B.Tech. Final YEAR (SEMESTER – VIII) MECHANICAL ENGINEERING
Credit Based Scheme w.e.f. 2015-16

S. No.	Course No.	Course Title	Teaching Schedule L	T	P	Marks of Class work	Examination Marks Theory	Practical	Total	Credit	Duration of Exam
1	ME 402B	COMPUTER AIDED DESIGN	3	1		25	75	-	100	4	3
2	ME 404B	MECHANICAL VIBRATION	3	1		25	75	-	100	4	3
3		ELECTIVE I	4	-		25	75	-	100	4	3
4		ELECTIVE II	4	-		25	75	-	100	4	3
5	ME 406B	COMPUTER AIDED DESIGN LAB	-	-	2	20		30	50	1	3
6	ME 408B	SEMINAR	-	-	2	50			50	2	-
7	ME 413B	PROJECT	-	-	8	75	-	125	**200**	8	3
8	GFME 402B	GENERAL FITNESS FOR THE PROFESSION	1	-	-		-	100	100	4	3
Total			**15**	**2**	**12**	**245**	**300**	**255**	**800**	**31**	

Elective – I		**Elective -II**	
ME 432B	Optimization Method s for Engineering Systems	ME442B	Robotics Engineering
ME 434B	Automobile Design	ME444B	Ergonomics and Work Place Design
ME 436 B	Mechatronics	ME446B	Modern Manufacturing Processes
ME 438B	Flexible Manufacturing System	ME448B	Emerging Automotive Technologies
ME 440B	Manufacturing Management	ME450B	Reliability Engineering

Note:

23 Every stu d ent has to p articip ate in the sp orts activities. Minim u m one hou r is fixed for sp orts activities either in the m orning or evening. Weightage of Sp orts is given in General Fitness For The Profession Syllabus.

24 The choice of the stu d ents for any elective shall not be bind ing for the d ep artm ent to offer, if the d ep artm ent d oes not have exp ertise. **The minimum strength of the students should be 20 to run an elective course.**

25 The stu d ents w ill be allow ed to u se non -p rogram m able scientific calcu lator. H ow ever, sharing/exchange of calculator is prohibited in the examination.

26 Electronics gadgets including Cellular phones are not allowed in the examination

27 Project coord inator w ill be assigned the p roject load of m aximu m of 2 hrs. p er w eek inclu d ing his ow n gu id ing load of one hr. H ow ever, the gu id ing teacher w ill be assigned m axim u m of one p eriod of teaching load irrespective of number of students/groups under him/her.

ME 402B COMPUTER AIDED DESIGN

B. Tech. Semester – VIII (Mechanical Engineering)							
L	**T**	**P**	**Credits**		**Class Work**	**:**	**25 Marks**
3	**1**	**--**	**4**		**Examination**	**:**	**75 Marks**
					Total	**:**	**100 Marks**
					Duration of Examination	**:**	**3 Hours**

UNIT I

INTRODUCTION: Introd u ction to CAD/ CAM, H istorical d evelop m ents, Ind u strial look at CAD/ CAM, Introd u ction to CIM; Basics of geom etric and solid m od elling, exp licit, Im p licit, intrinsic and parametric equations coordinate systems.

TRANSFORMATIONS: Introd u ction, transformation of p oints and line, 2-D rotation, reflection, scaling and com bined transformation, hom ogeneou s coord inates, 3-D scaling, shearing, rotation, reflection and translation, com bined transform ations, orthograp hic and p ersp ective p rojections, reconstruction of 3-D objects.

UNIT II

CURVES: Algebraic and geometric forms, tangents and normal, blending fu nctions re-parametrization, straight lines, conics, cubic splines, Bezier curves and B-spline curves.

SURFACES: Algebraic and geom etric forms, tangents and norm al, blend ingfu nctions,

rep aram etrization, sixteen p oint form , fou r cu rve form , p lane su rface, ru led su rface Su rface of revolution, tabulated cylinder, bi-cubic surface, bezier surface, B-spline Surface.

UNIT III

SOLIDS: Solid m od els and rep resentation schem e, bou nd ary rep resentation, constru ctive Solid geometry, sweep representation, cell decomposition, spatial occupancy Enumeration

UNIT IV

FIN ITE ELEMEN T MOD ELLIN G: Typ e of FE analysis; Degree of freed om ; Influ ence coefficient; Elem ent and stiffness equ ations; Ap plication of FE analysis to 1-D p roblem ; Assem bly p roced u re; General structure of FE analysis procedure.

TEXT BOOKS:

CAD/ CAM by Groover and Zimmer, Prantice Hall.

CAD/ CAM Theory and Practice by Zeid, McGraw Hill

Mathem atical Elem ents for com p u ter Grap hics by David F. Rogers and J. Alan Ad am s, Published by Mc Graw Hill, New York

REFERENCE BOOKS:

CAD/CAM (Princip les, Practice & Manu factu ring Managem ent) by Chirs Mc Mohan & Jim m ie Browne, Published by Addison- Wesley.

Note:

In the sem ester exam ination, the exam iner w ill set tw o qu estions from each u nit (total 08 qu estions in all), covering the entire syllabu s. The stu d ents w ill be requ ired to attem p t only 5 questions selecting at least one question from each unit.

The u se of scientific calcu lator w ill be allow ed in the exam ination . H ow ever, p rogram mable calculator and cellular phone will not be allowed.

ME 404B MECHANICAL VIBRATION							
B. Tech. Semester – VIII (Mechanical Engineering)							
L	**T**	**P**	**Credits**		**Class Work**	**:**	**25 Marks**
3	**1**	**--**	**4**		**Examination**	**:**	**75 Marks**
					Total	**:**	**100 Marks**
					Duration of Examination	**:**	**3 Hours**

UNIT-I

BASIC CONCEPT & SINGLE DEGREE OF FREEDOM SYSTEM-UNDAMPED AND DAMPED

Classifications of Vibrations: Free and Forced , Und am p ed and Dam p ed , Linear and N on -linear, Deterministic and Random, Harmonic Motion, Vector and Complex Number Representations

Single Degree of Freed om system , Governing equ ations u sing D'Alem berts Princip al, concep t of viscou s d am p ing, resp onse of Free Dam p ed Vibrations (Und er Dam p ing, Critical and Over Dam p ing), Logarithm ic Decrem ent, d eterm ination of Stru ctu ral d am p ing, d eterm ination of natu ral frequency of vibratory systems using Energy Method, Equivalent systems

