis and discuss its importance as a foundation for human resource management practice
CO3	Evaluate and critique an organization's selection process
CO4	Explain and apply the legal principles that apply to a wide range of workplace issues

CO-PO & PSO Mapping

COs	PROGRAMME OUTCOMES												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3													
CO2	1	3												
CO3	1	1	2	3										
CO4	2	2												
Avg.	1.7 5	1.5	0.5	0.7 5										

SYLLABUS

UNIT-I : (12 Hours)

Human Resource Development Strategies, Design And Experience, Human Resource Development: HRD-An Overview, Line Managers and HRD, Task Analysis, Motivational Aspects of HRD, Developmental Supervision, Counselling and Mentoring, HRD for Health and Family Welfare in Select HRD Culture and Climate, HRD for Workers, HRD/OD Approach to IR Corporate Business.

UNIT-II : (12 Hours)

Basics of Human Resource Planning , Macro Level Scenario of Human Resource Planning, Concepts and Process of Human Resource Planning, Methods and Techniques-Demand Forecasting, Methods and Techniques-Supply Forecasting, Job Evaluation: Concepts, Scope and Limitations, Selection and Recruitment, Induction and Placement, Performance and Potential Appraisal, Transfer, Promotion and Reward Policies, Training and Retraining.

UNIT- III : (12 Hours)

Wage and Salary Administration & Labour Legislation, Wage Concepts and Definition of Wages Under Various Labour Legislation, Norms for Wage Determination, Law relating to Payment of Wages and Bonus, Pay Packet Composition, Design of Performance-linked Reward System, Philosophy of Labour Laws, Labour Laws, Industrial Relations and Human Resource Management, Indian Constitution and Labour Legislations, Time Management: Importance of Time factor, Time waster, Prioritizing Work Scheduling, Functions of the Time Office, Flexible Work arrangements.



GIET UNIVERSITY, GUNUPUR, ODISHA

DEPARTMENT OF MECHANICAL ENGINEERING

SCHOOL OF ENGINEERING & TECHNOLOGY

Incorporated by Act 23 of Govt. of Odisha and under approval of UGC & AICTE

Accredited by NAAC with a CGPA of 3.28/4 at A⁺ Grade

Seven UG Programs CSE, ME, CHE, AEIE, ECE, BT & EEE Accredited by NBA

Gunupur - 765022, Dist.- Rayagada, Odisha, INDIA

www.giet.edu

Teaching Methods: Chalk & Board

TEXT BOOKS :

1. Beardwell and Len Holder, Human Resource Management Macmillan India Ltd.,
2. Graham H.T., & R. Bennet, Human Resource Management – Pitman, London

REFERENCE BOOKS

1. Performance Appraisal, Theory and Practice – AIMA VIKAS Management Series,
2. C.B. Manmoria, Personnel Management – Himalayan Publishing Co., New Delhi.
3. Nair, N.G. & Latha Nair: Personnel Management & Industrial Relations – S. Chand & Co.

