SCHEME OF STUDIES & EXAMINATIONS B.Tech. 3rd YEAR (SEMESTER – V) MECHANICAL ENGINEERING Credit Based Scheme w.e.f. 2014-15

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	ME301B	KINEMATICS OF MACHINES	3	1		25	75	-	100	4	3
2	ME303B	MACHINE DESIGN-I	3	2		25	75	-	100	5	3
3	ME305B	QUALITY ENGINEERING	3	1		25	75	-	100	4	3
4	ME307B	INTERNAL COMBUSTION ENGINES & GAS TURBINES (ME, AER)	3	1		25	75	-	100	4	3
5	ME309B	MANUFACTURING SCIENCE	3	1		25	75	-	100	4	3
6	ME311B	APPLIED NUMERICAL TECHNIQUES & COMPUTING	3	1		25	75	-	100	4	3
7	ME313B	KINEMATICS OF MACHINES LAB	-	-	2	20	--	30	50	1	3
8	ME315B	INTERNAL COMBUSTION ENGINES LAB (ME, AER)	-	-	2	20	---	30	50	1	3
9	ME317B	COMPUTER AIDED MANUFACTURING PRACTICES	1	-	2	40	---	60	100	2	3
10	ME319B	APPLIED NUMERICAL TECHNIQUES & COMPUTING LAB	-	-	2	20	--	30	50	1	3
11	ME321B	PROFESSIONAL TRAINING-I	-	-	2	50	-	-	50	2	3
Total			**19**	**7**	**10**	**300**	**450**	**150**	**900**	**32**	

Note:

0 Every student has to participate in the sports activities. Minimum one hour is fixed for sports activities either in the morning or evening. Weightage of Sports is given in General Proficiency Syllabus.

1 The students will be allowed to use non-programmable scientific calculator. However, sharing/exchange of calculator is prohibited in the examination.

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

ME 301B KINEMATICS OF MACHINES

B. Tech. Semester – V (Mechanical Engineering)

L	T	P	Credits				
3	1	--	4		Class Work	:	25 Marks
					Examination	:	75 Marks
					Total	:	100 Marks
					Duration of Examination	:	3 Hours

UNIT I

INTRODUCTION: Links-typ es, Kinem atics pairs-classification, Constraints-typ es, Kinematic chains, Mechanism and machines, Degrees of freed om of p lanar m echanism , Gru bler's equ ation, Inversions of fou r bar chain, Slid er crank chain and double slider crank chain

KINEMATIC SYN THESIS OF MECHAN ISMS: N u m ber synthesis, Freu d enstein's equ ation, Stages of kinem atic synthesis and errors, Chebychev spacing of precision points, Limit positions and dead centre of four-bar mechanism, Transmission angle in four bar mechanism and slider crank mechanism, Problems.

UNIT II

VELOCITY IN MECHAN ISMS: Velocity of p oint in m echanism , Relative velocity m ethod , Velocities in fou r bar m echanism , Slid er crank m echanism and qu ick retu rn m otion m echanism , Ru bbing velocity at a p in joint, Instantaneous center method, Types & location of instantaneous centers, Kennedy's theorem, Problems.

ACCELERATION IN MECHAN ISMS: Acceleration of a p oint on a link, fou r Bar m echanism and slid er Crank m echanism , Coriolis comp onent of acceleration, Analytical m ethod for d eterm ining the velocity and acceleration of slider crank mechanism, Problems.

UNIT III

GEARS: Classification & term inology, Law of gearing, Tooth form s & com p arisons, Length of p ath of contact, Contact ratio, Interference & u nd er cu tting in involu te gear teeth, Minimu m nu m ber of teeth on gear and p inion to avoid interference

GEAR TRAINS: Synthesis of simple, compound, epicyclic and planetary gear trains, Sun and planet gear, Torque in epicyclic gear trains, Problems.

UNIT IV

CAMS AN D FOLLOWERS - Classification & terminology, Cam profile by graphical m ethod s w ith knife ed ge and rad ial roller follow er for u niform velocity, sim p le harm onic and parabolic m otion of follow ers, Analytical m ethod s of cam design–tangent cam with roller follower and circular cams with flat faced follower, Problems.

FRICTION D EVICES: Typ e of friction, Law s of friction, Flat p ivots and flat collar bearing-u niform p ressu re and uniform wear, Belt and pulley drive, Length of open and cross belt drive, Ratio of driving tensions for flat belt drive, Centrifugal tension, V-belt drive, Problems.