UNIT –II

FORCED VIBRATIONS

Governing equ ation u nd er harm onic excitation and resp onse u sing techniqu es of calcu lu s and p hasor d iagram , Magnification factor, Active and p assive vibration isolation, Forced and Motion Transm issibility, Rotating and Recip rocating u nbalance, Critical Sp eed s and Whirling of Rotating Shafts Vibration isolation materials

Transient Response, Impulse Excitation, Response to Step Excitations

UNIT-III

MULTI DEGREE FREEDOM SYSTEM AND NUMERICAL TECHNIQUES

Tw o Degrees of Freed om System s, N orm al Mod e Vibrations, Coord inate Cou p ling, Princip al Coord inates, Free Vibrations in Term s of Initial Cond itions, Forced H arm onic Vibrations, Sim p le Vibration Absorber

Mu lti d egrees of Freed om System s , Eigen valu e p roblem s-close cou p led system and far cou p led system s u sing influ ence coefficient, N atu ral Frequ encies and N orm al Mod es, Orthogonality of N orm al Mod es, Method of Matrix Iteration, Introd u ction to vibration of continu ou s system w ith the help of lateral vibration of Beam , Dunkerley's method and Rayleigh's method

UNIT-IV

VIBERATION MEASEUREMENT AND CONDITION MONITERING

Princip le of seism om eter and accelerom eter ,Basic Vibration m easu ring set u p s- am p litu d e and p hase measurement ;vibration p ick-u ps, w orking p rinciple of p iezoelectric accelerom eter and ed d y cu rrent based displacement probe, bending critical speed of simple shaft

Fourier series and Fourier transform, Condition monitoring- its need and types; concept of 1X, 2X,3X,- vibration signals in a rotating machines.

Reference Books:

Theory of Vibrations with Applications W.T. Thomson, Prentice Hall of India.
Mechanical Vibration : G.K. Grover and S.P. Nigam, Nem Chand and Sons
Mechanical Vibrations: Thammaiah Gowda, Mc-Graw Hill
Theory and Practice of Mechanical Vibrations J.S. Rao and K. Gupta, Wiley Eastern Ltd.
Mechanical Vibrations S.S. Rao, Addison – Wesely Publishing Company

Note:

In the sem ester exam ination, the exam iner w ill set tw o qu estions from each u nit (total 08 qu estions in all), covering the entire syllabu s. The stu d ents w ill be requ ired to attem p t only 5 questions selecting at least one question from each unit.

The u se of scientific calcu lator w ill be allow ed in the exam ination . H ow ever, p rogram mable calculator and cellular phone will not be allowed.

ME 406B COMPUTER AIDED DESIGN LAB

B. Tech. Semester – VIII (Mechanical Engineering)

L	T	P	Credits		Class Work	:	20 Marks
--	--	2	1		Examination	:	30 Marks
					Total	:	50 Marks
					Duration of Examination	:	3 Hours

The students w ill be required to carry out the follow ing exercises using any one of the educational CAD softw ares like Latest version of AutoCAD , I-D EAS, CATIA, SOLID ED GE, PRO-ENGINEER etc

LIST OF EXPERIMENTS/ EXERCISES

UNIT I

Start a N ew Draw ing, N am e the Draw ing Sheet, Set the Draw ing Units, Draw ing Precision, Draw ing Lim its, Grid , Snap and Draw the Margin and Title Block as given in Exercise Problem s Sheet.

Draw Front, Top , Right Sid e and Orthogonal view of each of the objects in given Exercise Problems Sheet using View Port commands.

UNIT II

Draw 3D Su rface Mod els of the Objects as given in Exercise Problem s Sheet, u sing fu nd am ental of 3D Drawing and Surface commands

Draw 3D Solid Mod els of the Objects as given in Exercise Problem s Sheet, u sing fu nd am ental of 3D Drawing and Solid commands

UNIT III

Draw 3D Su rface Mod els of Mechanical and Au tom obile Sheet m etal com p onents as given in Exercise Problems Sheet.

Draw 3D Solid Mod els of Mechanical and Au tomobile Solid Metal com p onents as given in Exercise Problems Sheet.

Draw 3D Mod els of Sim p le Mechanical and Au tom obile Assem blies as given in Exercise Problems Sheet.

Note: **For class w ork, the students should be assigned to prepare at least ten draw ing sheets covering all units and each topic/ experiment/exercise of the syllabus.**

For practical examination, the examiner should set a question paper containing total three questions, one questions from each unit covering all units and each topic/experiment/exercise of the syllabus; students are required to attempt all the three questions.

ME 408B SEMINAR							
B. Tech. Semester – VIII (Mechanical Engineering)							
L	**T**	**P**	**Credits**		**Class Work**	**:**	**50 Marks**
--	--	**2**	**2**				

The objectives of the course remains

- To learn how to carry out literature search
- To learn the art of technical report writing
- To learn the art of verbal communication with the help of modern presentation techniques

A student will select a topic in emerging areas of Engineering & Technology and will carry out the task under the observation of a teacher assigned by the department.

He/ She will give a seminar talk on the same before a committee constituted by the chairperson of the d epartment. The committee should comprise of three faculty members from different specializations. The teacher associated in the committee will be assigned 2 hours teaching load per week.

However, guiding students' seminar will not be considered towards teaching load.

The format of the cover page and the organization of the body of the seminar report for all the undergraduate programs will be finalized and circulated by the Dean, Faculty of Engineering and Technology.

ME 413B PROJECT							
B. Tech. Semester – VIII (Mechanical Engineering)							
L	**T**	**P**	**Credits**		**Class Work**	**:**	**75 Marks**
--	--	**8**	**8**		**Examination**	**:**	**125Marks**
					Total	**:**	**200 Marks**
					Duration of Examination	**:**	**3 Hours**

The project started in VII Semester will be completed in VIII Semester and will be evaluated through a panel of examiners consisting of the following:

Chairperson of Department	: Chairperson
Project coordinator External	: Member
expert	: To be appointed by the University

The student will be required to submit two copies of his/her project report to the department for record (one copy each for the department and participating teacher).