SUBJECT CODE	TITLE OF THE SUBJECT	L	T	P	C	QP
	PROJECT MANAGEMENT AND COSTING	3	0	0	3	



GIET UNIVERSITY, GUNUPUR, ODISHA

DEPARTMENT OF MECHANICAL ENGINEERING

SCHOOL OF ENGINEERING & TECHNOLOGY

Incorporated by Act 23 of Govt. of Odisha and under approval of UGC & AICTE

Accredited by NAAC with a CGPA of 3.28/4 at A⁺ Grade

Seven UG Programs CSE, ME, CHE, AEIE, ECE, BT & EEE Accredited by NBA

Gunupur - 765022 , Dist.- Rayagada, Odisha, INDIA

www.giet.edu

Pre -Requisite:														
Course Outcomes: <i>Upon successful completion of this course, students should be able to:</i>														
CO1	Gain the knowledge and confidence to manage a project from beginning to end													
CO2	Identify the different stages involved in project planning													
CO3	To understand the concept of Project Scheduling and to analysis the Project Feasibility													
CO4	To understand the concept of Break even analysis and overhead allocation Techniques.													
CO-PO & PSO Mapping														
COs	PROGRAMME OUTCOMES												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3	1									2			
CO2	2	3												
CO3	3	3									1			
CO4	3	2									1			
Avg.	2.7 5	2.2 5									1.0			
SYLLABUS														
UNIT – I : (10 Hours) Project Feasibility Analysis: Technical feasibility, commercial and financial viability, Environment Analysis. Project Engineering: Project Management Techniques : PERT, CPM, Project Scheduling Crashing, PERT / COST, LOB.														
UNIT – II: (14 Hours) Projects Financing alternatives, Sources of finance, their advantages, Choice of Financing mix, Capital budgeting. Costing: Fixed and variable cost. Break even analysis, Overhead allocation Techniques.														
UNIT – 3: (16 Hours) Project Organization, management and control: Project organization and control staffing, monitoring: cost, time and control and progress monitoring techniques. Product and service pricing: Availability and quality based pricing for services.														
Teaching Methods: Chalk& Board														
TEXT BOOKS :														
1. Prasanna Chandra: Project Engineering and Management, Prentice Hall,2009														
REFERENCE BOOKS														



GIET UNIVERSITY, GUNUPUR, ODISHA

DEPARTMENT OF MECHANICAL ENGINEERING

SCHOOL OF ENGINEERING & TECHNOLOGY

Incorporated by Act 23 of Govt. of Odisha and under approval of UGC & AICTE

Accredited by NAAC with a CGPA of 3.28/4 at A⁺ Grade

Seven UG Programs CSE, ME, CHE, AEIE, ECE, BT & EEE Accredited by NBA

Gunupur - 765022 , Dist.- Rayagada, Odisha, INDIA

www.giet.edu

1. Levy and Weist: Management guide to PERT / CPM, Prentice Hall, 2007
--

SUBJECT CODE	TITLE OF THE SUBJECT	L	T	P	C	QP
--------------	----------------------	---	---	---	---	----



GIET UNIVERSITY, GUNUPUR, ODISHA

DEPARTMENT OF MECHANICAL ENGINEERING

SCHOOL OF ENGINEERING & TECHNOLOGY

Incorporated by Act 23 of Govt. of Odisha and under approval of UGC & AICTE

Accredited by NAAC with a CGPA of 3.28/4 at A⁺ Grade

Seven UG Programs CSE, ME, CHE, AEIE, ECE, BT & EEE Accredited by NBA

Gunupur - 765022 , Dist.- Rayagada, Odisha, INDIA

www.giet.edu

	BUSINESS ANALYTICS	3	0	0	3									
Pre -Requisite:														
Course Outcomes: <i>Upon successful completion of this course, students should be able to:</i>														
CO1	Students will demonstrate knowledge of data analytics.													
CO2	Students will demonstrate the ability of think critically in making decisions based on data and deep analytics.													
CO3	Students will demonstrate the ability to use technical skills in predicative and prescriptive modeling to support business decision-making.													
CO4	Students will demonstrate the ability to translate data into clear, actionable insights.													
CO-PO & PSO Mapping														
COs	PROGRAMME OUTCOMES												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3	1						1		1				
CO2	2	3						3		1				
CO3	3	3						3		2				
CO4	3	2						2		1				
Avg.	2.7	2.2						2.2		1.25				
	5	5						5						
SYLLABUS														
<p>UNIT:1 (16 Hours)</p> <p>Business analytics: Overview of Business analytics, Scope of Business analytics, Business Analytics Process, Relationship of Business Analytics Process and organisation, competitive advantages of Business Analytics.</p> <p>Statistical Tools: Statistical Notation, Descriptive Statistical methods, Review of probability distribution and data modelling, sampling and estimation methods overview.</p> <p>Trendiness and Regression Analysis: Modelling Relationships and Trends in Data, simple Linear Regression. Important Resources, Business Analytics Personnel, Data and models for Business analytics, problem solving, Visualizing and Exploring Data, Business Analytics Technology.</p>														
<p>UNIT:2</p> <p>Organization Structures of Business analytics, Team management, Management Issues, Designing Information Policy, Outsourcing, Ensuring Data Quality, Measuring contribution of Business analytics, Managing Changes. Descriptive Analytics, predictive analytics, predicative Modelling, Predictive analytics analysis, Data Mining, Data Mining Methodologies, Prescriptive analytics and its step in the business analytics Process,</p>														



