Indira Gandhi University, Meerpur, Rewari
SCHEME OF STUDIES AND EXAMINATION
M.TECH. (Mechanical)
SEMESTER Ist and 2nd

Scheme effective from 2019-20

Indira Gandhi University, Meerpur, Rewari

SCHEME OF STUDIES AND EXAMINATION
M.TECH 1st YEAR (MECHANICAL ENGINEERING)
SEMESTER 1
CBCS Scheme effective from 2019-20

Sl. No	Course Code	Subject	Credit Pattern				Examination Schedule (Marks)				Duration of Exam (Hours)	No of Hours /week
			L	T	P	Total Credits	Marks of Class work	Theory	Practical	Total		
1	MTME101	Micro Machining Processes	4	0	-	4	50	100	-	150	3	4
2	MTME102	Computer Aided Design & Manufacturing	4	0	-	4	50	100	-	150	3	4
3	MTME103	IC Engine Combustion & Pollution	4	0	-	4	50	100	-	150	3	4
4	MTME104	Machine Tool Design	4	0	-	4	50	100	-	150	3	4
5	MTME105	Seminar	-	-	-	1		-	-	25		-
6	MTME106	Computer Aided Design & Manufacturing Lab	-	-	2	2	50	-	50	100	3	4
7	MTME107	IC Engine Combustion & Pollution Lab	-	-	2	2	50	-	50	100	3	4
8	MTME 108	Micro Machining Processes Lab	-	-	2	2	50	-	50	100	3	4
9	MTME109A or MTME109B or MTME109C	Elective I (DCEC)	4	0	-	4	50	100	-	150	3	4
10	MTME 110	Self Study Paper				1				25		-
		TOTAL	**28**									

NOTE:

Examiner will set nine questions in total. Question One will be compulsory and will comprise short answer type questions from all sections and remaining eight questions to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each Unit.

ELECTIVE – I : Choose any one from the following three papers:

MTME109A - NUMERICAL METHODS & COMPUTING

MTME109B - METHOD ENGINEERING & ERGONOMICS

MTME109C - COMPUTATIONAL FLUID DYNAMICS

Indira Gandhi University, Meerpur, Rewari

SCHEME OF STUDIES AND EXAMINATION
M.TECH 1st YEAR (MECHANICAL ENGINEERING)
SEMESTER 2
CBCS Scheme effective from 2019-20

Sl. No	Course Code	Subject	Credit Pattern				Examination Schedule (Marks)				Duration of Exam (Hours)	No of Hours/ week
			L	T	P	Total Credits	Marks of Class works	Theory	Practical	Total		
1	MTME201	Welding & Allied Processes	4	0	-	4	50	100	-	150	3	4
2	MTME202	Total Quality Management	4	0	-	4	50	100	-	150	3	4
3	MTME203	Seminar	-		-	1		-	-	25		1
4	MTME204	Mechatronics Lab	-	-	2	2	50	-	50	100	3	4
5	MTME205	Advanced Welding Lab	-	-	2	2	50	-	50	100	3	4
6	MTME206A or MTME206B or MTME206C	Elective-II	4	0	-	4	50	100	-	150	3	4
7	MTME207	Foundation Elective	2	0	-	2						
8	MTME208	Self Study Paper				1				25		-
		TOTAL	**20**									

NOTE: Examiner will set nine questions in total. Question One will be compulsory and will comprise short answer type questions from all sections and remaining eight questions to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each Unit.

Elective II : Choose any one from the following three papers:

MTME206A - MODELING & SIMULATION

MTME206B - JIGS & FIXTURE

MTME206C - TOOL & DIE DESIGN

Foundation Elective:

A candidate has to select this paper from the pool of Foundation Electives provided by the University.

General Instructions

1. **Seminar**

Max.Marks-25

Students are required to prepare a presentation on any topic, not from syllabus, assigned by the teacher concerned in the department on the theme/topic such as review of research papers/articles published in national or internal journal or any other research based paper in his/her area of interest. Every candidate will have to deliver a seminar of 15-20 minutes duration on the assigned topic. The seminar will be delivered in the presence of students and teachers of the department on any fixed week day of the semester.
The seminar will be evaluated by an internal committee of two internal teachers, constituted by the Chairperson of the Department. The evaluation (internal evaluation only) will be based on the presentation of the student, depth of subject matter of the topic and answer to questions. There will be a Coordinator to be nominated by the Chairperson of the Department among the teachers of the Department..