Project coordinator will be assigned the project load of, maximum of 2 hrs. per week including his own guiding load of one hr. However, the guiding teacher will be assigned maximum of one period of teaching load irrespective of number of students/groups under him/her.

The format of the cover page and the organization of the body of the report for all the B. Tech. will be finalized and circulated by the Dean, Faculty of Engineering and Technology.

ME 432B OPTIMIZATION METHODS FOR ENGINEERING SYSTEMS

B. Tech. Semester – VIII (Mechanical Engineering)

L	T	P	Credits				
4	-	--	4		Class Work	:	25 Marks
					Examination	:	75 Marks
					Total	:	100 Marks
					Duration of Examination	:	3 Hours

UNIT I

INTRODUCTION: Unimod el objective Fu nction, Classification; Op tim ization Techniqu es, Levels of optimization, Mathematically representation of optimization problem.

Single Variable and Mu ltivariable Op tim ization m ethod s w ith and w ithou t constraints (equ ality), Calculus methods of optimization.

UNIT II

SEARCH METHOD S: Elim ination Method s – Dichotom ou s Search, Fibonacce and Gold en Section Method s; Unconstrained Minimization Method s: Univariate, Conju gate Directions, Grad ient and Variable Metric Methods.

INTERPOLATION METHODS – Quadratic and Cubic Interpolation Methods.

UNIT III

CON STRAIN ED MIN IMIZATION METHOD S: Characteristics of a constrained p roblem ; conversion of constrained to u nconstrained p roblem , Direct Method s of feasible d irections; Ind irect Methods of interior and exterior penalty functions.

GEOMETRIC PROGRAMMIN G: ap p licability, d egree of d ifficu lty, p roblem form u lation and Solutions of Unconstrained and Constrained problems.

UNIT VI

D YN AMIC PROGRAMMIN G: Concep t of Su b-op tim ization and the principle of op tim ality; Calcu lu s, Tabu lar and Com p u tational Method s in Dynam ic Program m ing; An Introd u ction to Continuous Dynamic Programming.

IN TEGER PROGRAMMIN G : Gom ory's Cu tting Plane Method for Integer Linear Program m ing; Formulation & Solution of Integer Polynomial and Non-linear problems.

Text Books :

Optimization (Theory & Applications) – S.S. Rao, Wiley Eastern Ltd., New Delhi.
Op tim ization Concep ts and Ap p lications in Engineering - Ashok D. Belegu nd u and Tiru p athi R Chandrupatla - Pearson Education.

Reference Books :

Optimization: Theory and Practice, C.S.G. Beveridge and R.S. Schechter, MGH, New York.

Note:

In the sem ester exam ination, the exam iner w ill set tw o qu estions from each u nit (total 08 qu estions in all), covering the entire syllabu s. The stu d ents w ill be requ ired to attem p t only 5 questions selecting at least one question from each unit.

The u se of scientific calcu lator w ill be allow ed in the exam ination . H ow ever, p rogram mable calculator and cellular phone will not be allowed.

ME 434B AUTOMOBILE DESIGN

B. Tech. Semester – VIII (Mechanical Engineering)

L	T	P	Credits				
4	-	--	4		Class Work	:	25 Marks
					Examination	:	75 Marks
					Total	:	100 Marks
					Duration of Examination	:	3 Hours

UNIT I

FRAME: Stu d y of Load s, Mom ents and Stresses on Au tom obile Fram e Mem bers. Design of Fram e for Passenger and Commercial Vehicles.

SUSPENSION SPRINGS: Design of Leaf Sp rings, Coil Sp rings and Torsion Bar Sp rings for automobile.

UNIT II

FRONT AXLE: Analysis of Loads, Moments and Stresses at different sections of Front Axle.

BEARINGS: Determ ination of Bearing Load s at Kingp in Bearings. Wheel Spind le Bearings, Choice and selection of Bearings

UNIT III

STEERIN G SYSTEMS: Determ ination of Op timu m Dim ension and Prop ortions for Steering Linkages ensuring minimum error in Steering.

D RIVE LIN E AN D READ AXLE: Design of Prop eller Shaft, Design of Final Drive Gearing, Design d etails of Fu ll-floating, Sem i-floating and Three Qu arter Floating, Rear Axle Shafts and Rear Axle Housings.

UNIT IV

CLUTCH: Type of Clutches, Torque capacity of Clutch. Design of Clutch Components

GEAR BOX: Design of Three Speed and Four Speed Gear Boxes.

TEXT BOOKS:

Dean Averns,Automobile Chassis Design, llliffe Books
Heldt, P.M., Automotive Chassis, Chilton Co., New York
Automobile Design Problems, K M Aggarwal, Satya Prakashan, New Delhi
Auto Design, R B Gupta, Satya Prakashan, New Delhi
Automobile Engineering, R B Gupta, Satya Prakashan, New Delhi

REFERENCE BOOKS:

Steeds.W., Mechanics of Road Vehicles, llliffee Books Ltd., London
Giles, J.G. Steering, Suspension and Tyres, llliffee Books Ltd., London,.
Newton, Steeds & Garret, Motor Vehicle, llliffee Books Ltd., London,.
Heldt, P.M. Torque Converter, Chilton Book Co., New York,

Note:

In the sem ester exam ination, the exam iner w ill set tw o qu estions from each u nit (total 08 qu estions in all), covering the entire syllabu s. The stu d ents w ill be requ ired to attem p t only 5 questions selecting at least one question from each unit.

The u se of scientific calcu lator w ill be allow ed in the exam ination . H ow ever, p rogram m able calculator and cellular phone will not be allowed.

ME 436B MECHATRONICS

B. Tech. Semester – VIII (Mechanical Engineering)							
L	**T**	**P**	**Credits**		**Class Work**	**:**	**25 Marks**
4	**-**	**--**	**4**		**Examination**	**:**	**75 Marks**
					Total	**:**	**100 Marks**
					Duration of Examination	**:**	**3 Hours**

UNIT I

IN TROD UCTION AN D BASICS: What is Mechatronics?; A Measu rem ent System w ith its Loop constitu ent elem ents; Op en and Closed Systems; Sequ ential Controllers; Micro-p rocessor Based Controllers; Mechatronic Approach.