GIET UNIVERSITY, GUNUPUR, ODISHA

DEPARTMENT OF MECHANICAL ENGINEERING

SCHOOL OF ENGINEERING & TECHNOLOGY

Incorporated by Act 23 of Govt. of Odisha and under approval of UGC & AICTE

Accredited by NAAC with a CGPA of 3.28/4 at A⁺ Grade

Seven UG Programs CSE, ME, CHE, AEIE, ECE, BT & EEE Accredited by NBA

Gunupur - 765022 , Dist.- Rayagada, Odisha, INDIA

www.giet.edu

Prescriptive Modelling, nonlinear Optimization.

Forecasting Techniques: Qualitative and Judgmental Forecasting, Statistical Forecasting Models, Forecasting Models for Stationary Time Series, Forecasting Models for Time Series with a Linear Trend, Forecasting Time Series with Seasonality, Regression Forecasting with Casual Variables, Selecting Appropriate Forecasting Models.

UNIT:3

(14 Hours)

Monte Carlo Simulation and Risk Analysis: Monte Carle Simulation Using Analytic Solver Platform, New-Product Development Model, Newsvendor Model, Overbooking Model, Cash Budget Model.

Decision Analysis: Formulating Decision Problems, Decision Strategies with the without Outcome Probabilities, Decision Trees, The Value of Information, Utility and Decision Making. Recent Trends in : Embedded and collaborative business intelligence, Visual data recovery, Data Storytelling and Data journalism.

Teaching Methods: Chalk& Board/ PPT/Video Lectures/Lecture by Industry Expert.

Ref. Books

1. Business analytics Principles, Concepts, and Applications by Marc J. Schniederjans, Dara G. Schniederjans, Christopher M. Starkey, Pearson FT Press. 2003
2. Business Analytics by James Evans, persons Education.2007



GIET UNIVERSITY, GUNUPUR, ODISHA

DEPARTMENT OF MECHANICAL ENGINEERING

SCHOOL OF ENGINEERING & TECHNOLOGY

Incorporated by Act 23 of Govt. of Odisha and under approval of UGC & AICTE

Accredited by NAAC with a CGPA of 3.28/4 at A⁺ Grade

Seven UG Programs CSE, ME, CHE, AEIE, ECE, BT & EEE Accredited by NBA

Gunupur - 765022 , Dist.- Rayagada, Odisha, INDIA

www.giet.edu

SUBJECT CODE	TITLE OF THE SUBJECT	L	T	P	C	QP
	BASIC MECHANICAL HANDLING SYSTEMS	3	0	0	3	

Pre -Requisite:

Course Outcomes: Upon successful completion of this course, students should be able to:

CO1	Identify the role that each department plays in achieving the goals of an organization.
CO2	Explain the problems in organizing, planning and controlling the use of men, money, materials and machines for industrial production.
CO3	Apply industrial engineering principles to solve the problems in organizing, planning and controlling the use of men, money, materials and machines for industrial production.
CO4	Design of Mechanical Handling equipment such as Hoists and Cranes.