Distribution of marks will be as follows:
1. Presentation = 10 Marks

2. Relevancy & Depth of subject matter of the topic = 10 Marks

3. Answers to the Questions = 5 Marks

2. **Self Study Paper**

Max.Marks-25

The objective of this course is to create habits of reading books and to develop writing skills in a manner of creativity and originality. The students will select a topic of their interest with consultation with their teachers/In charge/mentors. After selecting a suitable title for the paper, the student will be required to prepare a hand written report about 6-10 pages in his/her own handwriting. The student will be required to submit the report after getting it checked by the concerned teacher and will be asked to resubmit the report after making the required correction (s) if any before the commencement of the examination of that semester. The structure of the paper will include the following:

- Introduction
- Main Body
- Conclusion

The thoughts presented in the paper must be original work of the students.
The paper will be evaluated by the panel (one external and one internal examiner) to be appointed by the Chairperson of Department from the prescribed panel of the University.
The evaluation of Self Study paper will be done as given below:

- Evaluation of the paper 15 Marks
- Viva-voce on the paper 10 Marks
- Total 25 Marks

MTME101- MICRO-MACHINING PROCESSES

L	T	P	CREDIT
4	0	0	4

SESSIONAL:50Marks
THEORY :100 Marks
TOTAL :150 Marks
DURATION OF EXAM. :3 Hrs.

UNIT-I

Introduction to New Machining Technologies: Micro electromechanical Systems (MEMS), Non Conventional Machining Process, Comparison of conventional machining processes and new technologies.

UNIT-II

Micro-electro-mechanical System Description, System Process, MicroElectromechanical systems paradigms, Materials for MEMS, Future trends: Mechanical Transducers, Optical Transducers, and Multi Disciplinary Applications.

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UNIT-III

Ultrasonic machining, Whirling jet machining, fundamental principles, process parameters characteristics, tool design, metal removal rate analysis, important part design, analysis of process. Machining Accuracy and Surface Finish Optimization.

Electro Chemical Machining- Introduction, principles, scheme, process parameters, metal removal rate, Electrochemical grinding: Introduction, tools, process parameters, metal removal rate, Honing, Accuracy and Surface finish Optimization.

UNIT-IV

EDM- Introduction – basic principles, metal removal rate, machining accuracy and surface finish optimization, selection of tool material and dielectric, analysis of process. Wire electric discharge machining: Principle, Process variables.

Reference Books:

1. Manufacturing Sciences by Ghosh & Malik.
2. Newer machining processes; H.S.Shan
3. Advance machining processes by B. Bhushan
4. Fundamentals of Micro-machining by M.J Madou CRC Press.

MTME102- COMPUTER AIDED DESIGN AND1 MANUFACTURING

L	T	P	CREDIT	
4	0	0	4	

SESSIONAL:50 Marks
THEORY :100Marks
TOTAL :150Marks
DURATION OF EXAM. :3 Hrs.

UNIT-I

Introduction :Introduction, Review of vectors & Matrices, Basics of geometric and solid modeling, explicit, implicit, intrinsic and parametric equations, coordinate systems. Transformations : Introduction , Transformation of points & lines,2-D Translation , Shearing, Rotation , Reflection, Scaling & Combined Transformation, Homogeneous Co-ordinates, 3- D Scaling, Shearing, Rotation , Reflection & Translation, Combined Transformation, orthographic , axonometric, oblique & perspective projections.

UNIT –II

Curves & Surfaces Geometry and topology, Algebraic & geometric forms of straight lines, circle, bezier curves & B – splines curves, blending functions, Reparametrization, plane surfaces, sixteen point forms, four curves form, ruled surfaces of revolution, Tabulated cylinder, lofted surfaces, bi-cubic surfaces, bezier surfaces, B-splines surfaces, Coons patch.

UNIT –III

Introduction to CAM, Computer Hardware & Software, APT Language, Introduction to NC, CNC & DNC Systems, Convention of Machine axis and coordinate systems. CNC tooling Machine Tools. Automatic tool changers. Open loop and closed loop systems. Adaptive control encoders.