TEXT BOOKS:

Theory of Mechanism s and Machines: Am itabha Ghosh and Ashok Ku m ar Mallik, Third Ed ition Affiliated East-West Press.

Theory of Machines and Mechanism s: Josep h Ed w ard Shigley and John Josep h Uicker, Jr. Second Ed ition, MGH , N ew York.

REFERENCE BOOKS:

Mechanism and Machine Theory: J.S. Rao and R.V. Dukkipati Second Edition New age International.
Theory of Machines: Thomas Beven.
Theory and Machines: S.S. Rattan, Tata McGraw Hill.
Kinematics of Machines-Dr. Sadhu singh, Pearson Education

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 syllabus. The students will be required to attempt 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 calcu lator and cellu lar phone will not be allowed.

ME 303B MACHINE DESIGN - I

B. Tech. Semester – V (Mechanical Engineering)

L	**T**	**P**	**Credits**		**Class Work**	**:**	**25 Marks**
3	**2**	**--**	**5**		**Examination**	**:**	**75 Marks**
					Total	**:**	**100 Marks**
					Duration of Examination	**:**	**3 Hours**

UNIT I

DESIGN CONCEPTS: Design cycle, Phases of design, Brain storming, reverse engineering and redesign, Role of designer, Feasibility study-technical feasibility, economic & financial feasibility, societal & environmental feasibility, Selection of Fits and tolerances.

SELECTION OF MATERIALS: Classification of Engg. Materials, Mechanical p rop erties of the com m only u sed engineering Materials, hardness, strength parameters with reference to stress-strain diagram, Factor of safety.

UNIT II

MECHAN ICAL JOIN TS: ISO Metric Screw Thread s, Bolted joints in tension, Eccentrically load ed bolted joints in shear and u nd er com bined stresses, Design of p ow er screw s, Design of variou s typ es of w eld ing joints u nd er different static load conditions.

RIVETED JOIN TS, COTTER & KN UCKLE JOIN TS: Design of variou s typ es of riveted joints u nd er d ifferent static loading conditions, eccentrically loaded riveted joints, design of cotter and knuckle joints.

UNIT III

BELT, ROPE AN D CHAIN D RIVES: Design of belt d rives, Flat & V-belt d rives, Cond ition for Transmission of max. Power, Selection of belt, design of rope drives, design of chain drives with sprockets.

KEYS, COUPLIN GS & FLYWHEEL: Design of Keys – Flat, Kenned y Keys, Sp lines, Cou p lings d esign – Rigid & Flexible cou pling, tu rning Mom ent d iagram , coefficient of flu ctu ation of energy and sp eed , d esign of flyw heel – solid disk & rimmed flywheels.

UNIT IV

CLUTCHES: Variou s typ es of clu tches in u se, Design of friction clu tches – single d isc, Mu ltid isc, Cone & Centrifugal, Torque transmitting capacity.

BRAKES: Variou s typ es of Brakes, Self energizing cond ition of brakes, Design of shoe brakes – Internal & external expanding, band brakes, Thermal Considerations in brake designing.

Text Books :

Mechanical Engg. Design, Joseph Edward Shigley, McGraw Hill Book Co.
Design of Machine Elements, V.B. Bhandari ,Tata McGraw Hill, New Delhi.
Engineering design – George Dieter, McGraw Hill, New York.
Product Design and Manufacturing , A.K.Chitale and R.C.Gupta, PHI, New Delhi.
Machine Design An Integrated Approach: Robert L.Norton, Addison Wisley Longman
Analysis and Design of Machine Elements, V K Jadon, S Verma, I K International
Machine Design, S.G. Kulkarni, TMH , New Delhi.
Design of machine elements-C S Sharma, Kamlesh Purohit, PHI.
PSG design data book
Machine Design Data book by I K International Publication

Note:

In the sem ester examination, 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 qu estions 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 calcu lator and cellular phone will not be allowed.

The p ap er setter w ill be requ ired to mention in the note in the qu estion paper that the u se of only *PSG Design Data book* / *Machine Design Data book* by I K International Publication, New Delhi is permitted.

ME 305B QUALITY ENGINEERING							
B. Tech. Semester – V (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

PHILOSOPHIES AND FUNDAMENTALS

Introd u ction to Qu ality Control and Total Qu ality System-Evolu tion of Qu ality Management Philosop hy, Qu ality, Quality control, Quality Assurance, Quality circles and quality improvement, TQM, Cost of quality.