CO-PO & PSO Mapping

Cos	PROGRAMME OUTCOMES												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	2	1	1											
CO2	2	1	1											
CO3	-	2	3											
CO4	-	2	3											
Avg.	1.2 5	1.5	2											

SYLLABUS

UNIT:1

(15 Hours)

Elements of Material Handling System:- Importance, terminology, objectives and benefits of better Material Handling; Principles and features of Material Handling System; Interrelationships between material handling and Plant layout, physical facilities and other organizational functions; Classification of Material Handling equipments.

Selection of Material Handling Equipments:- Factors affecting for selection; Material Handling equation; choices of Material Handling equipment; general analysis procedures; basic analytical techniques; the unit load concept; selection of suitable types of systems for applications; activity cost data and economic analysis for design of components of Material Handling Systems; functions and parameters affecting service; packing and storage of materials.



GIET UNIVERSITY, GUNUPUR, ODISHA

DEPARTMENT OF MECHANICAL ENGINEERING

SCHOOL OF ENGINEERING & TECHNOLOGY

Incorporated by Act 23 of Govt. of Odisha and under approval of UGC & AICTE

Accredited by NAAC with a CGPA of 3.28/4 at A⁺ Grade

Seven UG Programs CSE, ME, CHE, AEIE, ECE, BT & EEE Accredited by NBA

Gunupur - 765022 , Dist.- Rayagada, Odisha, INDIA

www.giet.edu

UNIT:2	(14 Hours)
Conveyors: Belt Conveyors – characteristics, types, components, basic design considerations; Chain Conveyors – characteristics, types, components, aspects of design; Roller Conveyors- characteristics, types, components, aspect of design; Screw conveyors – characteristics, types, components, aspects of design.	
UNIT:3	(13 Hours)
Design of Mechanical Handling Equipments:- Design of Hoists:- Drives for hoisting, components, and hoisting mechanisms; rail traveling components and mechanisms; hoisting gear operation during transient motion; selecting the motor rating and determining breaking torque for hoisting mechanisms. Design of Cranes:- Hand-propelled and electrically driven EOT overhead traveling cranes; Traveling mechanisms of cantilever and monorail cranes; design considerations for structures of rotary Cranes with fixed radius; fixed post and overhead traveling cranes; Stability of stationary Rotary and traveling rotary cranes.	
Teaching Methods: Chalk& Board/ PPT/Video Lectures/Lecture by Industry Expert	
Text Books 1. Material Handling Equipments - N. Rudenko. Envee Publishers, ND.2003 2. Conveying Machines (Vol I & II) - A.O.Spivakovsky, & V.K. Dyachkav. MIR Publication2007 3. Mechanical Engg Design - J.E.Shiegley. Mc-Graw Hill Book Co.2003 4. Design of Machine Elements - M.F. Spotts and T.E. Shoup. PHI.2009	
Ref. Books 1. Design of Machine Elements - V. Dobrovolsky, et al., MIR Publishers.2001 2. Machine Design - D.N. Reshetov. MIR Publishers.2000	



GIET UNIVERSITY, GUNUPUR, ODISHA

DEPARTMENT OF MECHANICAL ENGINEERING

SCHOOL OF ENGINEERING & TECHNOLOGY

Incorporated by Act 23 of Govt. of Odisha and under approval of UGC & AICTE

Accredited by NAAC with a CGPA of 3.28/4 at A⁺ Grade

Seven UG Programs CSE, ME, CHE, AEIE, ECE, BT & EEE Accredited by NBA

Gunupur - 765022 , Dist.- Rayagada, Odisha, INDIA

www.giet.edu

SUBJECT CODE	TITLE OF THE SUBJECT	L	T	P	C	QP								
	COMPUTER GRAPHICS AND VISUALIZATION	3	0	0	3									
Pre -Requisite:														
Course Outcomes: Upon successful completion of this course, students should be able to:														
CO1	Able to demonstrate the knowledge and understanding of fundamental principles in computer graphics													
CO2	Apply the knowledge to the design of algorithms for graphics applications.													
CO3	Enhance his/her skills in graphics and visualization programming through experimental and simulated data .													
CO4	Implement a substantial computer graphics system/project in dynamic visualization.													
CO-PO & PSO Mapping														
COs	PROGRAMME OUTCOMES												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3	1												
CO2	2													
CO3	2	1												
CO4	2	1												
Avg.	2.2 5	.75												
SYLLABUS														
UNIT:1 (14 Hours) Raster graphics and volume graphics. Video basics. Display devices and interactive devices; 2-D and 3-D graphics primitives. Clipping in 2-D and 3-D; Generation and														