UNIT-IV

Manual part programming, CNC part programming, canned cycles, G-codes & M-codes. High language programming: Flexible manufacturing systems, Computer aided process planning, and Automated Material handling.

Text Books:

1. CAD/CAM by M.P. Groover, PHI
2. CAD/CAM Theory and Practice, Teid
3. Understanding CAD/CAM by D.J. Bowman

Reference Book:

1. CAD/CAM Handbook, tiecholz
2. Computer Aided Manufacturing, P.N. Rao.

MTME103- I.C. ENGINES COMBUSTION AND POLLUTION

L	T	P	CREDIT	
4	0	0	4	

SESSIONAL:50 Marks
THEORY :100Marks
TOTAL :150Marks
DURATION OF EXAM. :3 Hrs.

UNIT-I

Fuel air Cycles analysis, Thermodynamics of combustion, Chemical equilibrium, Dissociation, Combustion Charts and gas tables for air fuel mixtures and the products of Combustion. Types of Hydrocarbons in Petroleum fuels, Gasoline grades, required properties of SI and CI engine fuels. Rating of fuels.

UNIT-II

Definition of combustion, combustion modes and flame types, review of property relation, Law of thermodynamics, reactant and product mixtures adiabatic flame temperature, chemical equilibrium and product of combustion. Laminar premixed flame, definition principle characteristics, factors, influencing flame velocity and thickness, flammability limits and quenching of laminar flow, ignition, turbulent flames : turbulent flame propagation, flame stabilization

UNIT-III

Burning of carbon, coal combustion, effect of pollutant emissions from premixed combustion and from non-premixed combustion. Detonation, principle, characteristics one-dimensional, detonation velocity, structure of detonation waves.

UNIT-IV

Pollution : Exhaust gases and analysis, orset apparatus , infrared analyzer, determination of air fuel ratios, air pollution and engines.

Text Books:

1. I.C engine Vol. 1 & 2 by Taylor
2. Thermodynamics and Gas Dynamics of IC engines, Vol. 1 & 2 by Horlock and Winter bone.

Reference Books:

1. I.C engine Vol 1 & 2 by Benson and Whitehouse.
2. Thermodynamics analysis of combustion engines, by Campbell

MTME104-MACHINE TOOL DESIGN

L	T	P	CREDIT	
4	0	0	4	

SESSIONAL:50Marks
THEORY :100Marks
TOTAL :150 Marks
DURATION OF EXAM. :3 Hrs.

UNIT-I

Introduction to Machine Tools and Mechanisms: General principles of machine tool design, working and auxiliary motions, machine tool drives, hydraulic and mechanical transmission and its elements, general requirements of machine tool design, layout of machine tools. Regulation of Speed and Feed Rates: Purpose, stepped regulation of speed-design of speed box, machine tool drives using multiple speed motors, developing the gearing diagram, step-less regulation of speed and feed rates.

UNIT- II

Machine Tool Structure: Functions and requirements, design criteria, materials used and their properties, static and dynamic stiffness, cross-sectional shapes used for machine tool structures and basic design procedure for the design of beds, columns and other structural elements, model techniques used in design, introduction to Finite Element Method (FEM).

UNIT- III

Guideways and Power Screws: Function and types, design considerations & procedure for slideways, design of power screws.

UNI -IV

Spindles and Spindle Supports: Functions and requirements, materials, effect of machine tool compliance on machining accuracy, design of spindles, bearings design/selection. Control Systems: Functions, requirements and classification, control systems for speeds, feeds & auxiliary motions, manual control systems, automatic control systems, adaptive control systems, criteria and economic selection of machine tools, future trends in development of machine tools.

Text Book:

Machine tool design By N.K.Mehta
Design of Machine Tool By S.K.Basu

MTME106- COMPUTER AIDED DESIGN & MANUFACTURING LAB

L	T	P	CREDIT
0	0	4	2

SESSIONAL/Class work: 50 Marks
Practical(external) : 50 Marks
TOTAL : 100 Marks
DURATION OF EXAM. : 3 Hrs.