SOME PHILOSOPHIES AND THEIR IMPACT ON QUALITY- Deming, Juran, Crossby, Ishikawa

QUALITY MANAGEMENT: Practices, Tools, and stand ard s- Tools for qu ality im p rovem ent- Check sheets, Pareto diagrams, Flow charts, Cause and effect diagrams, Histograms, Scatter plots etc. ISO 9000

UNIT II

STATISTICAL FOUNDATIONS AND METHODS OF QUALITY IMPROVEMENT

D ESCIPTIVE STATISTICS-Data collection and presentation, measures of central tendency, measures variation and skew ness, measu res of association, probability d istribu tion- d iscrete p robability d istribu tion, and continu ou s probability distribution.

INFERENTIAL STATISTICS- Draw ing conclu sions on Prod u ct and Process Qu ality-Sam p ling d istribu tion, Estim ation of p rod u ct and p rocess param eters-Point estim ation, Interval Estim ation, **HYPOTHESIS TESTIN G**-concep ts, errors, step s, testing of m ean, d ifference betw een tw o m eans, p rop ortion, d ifference betw een tw o p rop ortions, d ifference betw een tw o bionom ial p rop ortions, variance, ratio of tw o variances, Concep ts of sam p ling-introduction, sampling design and schemes, Sample size determination. -Numerical Problems

UNIT III

STATISTICAL PROCESS CONTROL

Introd u ction, cau ses of variation, Control charts for variables and attribu tes- X, R, P, and C charts, **ACCEPTANCE SAMPLING**- ad vantages and d isad vantages of samp ling, p rod u cer's risk and Consu m er's risk, OC cu rve, typ es of sampling plans.

PROCESS CAPABILITY- Introd u ction, Sp ecification limits and control lim its, Process Cap ability Ind ices, Tagu chi Method, brief of six sigma approach.Numerical Problems

UNIT IV

ADVANCEMENTS IN QUALITY MANAGEMENT

TOTAL QUALITY MAN AGEMEN T- A Managem ent Philosop hy, Em p loyee involvem ent, Continu ou s Improvement, The costs of Poor Quality.

QUALITY IN SERVICE SECTOR- Introd u ction, Service Ind u stries and their characterstics, a m od el for service quality, applications.

Text Book:

Fundamentals of Quality Control and Improvement by Amitava Mitra- PHI, New Delhi
Managing for Total Quality-N. Logothetis- PHI

Reference Books:

Research Methodolgy: Methods and Techniques by C.R. Kothari – New age International
Quality Planning and Analysis- by J M Juran & Frank M. Gryna -TMH

Note:

In the sem ester examination, 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 qu estions 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 calcu lator and cellular phone will not be allowed.

ME 307B INTERNAL COMBUSTION ENGINES AND GAS TURBINES

0 Tech. Semester – V (Mechanical & Aeronautical 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

AIR STAN D ARD CYCLES: Internal and external com bu stion engines; classification of I.C. Engines, Cycles of operation in four stroke and two stroke I.C. Engines, Wankel Engines, Assumptions made in air standard cycle; Otto cycle; d iesel cycle, d u al com bu stion cycle, com p arison of Otto, d iesel and d u al com bu stion cycles; sterling and Ericsson cycles; air stand ard efficiency, sp ecific w ork ou tp u t, sp ecific w eight; w ork ratio; m ean effective p ressu re; deviation of actual engine cycle from ideal cycle. Problems.

CARBURETION , FUEL IN JECTION AN D IGN ITION SYSTEMS: Mixtu re requ irem ents for variou s op erating cond itions in S.I. Engines; elem entary carbu retor, Requ irem ents of a d iesel injection system ; typ es of injection system s; p etrol injection, Requ irem ents of ignition system ; typ es of ignition system s ignition tim ing; spark p lu gs. Problems.

UNIT II

COMBUSTION IN I.C. EN GIN ES : S.I. engines; Ignition lim its; stages of com bu stion in S.I. Engines; Ignition lag; velocity of flam e p rop agation; d etonation; effects of engine variables on d etonation; theories of d etonation; octane rating of fu els; p re-ignition; S.I. engine com bu stion cham bers, Stages of com bu stion in C.I. Engines; d elay p eriod ; variables affecting delay period; knock in C.I. engines, Cetane rating; C.I. engine combustion chambers.

LUBRICATION AN D COOLIN G SYSTEMS: Fu nctions of a lu bricating system , Typ es of lu brication system ; m ist, w et su m p and d ry su m p system s; p rop erties of lu bricating oil; SAE rating of lu bricants, engine p erformance and lu brication, N ecessity of engine cooling; d isad vantages of overcooling; cooling system s; air-cooling, w ater cooling; radiators.