HARD WARE OF MEASUREMEN T SYSTEMS: A review of Displacem ent, Position Velocity, Motion, Force, Flu id Pressu re, Liqu id Flow , Liqu id Level, Tem p eratu re, Light Sensors / alongwith Performance Term inology; Selection of Sensors; Inp u t Data by Sw itches; Signal Cond itioning; Brief Review of Op erational Am p lifier; Protection; Fitering; Wheat Stone Brid ge; Digital Signals; Mu ltip lexers; Data Acqu sition; Digital Signal Processing; Pu lse Mod u lation; Data Presentation Systems – Disp lays; Data Presentation Elem ents; Magnetic Record ing; Data Acqu isition System s; Testing & Calibration; Problems.

UNIT II

PN EUMATIC, HYD RAULIC, MECHAN ICAL AN D ELECTRICAL ACTUATION SYSTEMS: Pneu matic and H yd rau lic System s; Directional Control Valves; Valve Sym bols; Pressu re Control Valves; Cylind er Sequ encing; Process Control Valves; Rotary Actu ators; Mechanical Systems – Types of Motion, Kinem atic Chains, Cam s, Gear Trains, Ratchet & Paw l, Belt & Chain Drives, Bearings, Mechanical Asp ect of Motor Selection; Electrical System s; Mechanical & Solid State Sw itches; Solenoids; D.C. & A.C. Motors; Stepper Motors; Problems.

SYSTEM MOD ELIN G AN D PERFORMAN CE: Engineering, System s; Rotational – Translational System s; Electro-m echanical System s; H yd rau lic – Mechanical System s; A review of m od eling of First and Second Ord er System s and Perform ance Measu res; Transfer Fu nctions for first ord er System , Second Ord er System , System s in series & System s w ith Feed back Loop s; Frequ ency Resp onse of First Ord er and Second Ord er System s; Bod e Plots: Perform ance Sp ecifications: Stability; Problems.

UNIT III

CLOSED LOOP CON TROLLERS: Continu ou s and Discrete Processes – Lag, Stead y State Error; Control Modes; Two- step Mode; Proportional Mode – Electronic Proportional Controllers; Derivative Control – Proportional plus Derivative Control; Integral Control - Proportional plus Integral Control; PID Controller – Op erational Am p lifier PID Circu its; Digital Controllers – Implementing Control Mod es; Control System Perform ance; Controller Tu ning – Process Reaction Method & Ultimate Cycle Method; Velocity Control; Adaptative Control; Problems.

D IGITAL LOGIC AN D PROGRAMMABLE LOGIC CON TROLLERS : A Review of N u m ber System s & Logic Gates; Boolean Algebra; Kanau gh Map s; Sequ ential Logic; Basic Stru ctu re of Program m able Logic Controllers; Inp u t/ Ou tp u t Processing; Program m ing; Tim ers, Internal Relays and Cou nters; Master & Ju m p Controls; Data H and ling; Analogu e Inp u t/ Ou tp u t; Selection of a PLC; Problems.

UNIT IV

MICROPROCESSORS AN D IN PUT/OUTPUT SYSTEMS: Control; Microcom p u ter Stru ctu re; Micro-controllers; Ap p lications; Program m ing Langu ages; Instru ction Sets; Assem bly Langu age Program s; Su brou tines; Why C Langu age ? A review of Program Stru ctu re, Branches, Loop s, Arrays, Pointer; Exam p les of Program s; Interfacing; Inp u t/ Ou tp u t; Interface Requ irem ents; Perip heral Interface Adaptors; Serial Communication Interface; Examples of Interfacing; Problems.

D ESIGN AN D MECHATRON ICS: Design Process; Trad itional and Mechantronics Design; Possible Mechatronics d esign solu tions for Timed Sw itch, Wind Screen Wip er Motion, Bath Room Scale, A Pick & Place Robot, Automatic Camera, Engine Management System & Bar Code Recorder.

TEXT BOOKS:

Mechatronics by W. Bolton, Published by Addition Wesley.

Mechatronics System Design – Devdas Shetty and Richard A. Kolx Brooks/ Cole 1997.

REFERENCE BOOKS:

Introd u ction to Mechatronics and Measu ring System : d avid G. Alciation and Michael B. H ist and Tata McGraw Hill

Mechtronics – Sensing to Implementation - C.R.Venkataraman, Sapna

Note:

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The u se of scientific calcu lator w ill be allow ed in the exam ination . H ow ever, p rogram m able calculator and cellular phone will not be allowed.

ME 438B FLEXIBLE MANUFACTURING SYSTEM

B. Tech. Semester – VIII (Mechanical Engineering)

L	T	P	Credits				
4	-	--	4		Class Work	:	25 Marks
					Examination	:	75 Marks
					Total	:	100 Marks
					Duration of Examination	:	3 Hours

UNIT I

AUTOMATION AN D MAN UFACTURIN G FLEXIBILITY: Au tom ation and typ es, reasons for au tom ation, Basic elem ents of an Au tom ated System : Sensors, Actu ators, Analog-to-Digital and Digital-to-Analog Converters, Inp u t/ Ou tp u t Devices for Discrete Data, Definition of Manu factu ring Flexibility, N eed of Manu factu ring flexibility, Typ es of Manu factu ring Flexibilities, Classification of Manu factu ring system s on Flexibility typ es, Resou rces and Processes to increase flexibility of manufacturing systems

GROUP TECHN OLOGY (GT): GT and its benefits, Parts classification and cod ing system s, the com p osite p art concep t, GT based Machine cell d esign throu gh Clu ster Analysis and H ollier's Algorithm; Numerical problems

UNIT II

NUMERICAL CONTROL (NC): Fundamentals of NC Technology and advantages in Manufacturing, N C Machines and typ es, Com p u ter N u m erical Control, Distribu ted N u m erical Control, brief introduction of NC Part Programming.