LIST OF EXPERIMENTS

1. To create a 2-Dimensional Sketch with the help of all geometrical Shapes.
2. To list the coordinate of given diagram
3. To prepare a part programme for facing & turning operation on a CNC Lathe.
4. Prepare part programme for facing & taper turning operation on CNC Lathe in single cut programming in word address format.
5. To create a solid with all of all solid entities of basic solid modeling commands.
6. Practice Boolean operation on solids.
7. Create surface with help of ruled & the tabulated surfaces.
8. Create a surface with the help of a surface of revolution & edge surface.

MTME107 I.C. ENGINES COMBUSTION & POLLUTION LAB L T P
0 0 4

CREDIT(2)
Sessional : 50 Marks
Practical : 50 Marks
Total : 100 Marks

Duration of Exam. : 3 Hrs.

List of Experiments :

1. To study the constructional detail & working of two-stroke/ four stroke diesel engine.
2. Analysis of exhaust gases from single cylinder/multi cylinder diesel/petrol engine by Orsat Apparatus.
3. To prepare heat balance sheet on multi-cylinder diesel engine/petrol engine.
4. To find the indicated horse power (IHP) on multi-cylinder petrol engine/diesel engine by Morse Test.
5. To prepare variable speed performance test of a multi-cylinder/single cylinder petrol engine/diesel engine and prepare the curves (i) bhp, ihp,fhp, vs speed (ii) volumetric efficiency & indicated specific specific fuel consumption vs speed.
6. To find fhp of a multi-cylinder diesel engine/petrol engine by Willian's line method & by motoring method petrol engine.

MTME108-MICRO MACHINING PROCESSES LAB

L	T	P	CREDIT	
0	0	4	2	SESSIONAL:50 Marks Practical :50 Marks TOTAL :100 Marks DURATION OF EXAM. :3 Hrs.

LIST OF EXPERIMENTS

1. Study and applications of Abrasive Jet Machining.
2. Study and applications of Electrical Discharge M/C
3. Study and applications of Electrochemical Grinding
4. Study and applications of Ultrasonic Machining
5. Study and applications of Electrochemical Machining
6. Study and applications Jet Machining
7. Study and applications wire Electrical Discharge M/C

MTME109A - NUMERICAL METHODS AND COMPUTING

L	T	P	CREDIT	
4	0	0	4	

SESSIONAL:50 Marks
THEORY :100 Marks
TOTAL :150 Marks
DURATION OF EXAM. :3 Hrs.

UNIT-1 ERRORS IN NUMERICAL CALCULATIONS

Introduction. Numbers and their accuracy. Absolute. Relative and percentage errors and their analysis General error formula.

IN ERPOLATION AND CURV LIFTING

Taylor series and calculation of functions. Introduction to interpolation. Lagrange approximation. Newton polynomials. Chebyshev polynomials least squares fine. curve fitting. Interpolation by spline function

UNIT-2 NUMERICAL DEFFERENTIATION AND INTEGRATION

Approximating the derivative. Numerical differentiation formulas. Introduction to Numerical quadrature. Newton-cores formula. Gausion quadrature.

SOLUTION OF NONLINEAR EQUATIONS

Bracketing methods for locating a roor. Initial approximations and convergence criteria. Newton-Raphsen and secant methods. Solution of problems through a structural programming language such as C or pascal.

UNIT-3 SOLUTION OF LINEAR SYSTEMS

Direct Meghods. Gaussian elimination and pivoting. Matrix inversion. UV factorization. Iterative methods for linear systems solution of problems through a structured programming language such as C or Pascal. EIGEN VALUE PROBLEMS

Jacobi. Given's and Householder's methods for symmetric matrices. Rutishauser method for general matrices, power and inverse power methods solution of problems through a structured programming language such as C or Pascal.

UNIT-4 SOLUTION OF DIFFERENTIAL EQUATIONS

Introduction to differential equations. Initial value problems. Euler's methods. Heun's method. Runge- Kutta methods. Taylor series mefthod. Predictor-corrector methods. Systems of differential equations. Boundary valve problems. Finite-difference method. Solution of problems through a structured programming language such as C or Pascal.

PARTIAL DIFFERENTIAL EQUATIONS

Solation of hyperbolic. Parabolic and elliptic equations. The eigenvalue problem the power method and the Jacobi's method for eigen value problems. Solution of problems through a structured programming language such as C or Pascal.