GIET UNIVERSITY, GUNUPUR, ODISHA

DEPARTMENT OF MECHANICAL ENGINEERING

SCHOOL OF ENGINEERING & TECHNOLOGY

Incorporated by Act 23 of Govt. of Odisha and under approval of UGC & AICTE

Accredited by NAAC with a CGPA of 3.28/4 at A⁺ Grade

Seven UG Programs CSE, ME, CHE, AEIE, ECE, BT & EEE Accredited by NBA

Gunupur - 765022, Dist.- Rayagada, Odisha, INDIA

www.giet.edu

projection of 3-D wire frame solid models, polygonal models. Space curves and surface models. Intersection of surfaces and blending; hidden line and hidden surface elimination algorithms. Ray-surface intersection and inverse mapping algorithms. Ray tracing for photo realistic rendering. Illumination models. Shading, Transparency, Shadowing and Texture mapping; Representation of colours.

UNIT:2

(13 Hours)

Visualization of experimental and simulated data. Surface construction from scattered data, 3-D data arrays and 2-D cross sections. Elevation maps, topological maps, contour maps and intensity maps; fractals for visualization of complex and large data sets. Algebraic stochastic and Geometrical fractals. Modeling of natural forms and textures using fractals; Visualization of multi variate relations. Flow visualization and hyper streamlines; visualization of Metrological, cosmological, seismic, biological data for scientific decision making.

UNIT:3

(13 Hours)

Animation, Modeling issues in dynamic visualization. Behavioral animation; walk through coordinate transformation and view transformation; virtual reality interfaces. Interactive and immersive systems for prototyping and visualization; Visualization in concurrent engineering. Interactive multimedia technology and standards for VideoGraphics-Audio integration and tele-video conferencing

Teaching Methods: Chalk& Board/ PPT/Video Lectures/Lecture by Industry Expert

Text Books

1. CAD/CAM : Computer-Aided Design and Manufacturing - M. P. Groover and E.W. Zimmer, PHI, 2007.

Ref. Books

1. AutoCAD 2002 - New Riders, Techmedia, 2006
2. Computer Aided Analysis and Design of Machine Elements - V. D. Rao, M. Ananda Rao and Rama Bhat. New Age International. 2001



GIET UNIVERSITY, GUNUPUR, ODISHA

DEPARTMENT OF MECHANICAL ENGINEERING

SCHOOL OF ENGINEERING & TECHNOLOGY

Incorporated by Act 23 of Govt. of Odisha and under approval of UGC & AICTE

Accredited by NAAC with a CGPA of 3.28/4 at A⁺ Grade

Seven UG Programs CSE, ME, CHE, AEIE, ECE, BT & EEE Accredited by NBA

Gunupur - 765022 , Dist.- Rayagada, Odisha, INDIA

www.giet.edu

SUBJECT CODE	TITLE OF THE SUBJECT	L	T	P	C	QP								
	MACHINE TOOL DESIGN	3	0	0	3									
Pre -Requisite:														
Course Outcomes: Upon successful completion of this course, students should be able to:														
CO1	Interpret the geometrical and dimensional details of a production drawing													
CO2	Design jigs and fixtures for conventional and NC machining													
CO3	Select and design progressive, compound or combination dies for press working operations													
CO4	Design single point and multipoint cutting tools													
CO-PO & PSO Mapping														
COs	PROGRAMME OUTCOMES												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	1											1		
CO2	1		3									1		
CO3	1		3									1		
CO4	1		3									1		
Avg.	1		2.2 5									1		
SYLLABUS														
UNIT:1 (14 Hours)														