FLEXIBLE MAN UFACTURIN G SYSTEMS (FMS): Com p onents of an FMS, FMS w ork stations. Material hand ling and storage system : Fu nctions of material hand ling system , FMS layou t configurations, Computer control system: Computer function, FMS data file, system reports. Planning the FMS, FMS applications and benefits

UNIT III

ROBOTIC TECHNOLOGY: Com m on robot configu rations, Joints and links, w ork volu m e, typ es of robot control, accu racy and rep eatability, interlocks, ad vantages and d isad vantages. Brief review of Robot p rogram m ing and langu ages: Motion p rogram m ing, sim u lation and offline p rogram m ing, w ork cell control. Ap p lications of Robot: Material hand ling, p rocessing op erations, assem bly and inspection

MATERIALS HAN D LIN G SYSTEMS: Au tom ated flow lines, m ethod s of w ork part transp ort, Transfer Mechanism s, bu ffer storage, au tom ation for m achining op erations, p art feed ing d evices, Brief review of Automated assembly systems and types,

UNIT IV

COMPUTER IN TEGRATED MAN UFACTURIN G SYSTEMS (CIMS): Elem ents of CIM, Brief Review of Computer aided process Planning, Computer Integrated Production Management Systems, MRP, Capacity Planning, MRPII, Shop floor Control system s, Com p u ter Process Monitoring, Computer aided quality control, Adaptive Control of Manufacturing

TEXT BOOKS:

Au tom ation, Prod u ction System s and Com pu ter Integrated Manufactu ring: Groover M.P, Prentice H all of India.

CAD/CAM: Groover M.P, Zimmers E.W, Prentice Hall of India.

REFERENCE BOOKS:

Approach to Computer Integrated Design and Manufacturing: Nanua Singh, John Wiley and Sons, 1998.

Prod u ction Managem ent System s: A CIM Perspective: Brow ne J, H arhen J, Shivnan J, Ad d ison Wesley, 2nd Ed. 1996.

Note:

In the sem ester exam ination, the exam iner w ill set tw o questions from each u nit (total 08 qu estions in all), covering the entire syllabus. The stu d ents w ill be required to attem p t only 5 qu estions selecting at least one question from each unit.

2. The use of scientific calcu lator w ill be allow ed in the exam ination . H ow ever, program m able calcu lator and cellular phone will not be allowed.

ME 440B MANUFACTURING MANAGEMENT

B. Tech. Semester – VIII (Mechanical Engineering)

L	T	P	Credits				
4	-	--	4		Class Work	:	25 Marks
					Examination	:	75 Marks
					Total	:	100 Marks
					Duration of Examination	:	3 Hours

UNIT I

MAN UFACTURIN G SYSTEMS D ESIGN : Definition, System s, Su bsystem s, System s Ap p roach Fu nd am entals, System s Ap p roach for d esigning of Manu factu ring System s, Brief review s of Systematic Layou t Planning (SLP), Com p u terized Layou t Planning, Assem bly Line balancing, Grou p Technology & Cellu lar System s, Classification & Grou p ing, overview of FMS. Strategic consid eration for comparison of various systems

UNIT II

N EW PROD UCT D EVELOPMEN T (N PD): Prod u ct Develop m ent, Cu stom er N eed , Strategies for N ew Prod u ct d evelop m ent, Prod u ct life cycle, Prod u ct statu s. Corp orate Design Strategies, Mod u lar Design, Standardization, Value Engineering & Analysis

MAN UFACTURIN G PLAN N IN G & CON TROL SYSTEMS: Overview of Aggregate Planning Mod els, Master Prod u ction Sched u le, Capacity p lanning, Ju st-in-Tim e (JIT) Manu factu ring Philosophy, KANBAN, JIT requirements, Optimized Production Technology (OPT).

UNIT III

FORECASTIN G METHOD S: N eed of Forecasting in Ind u stries, Different Method s and Mod els of Forecasting, Forecasting Errors – MAD, Regression Method s, Linear Mod el for single & m u ltip le variables, Brief idea of computerized forecasting systems, Numerical Problems

MATERIAL REQUIREMEN TS PLAN N IN G (MRP): Definition of MRP system s. Elem ents of MRP system s, MRP I & II. Stru ctu red Bill of Materials, Regenerative & N et change MRP, Op erating an MRP, Integration of Production & Inventory Control

UNIT IV

MAIN TEN AN CE & RELIABILITY: Concep t of p reventive & breakd ow n maintenance, m aintenance cost, op tim al p reventive m aintenance, reliability d efinitions, failu re analysis and cu rve, system s reliability- series parallel, red u nd ancy, m ethod s of im p roving reliability, MTBF, MTTR, Maintainability, availability, brief concept of tero-technology

MAN UFACTURIN G SYSTEMS ECON OMICS: Concep t of tim e valu e of money, Single p aym ent, Equ al Series p aym ent, variou s machine and p roject selection & evalu ation techniqu es: Payback p eriod , Present w orth, Equ ivalent annu al cost, Cost- benefit ratio, Dep reciation concep t variou s methods-straight line, declining balance, Sum of the digits, Sinking fund

TEXT BOOKS:

Operations Management – SCHOROEDER, MGH, New York.

Production Operations Management – CHARY, TMH, New Delhi.

REFERENCE BOOKS:

Production Operations Management – ADAM & EBERT, PHI, New Delhi

Production & Operations Management – MARTINICH, John Wiely SE, New Delhi.

Production & Operation Management- Panneerselvam, PHI, New Delhi

Note:

In the sem ester exam ination, the exam iner w ill set tw o questions from each unit (total 08 qu estions in all), covering the entire syllabus. The stu d ents w ill be required to attem p t only 5 qu estions selecting at least one question from each unit.

2. The use of scientific calcu lator w ill be allow ed in the exam ination . H ow ever, program m able calcu lator and cellular phone will not be allowed.

ME 442B ROBOTICS ENGINEERING

B. Tech. Semester – VIII (Mechanical Engineering)

L	T	P	Credits				
4	-	--	4		Class Work	:	25 Marks
					Examination	:	75 Marks
					Total	:	100 Marks
					Duration of Examination	:	3 Hours

UNIT I

ROBOTIC MAN IPULATION : Au tom ation and Robots; Robot Classification – Drive Technologies, Work-Envelop e Geom etries, Motion Control Method s, Ap p lications; Robot Sp ecifications – N o. of Axes, Cap acity and Sp eed , Reach and Stroke, Tool Orientation, Rep eatability, Precision, Accu racy, Operating Environment, An Example, Rhino X-3.

UNIT II

D IRECT KIN EMATICS: The Arm Equ ation H omogenou s Co-ordinates – Fram es, Translations and Rotations, Com p osite H om ogenou s Transform ations; Screw Transform ations; Link Co-ordinates; The Arm Equ ation; A Five-Axis Articu lated Robot; A Fou r-Axis SCARA Robot; A Six-Axis Articulated Robot; Problems.