Text Books:

1. Applied Numerical Analysis by Curtis E. Gerald and Patrick Q. Wheatley- published by Addition Wesley.
2. Applied Numerical Methods- carnahan. B.H. Luthar. H.A. and Wilkes. J.O. Pub-j. Wiley. New York

Reference Books:

1. Numerical Solution of Differential Equations. By M.K.Jain. published by Wiley Eastern. New York.
2. Introductory Methods of Numerical Analysis by S.D. Sastry. Published by Prentice Hall of India.
3. Numerical Methods- Hornbeek. R.W. Pub-prentice Hall. Englewood Cliffs. N.J.
4. Numerical Methods for Mathematics. Science and Engineering by John H.Mathews. PHI New Delhi

MTME109B-METHOD ENGINEERING AND ERGONOMICS

L	T	P	CREDIT	SESSIONAL:50 Marks
4	0	0	4	THEORY :100Marks
				TOTAL :150 Marks
				DURATION OF EXAM. :3 Hrs.

UNIT-I

Introduction to industrial engineering and productivity, measurement of productivity, Introduction to work study, methods study principles and motion economy, Filming techniques and micro-motion analysis, Introduction to work measurement. Time study, performance allowances, work sampling,

UNIT-II

Introduction of Ergonomics, system approach to ergonomic model, .Area of study covered under ergonomics ,man/machine systems, characteristics of man machine system, limitation of man & machine with respect to each other. Design approach: Work design consideration, General principles for carrying out the physical activities, Design of work place, machine at work place, seat for workplace.

UNIT-III

Controls: Criteria for control design, Hand controls and foot controls, Relationship between controls and display instruments, Controls for high precision work (Push buttons, Toggle switches, knobs etc.), Layout of panels and machine Displays:- Types of displays, Design recommendation for quantitative displays.

UNIT-IV

Climates:- Heat Humidity- Fundamentals of human thermal regulation, measuring the thermal environment, work in hot climate, work in cold climate protection against climatic extremes, effect of climate on performance.

Noise:- Terminology, physiological effects of noise, annoyance of noise, speed interference, hearing loss, temporary and permanent threashold shift, effect of noise on performance reduction of noise, personal noise protection.

Text Books:

1. Method Engineering study – Krick, S.V.
2. Work study and Ergonics – Suresh Dalela, Saurabh.

Reference Books:

1. Introduction of Ergonomics-Bridger-Tata McGraw Hill 1995
2. Work Study - Khanna– Dhanpat Rai & Sons-1995

MTME109C-COMPUTATIONAL FLUID DYNAMICS

L	T	P	CREDIT	
4	0	0	4	

SESSIONAL:50 Marks
THEORY :100 Marks
TOTAL :150 Marks
DURATION OF EXAM. :3 Hrs.

UNIT-1 Introduction

History of CFD: Comparison of the three basic approaches in engineering problems solving analytical. Experimental and computational methods. Beam advance in computational techniques.

UNIT-II Problem formulation

The standard procedure for formulating a problem physical and mathematical classification of problems: types of governing differential equations.

Methods of Discretisation:

Basic of finite difference method: Finite element method. Finite volume method and spectral method. Treatment of boundary conditions.

UNIT-III Numerical solution of Heat conduction problems:

Steady-state problems: (i) One dimensional heat conduction transfer through a pin-fin- din, two dimensional conduction through a plate unsteady state problem: One dimensional transient heat conduction. Explicit and implicit methods. Stability of numerical methods.

UNIT-IV Numerical solution of fluid flow problems

Types of fluid flow and their governing equation: Viscous incompressible flows calculation of flow field using the stream function-vorticity method: calculation of boundary layer over a flet plate: Numerical algorithm for solving complete Navier- Stokes equation-MAC method SIMPLE algorithm: Project Problem.

Books recommended:

Numerical heat transfer and fluid flow by Suhas V. Patankar, taylor and francis.
Computational fluid dynamics by J. Anderson

MTME201- WELDING AND ALLIED PROCESSES

L	T	P	CREDIT	
4	0	0	4	

SESSIONAL: 50 Marks
THEORY : 100 Marks
TOTAL : 150 Marks
DURATION OF EXAM. : 3 Hrs

UNIT 1.