GIET UNIVERSITY, GUNUPUR, ODISHA

DEPARTMENT OF MECHANICAL ENGINEERING

SCHOOL OF ENGINEERING & TECHNOLOGY

Incorporated by Act 23 of Govt. of Odisha and under approval of UGC & AICTE

Accredited by NAAC with a CGPA of 3.28/4 at A⁺ Grade

Seven UG Programs CSE, ME, CHE, AEIE, ECE, BT & EEE Accredited by NBA

Gunupur - 765022 , Dist.- Rayagada, Odisha, INDIA

www.giet.edu

Introduction to metal cutting machine tools- criteria for the selection of operating capacity and design parameters, kinematics of machine tools.

Basic principles of machine tool design, estimation of drive power, machine tool drives, electrical, mechanical and fluid drives, stepped and step less speed arrangements and systems.

UNIT:2 (12 Hours)

Design of machine tool spindles and bearings, design of power screws, design of slide ways, selective and pre-selective mechanisms.

Machine tool structures-beds, columns, tables and supports, stock feed mechanism, Measurement and control of machine tools, protective and safety devices, design of precision machine tools.

UNIT:3 (14 Hours)

Micro-feeding mechanisms, concept of modular design and integration of SPM's, Concepts of aesthetic and ergonomics applied to machine tools.

Acceptance tests standardization of machine tools, machine tool conditioning, latest trends in machine tool design, Introduction to CAD techniques.

Teaching Methods: Chalk & Board/ PPT/Video Lectures/Lecture by Industry Expert.

Text Books

1. N. K.Mehta , Machine tool design, Tata Mcgraw-hill, New Delhi. 2000
2. N.Acherkan, Machine tool design, Vol. 3 and 4, Mir publisher, Moscow.2004

Ref. Books

1. A.Koenigsburger, Design principles of metal cutting machine tools, Pergamon press.
2. C.M.T.I. Machine tool design course notes, C.M.T.I. Bangalore.
3. G.Sen and A.Bhattacharya , Principles of machine tools, Vol. 2, NCB, Calcutta.



GIET UNIVERSITY, GUNUPUR, ODISHA

DEPARTMENT OF MECHANICAL ENGINEERING

SCHOOL OF ENGINEERING & TECHNOLOGY

Incorporated by Act 23 of Govt. of Odisha and under approval of UGC & AICTE

Accredited by NAAC with a CGPA of 3.28/4 at A⁺ Grade

Seven UG Programs CSE, ME, CHE, AEIE, ECE, BT & EEE Accredited by NBA

Gunupur - 765022 , Dist.- Rayagada, Odisha, INDIA

www.giet.edu

SUBJECT CODE	TITLE OF THE SUBJECT	L	T	P	C	QP								
	MECHATRONICS	3	0	0	3									
Pre -Requisite:														
Course Outcomes: Upon successful completion of this course, students should be able to:														
CO1	Ability to design and calculate mechanical designs.													
CO2	Ability to model and build mechatronic systems and implement these systems.													
CO3	Specialized knowledge within either of the profiles: Mechanical engg, Electronic engg or embedded engg.													
CO4	Ability to carry out development projects independently and in teams.													
CO-PO & PSO Mapping														
COs	PROGRAMME OUTCOMES												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3	3												
CO2	3	3	2											
CO3	3	2												
CO4	2	1												