IN VERSE KIN EMATICS: Solving the Arm Equ ation: The Inverse Kinem atics Problem ; General Prop erties of Solu tions; Tool Configu ration; Inverse Kinem atics of a Five-Axis Articu lated Robot, Four-Axis Scara Robot, Six-Axis Articu lated Robot and Three-Axis Planer Articu lated Robot; A Robotic Work Cell; Problems.

UNIT III

WORK SPACE AN ALYSIS AN D TRAJECTORY PLAN N IN G : Work Sp ace Analysis; Work Envelop e of a Five-Axis Articu lated Robot; Work Envelop e of a Fou r Axis Scrara Robot; Work Sp ace Fixtu res; The Pick and Place Op eration; Continu ou s Path Motion; Interp olated Motion; Straight Line Motion; Problems.

D IFFEREN TIAL MOTION AN D STATICS : The Tool Configu ration Jacobian Matrix; Joint – Space Singularities; Generalised Inverses; Resolved – Motion Rate Control; n > 6; Rate Control of Redundant Robots : n > 6; Rate Control u sing (1) – Inverses; The Manip u lator Jacobian; Ind u ced Joint Torques and Forces; Problems.

UNIT IV

MAN IPULATOR D YN AMICS : Lagrange's Equ ation; Kinetic & Potential Energy; Generalised Force; Lagrange – Eu ler Dynam ic Mod el; Dynam ic Mod els of a Tw o-Axis Planer Articu lated Robot and A Three-Axis SCARA Robot; Direct & Inverse Dynamics; Recursive Newton - Euler Formulation; Dynamic Model of a One-Axis Robot; Problems.

ROBOT CON TROL : The Control Problem s; State Equ ations; Constant Solu tions; Linear Feed back System s; Single-Axis PID Control; PD-Gravity Control; Computed –Torqu e Control; Variable-structure Control; Impedance Control; Problems.

Text Books:

Fu nd am ental of Robotics (Analysis & Control) by Robert J.Schilling, Pu blished by PH I, Pvt. Ltd., New Delhi.

Introd u ction to Robotics (Mechanics & Control) by John J. Craig, Pu blished by Ad d ition Wesley (Intl. Student Edition).

Analytical Robotics & Mechatronics by Wolfram Stad ler, Pu blished by Mc-Graw H ill, Inc., New Delhi.

Ind u strial Robotics - Technology, Program m ing & Ap p lications by Mikell P. Grover, Weiss, Nagel and Ordef , Published by Mc-Graw Hill International Edition.

A Robot Engg. Test Book - Mohsen Shahinpoor, Harper & Low, Publishing New York.

6. Robotic Engineering – An Integrated Ap p roach : Richard D.Klafter, Thom as A. Chmielewski and Michael Negin PHI 1989.

Fou nd ations of Robotics Analysis and Control - Tsu neo Yashikaw a MIT Press 1990, Ind ian Reprint 1998.

Robots and Control - R.K.Mittal and I.J.Nagrath - Tata McGraw Hill 2003

Note:

In the sem ester exam ination, the exam iner w ill set tw o qu estions from each u nit (total 08 qu estions in all), covering the entire syllabu s. The stu d ents w ill be requ ired to attem p t only 5 questions selecting at least one question from each unit.

The u se of scientific calcu lator w ill be allow ed in the exam ination . H ow ever, p rogram m able calculator and cellular phone will not be allowed.

ME 444B ERGONOMICS AND WORK PLACE DESIGN

B. Tech. Semester – VIII (Mechanical Engineering)

L	T	P	Credits				
4	-	--	4		Class Work	:	25 Marks
					Examination	:	75 Marks
					Total	:	100 Marks
					Duration of Examination	:	3 Hours

UNIT I

Basic Princip les of Ergonom ics, Anthrop om etry, Postu re and H ealth; Anthrop om etry Practical; Disp lays, Controls and H MI; Tools and Equ ip m ent Design; Workp lace Design and Assessm ent; Task Analysis; Qu estionnaire and Interview Design; Prod u ct Design and Evalu ation; Designing for manufacture and maintenance; Health and Safety Legislation and Ergonomics.

UNIT II

Ap p lication of Ergonom ics Princip les, Cognitive Ergonom ics, H u m an Inform ation Processing; Mem ory; Read ing; Percep tion; N avigation; Problem Solving; Decision Making, H u m an-Computer Interaction, Input/Output Technology, Usability; Evaluation; Health problems.

UNIT III

Fu tu re System s, Job Design, Scientific Managem ent, Enrichm ent, Enlargem ent, Rotation, Cells, Shift w ork, Managem ent Style and Job Design, Change Managem ent. N ew Technology, Unem p loym ent, Deskilling, Introd u cing new technology. Qu estionaire d esign and assessm ent. Task analysis techniqu es. Measu rem ent of hu man error and risk. Use of sim u lation and p rototyp es. Prod u ct Evaluation. Experimental Design.

UNIT IV

Case Stu d ies: A set of case stu d ies w ill be u sed to d em onstrate how ergonom ics has lead to changes in w ork activity, safety and p rod u ct d esign . Case stu d ies w ill inclu d e ad vanced com p u ter applications, w orkp lace assessm ent and re-d esign, accid ent analysis and ind u strial insp ection, and in m anu factu ring. Stu d ents w ill be requ ired to ap p ly the p rincip les to a real life ergonom ic d esign as applied to a product, service or computer application.

TEXT BOOKS:

1. Work Design: Ind u strial Ergonom ics – Knoz, Step han A., Johnson, Steven, H olcom b H athaw ay, Scottsdale, AZ.
2. H u m an factors in engineering and d esign – Sand ers, M.S. & McCorm ick, E.J., 6th ed., McGraw-Hill, New York.

REFERENCE BOOKS:

Ergonomics: Man in his working environment- Murrell, K.F.H, Champan & Hall, London.
Man – Machine Engineering – Chapanis A: Wordsworth Publishing Co.
The Practice and Managem ent of Ind u strial Ergonom ics – Alexand er, D.C., Prentice-Hall, Englewood Cliffs, NJ.
Textbook of Work Physiology – Astrand, P.O. & Rhodahl, K.– McGraw-Hill, New York.
Human Factors in Lighting – Boyce, P.R. Macmillan, New York.
The Ergonom ics of Worksp aces and Machines : A d esign m anu al – Clark, T.S. & Corlett, E.N . Taylor & Francis, London.
Ergonomics at work. Oborne, D Wiley, London.
Bodyspace–Anthropometry, Ergonomics and Design. – Pheasant, S. Taylor & Francis,.