Introduction: Basic classification of welding processes, weldability, weld thermal cycle, metallurgy of fusion welds, solidification mechanism and microstructural products in weld metal, epitaxial, cellular and dendritic solidification, metallurgical changes in weld metal, phase transformation during cooling of weld metal in carbon and low alloy steel, prediction of microstructures and properties of weld metal. Heat affected zone, re-crystallization and grain growth of HAZ, gas metal reaction, effects of alloying elements on welding of ferrous metals.

Welding Arc: Arc efficiency, temperature distribution in the arc; arc forces, arc blow, electrical characteristics of an arc, mechanism of arc initiation and maintenance, role of electrode polarity on arc behaviour and arc stability, analysis of the arc.

Types of electrodes, AWS and Indian system of classification and coding of covered electrode for mild steel, Shielding gases and associated mixtures

UNIT 2.

Metal transfer : Short circuit/ dip transfer. Free flight. Globular type. Spray type, Forces affecting metal transfer. Weld bead geometry and shape factors, Weld dilution.

Electric arc welding principle, MIG: - welding equipment and processes, shielding gas, types of metal transfer. Tungsten inert gas arc welding (GTAW): - welding equipment, electrodes, inert gases and torches. Submerged arc welding (SAW):- principle of processes, applications, fluxes and welding electrodes used. CO_2 welding: - difference from MIG welding, Principle of operation, equipment, welding parameters and applications.

UNIT 3.

Solid state welding: Introduction, main features and applications of Ultrasonic welding, Friction welding,FRICTION STIR WELDING ,FRICTION STIR PROCESSING and Explosive welding.

Welding of plastics: Difficulties in welding of Plastics, Processes for welding of Plastics.

Surfacing and metal spraying: Surfacing methods such as SMAW, MIG, TIG, SAW. Thermal spraying: Introduction, Procedures, Applications, Advantages and Disadvantages.

Under water Welding: Introduction, methods and applications.

UNIT 4.

Automation in Welding: Introduction, Semiautomatic welding, Automatic welding, Welding mechanization, Flexible Automated Welding, Robotic welding, Types of Welding Robots, Robot Selection Mechanics, Joint tracking system.

REFERENCE BOOKS

1. Welding processes & technology by Dr. R.S.Parmar Khanna Publishers
2. Welding Engineering & Technology by Dr. R.S.Parmar Khanna Publishers
3. Modern Arc Welding Technology by S.V. Nandkarni Oxford & IDH publishing Co. Principles of Welding Technology by L.M. Gourd ELBS/ Edward Arnold
4. The Physics of welding by Lancaster; Pergaman Press.
5. The Metallurgy of welding by Lancster; George Allen & Unwin Ltd. U.K. Welding handbook, Vol. 1 & 2, seventh edition; American welding society. Metal Handbook, Vol 6, 73; ASME
6. Procedure Handbook of ARC welding; Lincoln Electric Co. USA.
7. The Solid phase welding of metals by Tylecote; Edward Arnold Pvt. Ltd. Welding & Welding Technology Richard L. Little, McGraw Hill. Welding Technology by Rossi; McGraw Hill.
8. Welding Technology by Koenigsberger and Adaer; Macmillan.

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MTME202- TOTAL QUALITY MANAGEMENT

L	T	P	CREDIT	
4	0	0	4	

SESSIONAL:50 Marks
THEORY :100Marks
TOTAL :150 Marks
DURATION OF EXAM. :3 Hrs.

UNIT1.

1. **TQM Perspective and TQM Implementation:**
   Quality, Chain Reaction, Dimensions of Quality, Evolution Of Quality, Quality Control, Quality Assurance, Quality Planning, Quality Improvement, Quality Management, Total Quality Management, Cost Of Quality, Classification of Failure Cost, Reducing Costs, Juran's Model Of Optimum Quality Costs, Analysis of COQ For Improvement, Analysis Of External Nd Internal Failure Costs, TQM, Elements Of TQM, Leadership For TQM, Demings 14 Points For Top Management, TQM Tools And Techniques, PDSA, Barriers For TQM Implementation

UNIT 2.