GIET UNIVERSITY, GUNUPUR, ODISHA

DEPARTMENT OF MECHANICAL ENGINEERING

SCHOOL OF ENGINEERING & TECHNOLOGY

Incorporated by Act 23 of Govt. of Odisha and under approval of UGC & AICTE

Accredited by NAAC with a CGPA of 3.28/4 at A⁺ Grade

Seven UG Programs CSE, ME, CHE, AEIE, ECE, BT & EEE Accredited by NBA

Gunupur - 765022 , Dist.- Rayagada, Odisha, INDIA

www.giet.edu

Avg.	2.7 5	2.2 5	.5											
SYLLABUS														
<p>UNIT:1 (14 Hours)</p> <p>1.Introduction: Definition of mechatronics, measurement system, control systems, microprocessor based controllers, mechatronics approach.</p> <p>2.Sensors and Transducers: Sensors and transducers, performance terminology, photoelectric transducers, flow transducers, optical sensors and transducers, semiconductor lasers, selection of sensors, mechanical / electrical switches, inputting data by switches.</p> <p>3. Actuators: Actuation systems, pneumatic and hydraulic systems, process control valves, rotary actuators, mechanical actuation systems, electrical actuation systems.</p>														
<p>UNIT:2 (12 Hours)</p> <p>4.Signal Conditioning: Signal conditioning, filtering digital signal, multiplexers, data acquisition, digital signal processing, pulse modulation, data presentation systems.</p> <p>5.Microprocessors and Microcontrollers: Microcomputer structure, microcontrollers, applications, programmable logic controllers.</p>														
<p>UNIT:3 (14 Hours)</p> <p>6.Modeling and System Response: Mathematical models, mechanical, electrical, hydraulic and thermal systems, dynamic response of systems, transfer function and frequency response, closed loop controllers.</p> <p>7.Design and Mechatronics: Input/output systems, computer based modular design, system validation, remote monitoring and control, designing, possible design solutions, detailed case studies of mechatronic systems used in photocopier, automobile, robots.</p>														
Teaching Methods: Chalk& Board/ PPT/Video Lectures/Lecture by Industry Expert.														
Text Books														
<ol style="list-style-type: none"> 1. Bolton, W., "Mechatronics", Longman, 2009. 2. Bolton, W., "Mechatronics: A Multidisciplinary Approach", 4th Ed., Prentice Hall, 2009. 3. Mahalik, N., "Principles, Concept and Applications: Mechatronics", Tata McGraw, 2003. 														
Ref. Books														
<ol style="list-style-type: none"> 1. HMT Ltd. Mechatronics, Tata Mcgraw-Hill, New Delhi, 2008. 2. G.W. Kurtz, J.K. Schueller, P.W. Claar . II, Machine design for mobile and industrial applications, SAE. 3. T.O. Boucher, Computer automation in manufacturing - an Introduction, Chappman and Hall. 4. Mechatronics, Intl. J. published by Pergamon Press 														



GIET UNIVERSITY, GUNUPUR, ODISHA

DEPARTMENT OF MECHANICAL ENGINEERING

SCHOOL OF ENGINEERING & TECHNOLOGY

Incorporated by Act 23 of Govt. of Odisha and under approval of UGC & AICTE

Accredited by NAAC with a CGPA of 3.28/4 at A⁺ Grade

Seven UG Programs CSE, ME, CHE, AEIE, ECE, BT & EEE Accredited by NBA

Gunupur - 765022 , Dist.- Rayagada, Odisha, INDIA

www.giet.edu

IV SEMESTER [SECOND YEAR]

Sl. No.	Course Category	Course Code	Course Title	L	T	P	Credits
PRACTICAL / SESSIONAL							
1	ES		Dissertation Phase-II	0	0	32	16
TOTAL				0	0	32	16



GIET UNIVERSITY, GUNUPUR, ODISHA

DEPARTMENT OF MECHANICAL ENGINEERING

SCHOOL OF ENGINEERING & TECHNOLOGY

Incorporated by Act 23 of Govt. of Odisha and under approval of UGC & AICTE

Accredited by NAAC with a CGPA of 3.28/4 at A⁺ Grade

Seven UG Programs CSE, ME, CHE, AEIE, ECE, BT & EEE Accredited by NBA

Gunupur - 765022 , Dist.- Rayagada, Odisha, INDIA

www.giet.edu