Note:

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The u se of scientific calcu lator w ill be allow ed in the exam ination . H ow ever, p rogram m able calculator and cellular phone will not be allowed.

ME 446B MODERN MANUFACTURING PROCESSES

B. Tech. Semester – VIII (Mechanical Engineering)

L	T	P	Credits				
4	-	--	4		Class Work	:	25 Marks
					Examination	:	75 Marks
					Total	:	100 Marks
					Duration of Examination	:	3 Hours

UNIT I

Lim itations of conventional m anu factu ring p rocesses, N eed of u nconventional m anu factu ring processes, Classification of Modern Manufacturing Processes and its future possibilities.

ULTRASON IC MACHIN IN G- Introd u ction, Basic Principle of USM, Elem ents of Process, tool feed m echanism , cu tting tool system d esign, effect of p aram eters on MRR, econom ic consid erations, applications, limitations of the process, advantages and disadvantages.

ABRASIVE JET MACHIN IN G- Process d escrip tion, featu res of AJM, Param eters in AJM, m etal rem oval rate (MRR) in AJM. Ad vantages, limitations and Practical ap plications of AJM. Water Jet Machining- Jet cutting equipments, process details,

UNIT II

CHEMICAL MACHIN IN G, basic techniqu e of chem ical m achining, Mechanism of m etal removal, process variables, advantages and applications .Electrochemical machining, principle of ECM process, ECM p rocess d etail, chem ical reactions in ECM, tool w ork gap, p rocess variables and characteristics in ECM, ad vantages, d isad vantages and ap p lication of ECM ,Electrochem ical Grind ing - Material removal, surface finish, accuracy, advantages, applications.

UNIT III

THERMAL SPARK EROSION PROCESSES: Electric Discharge Machining (EDM) or sp ark erosion m achining p rocesses, p ractical asp ects of sp ark erosion m achining, m echanism of m etal rem oval, sp ark erosion generators, electrod e feed control, d ielectric flu id s, flu shing, electrod es for sp ark erosion, selection of electrod e m aterial, tool electrod e d esign, su rface finish, m achining accu racy, m achine tool selection, ap p lications. Wire cu t EDM. Ad vantages and d isad vantages of spark erosion machining.

LASER BEAM MACHIN IN G (LBM)- Introd u ction, lasing p rocess, Laser m achining system , Therm al effect on w orkp iece, calcu lation of MRR, d escrip tion of laser d rilling m achine, cu tting sp eed and accuracy of cut, advantages and limitations.

UNIT IV

PLASMA ARC MACHIN IN G (PAM): introd u ction, non therm al generation of p lasma typ es of p lasma arc , the stabilized arc, m echanism of p lasm a torch, , m echanism of m etal rem oval, PAM p aram eters, equ ip m ents for D.C. p lasm a torch u nit, safety p recau tions, econom ics, other ap p lications of plasma jets.

ELECTRON BEAM MACHIN IN G (EBM) – Descrip tion of the p rocess, need for high vacu u m in EBM, process parameters in EBM. Advantages and disadvantages of EBM. Electron beam welding.

Text Books:

Advanced Machining Processes by V.K. Jain. Allied Publishers Pvt Ltd

Modern Machining Methods by M. Adithan, Khanna Publishers

Modern Machining Processes by P.C. Pandey and H.S. Shan. Tata McGraw - Hill

Advanced Methods of Machining by J. A. Mcgeou gh, Sp rin ger

Non-Traditional Manu facturing Process by Bened ict, CRC pub.

Unconventional Manufacturing Process by M K Singh, N ew Age Publishers

Nonconventional manufacturing by P. K. Mishra, N arosa Publishers

Note:

In the sem ester exam ination, the exam iner w ill set tw o questions from each u nit (total 08 qu estions in all), covering the entire syllabus. The stu d ents w ill be required to attem p t only 5 qu estions selecting at least one question from each unit.

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ME 448B EMERGING AUTOMOTIVE TECHNOLOGIES

B. Tech. Semester – VIII (Mechanical Engineering)

L	T	P	Credits				
4	-	--	4		Class Work	:	25 Marks
					Examination	:	75 Marks
					Total	:	100 Marks
					Duration of Examination	:	3 Hours

UNIT I

The Fu tu re Of The Au tomotive Ind u stry : Challenges and Concep ts for the 21st century. Crucial issues facing the industry and approaches to meet these challenges.

Fu el Cell Technology For Vehicles : What is fu el cell, Typ e of fu el cell, Ad vantages of fu el cell. Current state of the technology. Potential and challenges. Advantages and disadvantages of hydrogen fuel.

UNIT II

Latest Engine Technology Featu res : Ad vances in d iesel engine technology. Direct fu el injection Gasoline engine. Diesel p articu late em ission control. Throttling by w ire. Variable Valve Timing, Method used to effect variable Valve Timing. Electromagnetic Valves, Camless engine actuation.

42 Volt System : N eed , benefits, potentials and challenges. Technology Im p lications for the Au tom otive Ind u stry. Technological evolu tion that w ill occu r as a resu lt of the ad op tion of 42 volt systems.

UNIT III

Electrical And H ybrid Vehicles : Typ es of hybrid system s, Objective and Ad vantages of hybrid systems. Current status, Future developments and Prospects of Hybrid Vehicles

Integrated Starter Alternator: Starts stop op eration, Power Assist, Regenerative Braking. Ad vanced lead acid batteries, Alkaline batteries, Lithiu m batteries, Develop m ent of new energy storage system s, Deep discharge and rapid charging ultra capacitors.

UNIT IV

X- By Wire Technology : What is X-By Wire, Ad vantage over hyd rau lic system s. Use of Au tom otive micro controllers. Types of censors. Use of actuators in an automobile environment.

Vehicles System s : Constantly Variable Transmission, Benefits, Brake by w ire, Ad vantages over power Braking System . Electrical assist steering, Steering by w ire, Ad vantages of Steering by w ire. Semi-active and fully-active suspension system. Advantages of fully active suspension system.