2. **TQM principles and Strategies:**
   Customer Satisfaction & Employee Involvement.
   Service Quality, Features Of Services, The Kano Model, Employee Motivation, Motivation Theory Of Individual Employees, Effective Communications, Training And Mentoring, Recognition And Reward.
   Continuous Process Improvement and Process Approach.
   Juran's Triology, Kaizan, PDCA, Seven Quality Tools, BPR, Seven Deadly Wastes, ETX Model, Lean Manufacturing, Kanban System, Cellular Manufacturing, Single Piece Flow, Zero Defects

UNIT 3.

3. **Statistical Process Control & TQM Tools**
   The Seven Quality Control Tools, Standard Normal Distribution, AQL, Seven Management Tools, Benchmarking, QFD, Taguchi's Design, TPM,FMEA

Unit 4.

4. **Quality Systems**
   ISO9000 standard, EMS14001, Quality Awards

5. Supplier Partnership and Performance Measures-

   Importance Of Suppliers, Selection And Standards, Quality Audit, Product Audit, Vendor Rating System, PDCA For Measurements, Performance Measure Design, BSC.

REFERENCE BOOKS:

1. "Total Quality Management" by Oakland (Butterworth - Heinamann Ltd.)
2. "Managing for total quality from Deming to Taguchi and SPC" by Logothetis N. (PHI)
3. "Total Quality Control" by Feigenbaum A.V. (MGH)
4. "Total Quality Management" by Besterfield Dale H (Pearson Education)
5. "A slice by slice guide to TQM" by John Gilbert (Affiliated East West Press).
6. "The TQM toolkit - a guide to practical techniques for TQM" by Waller Jenny, Allen Derek and Burna Andrew (Kogan Page)

MTME204- MECHATRONICS LAB

L	T	P	CREDIT	
0	0	4	2	

SESSIONAL:50 Marks
Practical :50Marks
TOTAL :100 Marks
DURATION OF EXAM. :3 Hrs.

1. Study of sensor & Transducers.
2. Study of operational Amplifier
3. Study of Pneumatic & Hydraulic System
4. Study of Mechanical System
5. Study of Computer & Microprocessor equipments
6. Study of Programmable controller

MTME205- ADVANCED WELDING LAB

L	T	P	CREDIT	
0	0	4	2	

SESSIONAL:50 Marks
Practical :50 Marks
TOTAL :100 Marks
DURATION OF EXAM. :3 Hrs.

LIST OF EXPERIMENTS IN WELDING

1. To study Heat flow in Welding (Equipment for

use-Gas Weldingequipment)

2. To study tensile property, Bead Geometry, Hardness of Bead, Micro structure of welding Bead in caseof:

i) MIG Welding ii) TIG Welding

iii) SAW Welding iv)Arc welding

3 To study mechanical behaviour(tensile strength Hardness of Bead, Micro structure of welding Bead ,impact strength ,corrosion and wear ,fatigue behaviour)in case of.

1. Friction stir welding
2. Friction stir processing

MTME206A-MODELLING & SIMULATION

L	T	P	CREDIT	
4	0	0	4	

SESSIONAL:50 Marks
THEORY :100 Marks
TOTAL :150 Marks
DURATION OF EXAM. :3 Hrs.

UNIT-I

Concept of system, system environment, elements of system, system modeling, types of models, Monte Carlo method. System simulation- a management laboratory, advantages & limitations of system simulation, continuous & discrete systems.

UNIT-II

Simulation of Continuous systems: Characteristics of a continuous system, comparison of numerical integration with continuous simulation system. Simulation of an integration formation.

Simulation of discrete systems: Time flow mechanisms, discrete and continuous probability density functions, Generation of random numbers, testing for randomness and for auto correlation, generation of random veriates for discrete distribution.

UNIT-III

Simulation of Queuing system: Concept of queuing theory, characteristics of queues, stationary & time dependent queues, Queue discipline, time series analysis, measure of system performance, kendal's notation, simulation of single sever queues multi-server queues.

Simulation of inventory systems: Rudiments of inventory theory, MRP, in process inventory, necessity of simulation I inventory problems, forecasting & regression analysis, forecasting through simulation.

UNIT-IV

Design of simulation experiments: Length of run, elimination of initial bias, variance reduction techniques, stratified sampling, antipathetic sampling, common random numbers.

Simulation languages: Continuous & discrete simulation languages, block structure, continuous languages, special purpose simulation languages, SIMSCRIPT, GPSS, SIMULA, importance & limitation of special purpose languages.