TEXT & REFERENCE BOOKS:

Advanced Vehicle Technologies by Heinz Heisler-SAE International Publication.
Electric and Hybrid Electric vehicles by Ronald K. Jurgen.- SAE International Publication
Electronic Braking, Traction and Stability control-SAE Hardbound papers.
Electronics steering and suspension systems- SAE Hardbound papers.
42 Volt system by Daniel J. Holt- SAE International Publication
Diesel Particulate Emission by J.H. Johnson- SAE Hardbound papers.
Fuel Cell Technologies for vehicles by Richard Stobart- SAE Hardbound papers.

Note:

In the sem ester exam ination, the exam iner w ill set tw o qu estions from each u nit (total 08 qu estions in all), covering the entire syllabu s. The stu d ents w ill be requ ired to attem p t only 5 questions selecting at least one question from each unit.

The u se of scientific calcu lator w ill be allow ed in the exam ination . H ow ever, p rogram m able calculator and cellular phone will not be allowed.

ME 450B RELIABILITY ENGINEERING

B. Tech. Semester – VIII (Mechanical Engineering)

L	T	P	Credits				
4	-	--	4		Class Work	:	25 Marks
					Examination	:	75 Marks
					Total	:	100 Marks
					Duration of Examination	:	3 Hours

UNIT I

IN TROD UCTION TO RELIABILITY: Reliability: Definition; Probability Concep t; Ad d ition of Probabilities; Com p lim entary Events; Kolm ogorov Axiom s. Failu re Data Analysis: Introd u ction, Mean Failu re Rate, Mean Tim e to Failu re (MTTF), Mean Tim e betw een Failu res (MTBF), MTTF in terms of Failure Density, MTTF in Integral Form.

UNIT-II

SYSTEM RELIABILITY: Typ es of system - series, p arallel, series p arallel, stand by and com p lex; d evelop m ent of logic d iagram , m ethod s of reliability evalu ation; cu t set and tieset m ethod s, m atrix m ethod s event trees and fau lt trees method s, reliability evalu ation u sing p robability d istribu tions, Markov method, frequency and duration method.

UNIT III

RELIABILITY MOD ELS: H azard Mod els: Introd u ction, Constant H azard ; Linearly Increasing H azard , the Weibu ll Mod el, Density Fu nction and Distribu tion Fu nction, Reliability Analysis, Important Distributions and their Choice, Standard Deviation and Variance.

Cond itional Probability: Introd u ction, Mu ltip lication Ru le, Ind ep end ent Events, Venn Diagram, Hazard Rate as conditional probability, Bayes Theorem..

UNIT IV

RELIABILITY IMPROVEMEN T: Rep airable System s: Red u nd ancy, Elem ent, Unit and stand by Red u nd ancy, Op tim ization; Reliability cost trad e- off, Introd u ction to Repairable System s, Instantaneou s Repair Rate, , Reliability and Availability Fu nctions, Im p ortant Ap p lications. Maintainability and Availability: Introd u ction, Maintenance Planning, Reliability and Maintainability trade off.

TEXT BOOKS:

Reliability Engineering, L.S. Srinath, Affiliated East-West Press, New Delhi.

Reliability Engineering, A.K.Govil, Tata Mc-Graw Hill, New Delhi.

REFERENCE BOOKS:

Reliability Engineering, L.Balagurusamy, Tata Mc-Graw Hill, New Delhi, 1984.

Reliability Based Design, S. Rao, Mc-Graw Hill, 1992.

Reliability in Engineering Design, K.C. Kapur and L.R. Lamberson, Wiley Publications.

Reliability Engineering, D.J. Smith, 1972, E.W. Publications.

Reliability Evaluation of Engineering and Systems R.Billintan & R.N. Allan, Plenum Press.

Reliability in Engineering and Design, K.C. Kapoor & L.R. Lamberson, John Wiely and Sons.

Life Testing and Reliability Estimation, S.K. Sinha & B.K. Kale, Wiely Eastern Ltd.

Probabilistic Reliability, An Engineering Approach, M.L. Shooman, McGraw Hill.

System Reliability Engineering, G. H.Sandler, Prentice Hall.

Note:

In the sem ester exam ination, the exam iner w ill set tw o qu estions from each u nit (total 08 qu estions in all), covering the entire syllabu s. The stu d ents w ill be requ ired to attem p t only 5 questions selecting at least one question from each unit.

The u se of scientific calcu lator w ill be allow ed in the exam ination . H ow ever, p rogram m able calculator and cellular phone will not be allowed.

GFME – 402	**GENERAL FITNESS FOR THE PROFESSION**

B. Tech. Semester – VIII (Mechanical Engineering)							
L	**T**	**P**	**Credits**		**Examination**	**:**	**100 Marks**
1	**--**	**--**	**4**		**Total**	**:**	**100 Marks**

The p u rp ose of this cou rse is to incu lcate a sense of p rofessionalism in a stu d ent along w ith p ersonality d evelop m ent in term s of qu ality su ch as receiving, resp ond ing, tem p eram ent, attitu d e and ou tlook. The stu d ent efforts w ill be evalu ated on the basis of his/ her p erform ance / achievements in different walks of life.

The evaluation will be made by the committee of examiners constituted as under:

Dean, Faculty of Engineering & Technology/ Director /Principal of affiliated college : Chairperson

2. Chairperson of the department : Member
3. External expert : Appointed by the university

The student will present a written report before the committee with following in view:

The student will present before the committee his/her achievements during the current academic session in the form of a written report highlighting followings:

I. Academic Performance --------

II. Extra Curricular Activities / Community Service, Hostel Activities **(12 Marks)**

III Technical Activities / Industrial, Educational tour **(12 Marks)**

IV Sports/games **(16Marks)**

N ote: Report submitted by the students should be typed on both sides of the paper.

A stu d ent w ill su p p ort his/ her achievem ent and verbal & com m u nicative skill throu gh presentation before the examiners. **(40 Marks)**

C. Faculty Counselor Assignment (20 Marks)

It w ill be the d u ty of the stu d ent to get evalu ated by resp ective facu lty cou nselor and to submit the counselor assessment marks in a sealed envelope to the committee.

0 cou nselor w ill assess the stu d ent w hich reflects his/ her learning grap h inclu d ing followings:

Discipline throughout the year

Sincerity towards study

How quickly the student assimilates professional value system etc.

Moral valu es & Ethics- Syllabu s (one lectu re/ w eek on the topics of H u m an values/Ethics is to be delivered)