Text Books:

1. System simulation by Gordon
2. System simulation by Hira

MTME206B-JIGS AND FIXTURES

L	T	P	CREDIT	
4	0	0	4	

SESSIONAL:50 Marks
THEORY :100 Marks
TOTAL :150 Marks
DURATION OF EXAM. :3 Hrs.

UNIT -I

Degree of freedom & Restrain, Location methods, Design of guide pins & dowel pins, Location of irregular geometrical product, Calculation of forces & Torque exerted by machining methods.

UNIT -II

Purpose types and functions of jigs and fixtures, Tool design objectives - Production devices-Inspection devices-Materials used in Jigs and Fixtures – Types of Jigs - Types of Fixtures-Mechanical actuation-pneumatic and hydraulic actuation-Analysis of clamping force-Tolerance and error analysis.

UNIT -III

Jigs, Drill bushes –different types of jigs-plate latch, channel, box, post, angle plate, angular post, Turnover, pot jigs-Automatic drill jigs-Rack and pinion operated. Air operated Jigs components. Design and development of jigs for given components.

UNIT -IV

Fixtures for machining and inspection, General principles of boring, lathe, milling and broaching fixtures- Grinding, planning and Shaping fixtures, assembly, Inspection and welding fixtures- Modular fixtures. Design and development of fixtures for given component.

Text Books:

1. Edward G Hoffman, “Jigs & Fixture Design”, Thomson – Delmar Learning, 5004
2. Donaldson. C, “Tool Design”, Tata McGraw-Hill, 1986

Reference Books:

1. Kempster, “Jigs & Fixtures Design”, The English Language Book Society, 1978
2. Joshi, P.H., “Jigs & Fixtures”, Second Edition, Tata McGraw-Hill Publishing Company Limited, 5004
3. Hiram E Grant, “Jigs and Fixture”, Tata McGraw-Hill, 5003
4. “Fundamentals of Tool Design”, CEEE Edition, ASTME, 1983
5. PSG College of Technology, Coimbatore – Design DataHandbook

MTME206C- TOOL AND DIE DESIGN

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SESSIONAL:50 Marks
THEORY :100 Marks
TOTAL :150 Marks
DURATION OF EXAM. :3 Hrs.

UNIT -I

Tools Materials and their heat treatment, Mechanism and geometry of chip formation, effect of large and small shear angles on chip thickness and length of shear planes study of cutting forces, friction forces, mean shear strength coefficient of for cutting, method of calculating the metal remove rate. Influence of rake angle side cutting edge & nose radius on cutting forces. Relationship between temperature and hardness of cutting tool materials, Tool geometry of single point and Multipoint Cutting Tool

UNIT - II

Press working terminologies and elements of dies and strip lay out, Press working terminology-Presses and press accessories-Computation of capacities and tonnage requirements. Elements of progressive combination and compound dies: Die block die shoe. Bolster plate-punch plate-punch holder-guide pins and bushes – strippers – knockouts-stops – pilots-Selection of standard die sets
strip lay out-strip lay out
calculations.

UNIT -III

Design and development of dies, Design and development of progressive and compound dies for Blanking and piercing, operations. Bending dies – development of bending dies- forming and drawing dies-Development of drawing dies. Design considerations in forging, extrusion, casting and plastic dies

UNIT- IV

Plastic as a tooling material, commonly used plastic for tooling material, application of epoxy plastic tools, Construction methods of plastic tooling, Metal forming operation with Urethane dies. Calculating forces for Urethane pressure pads.

Text Books:

1. Tool Design by Cyril Donation, George H. Lecain, V C Goold.
2. Edward G Hoffman, “Jigs & Fixture Design”, Thomson – Delmar Learning, 5004
3. Donaldson.C, “Tool Design”, Tata McGraw-Hill, 1986

Reference Books:

1. Kempster, “Jigs & Fixtures Design”, The English Language Book Society, 1978
2. Joshi, P.H., “Jigs & Fixtures”, Second Edition, Tata McGraw-Hill Publishing Company Limited, 5004
3. Hiram E Grant, “Jigs and Fixture”, Tata McGraw-Hill, 5003
4. “Fundamentals of Tool Design”, CEEE Edition, ASTME, 1983
5. PSG College of Technology, Coimbatore - Design Data Handbook