UNIT–III

EN GIN E TESTIN G AN D PERFORMAN CE: Perform ance param eters: BH P, IH P, m echanical efficiency, brake m ean effective p ressu re and ind icative m ean effective p ressu re, torqu e, volu m etric efficiency; sp ecific fu el consu m p tion (BSFC, ISFC), therm al efficiency; heat balance; Basic engine m easu rem ents; fu el and air consu m p tion, brake p ow er, ind icated pow er and friction p ow er, heat lost to coolant and exhau st gases; p erformance cu rves. Problems.

AIR POLLUTION FROM I.C. EN GIN ES AN D ITS REMED IES: Pollu tants from S.I. and C.I. Engines, Method s of emission control; alternative fuels for I.C. Engines; the current scenario on the pollution front.

UNIT–IV

ROTARY COMPRESSORS: Root and vane blowers; Static and total head values; Centrifugal compressors- Velocity d iagram s, slip factor, ratio of com p ression, p ressu re coefficient, p re-w hirl; Axial flow com p ressor- Degree of reaction, polytropic efficiency, surging, choking and stalling, performance characteristics, Problems.

GAS TURBIN ES: Brayton cycle; Comp onents of a gas tu rbine plant; op en and closed typ es of gas tu rbine p lants; Op tim u m p ressu re ratio; Im p rovem ents of the basic gas tu rbine cycle; m u lti stage com p ression w ith inter-cooling; m u lti stage exp ansion w ith reheating betw een stages; exhau st gas heat exchanger, Ap p lications of gas tu rbines. Problems.

TEXT BOOKS:

Internal Combustion Engines –V. Ganesan, Pub.-Tata McGraw-Hill.
Gas Turbines - V. Ganesan, Pub.- Tata McGraw Hill.

Engineering fundamental of the I. C. Engines – Willard W. Pulkrabek Pub.-PHI,India

REFERENCE BOOKS:

Internal Combustion Engines & Air pollution- Obert E.F, Pub.-Hopper & Row Pub., New York
Internal Combustion Engines Fundamentals- John B. Heywood, Pub.-McGraw Hill, New York

Note:

In the sem ester examination, 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 qu estions 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 calcu lator and cellular phone will not be allowed.

ME 309B MANUFACTURING SCIENCE

B. Tech. Semester – V (Mechanical Engineering)

L	T	P	Credits				
3	1	--	4		Class Work	:	25 Marks
					Examination	:	75 Marks
					Total	:	100 Marks
					Duration of Examination	:	3 Hours

UNIT I

MECHAN ISM OF METAL CUTTIN G: Deform ation of m etal d u ring m achining, nom enclatu re of lathe, m illing tools, m echanics of chip form ation, bu ilt-u p ed ges, m echanics of orthogonal cu tting, Merchant cu tting force circle

and shear angle relationship in orthogonal cu tting, factors affecting tool forces: Cu tting sp eed , feed and d ep th of cut, surface finish. Temperature distribution at tool chip interface. Numericals.

UNIT II

CUTTIN G TOOL MATERIALS & CUTTIN G FLUID S: Characteristics of tool m aterials, variou s typ es of cu tting tool m aterials, coated tools, cu tting tool selection, Pu rp ose and typ es of cu tting flu id s, basic actions of cu tting fluids, effect of cutting fluid on tool life, selections of cutting fluid.

TOOL WEAR AN D MACHIN ABILITY: Typ es of tool w ear, tool life, factors governing tool life, Machinability: Definition and evaluation. Economics of machining. Numericals on tool life.

GEAR MAN UFACTURIN G: Introd u ction, m ethod s of m anu factu re. Gear generation and form ing: Gear cu tting by m illing, single p oint form tool, gear hobbing and shap ing. Gear finishing op erations: Gear shaving, gear burnishing, gear grinding, lapping.

UNIT III

UN CON VEN TION AL MACHIN IN G PROCESSES: Abrasive jet m achining: Princip les, ap p lications, p rocess p aram eters. Ultrasonic machining: Princip les, ap p lications, analysis of p rocess p aram eters. Electro-chemical m achining and grind ing: Princip les, classifications, choice of electrolytes, ap p lications. Electric d ischarge m achining: Principles, selection of tool m aterials and d ielectric flu id . Electron beam m achining: Generation of electron beam, relative merits and demerits. Laser beam machining: Principles and applications.

UNIT IV

JIGS & FIXTURES: Introduction, location and location devices, clamping and clam p ing d evises, Drill Jigs, Milling Fixtures.

MAN UFACTURIN G ACCURACY: Prod u ct cycle in m anu factu ring, p art print analysis, location, p rincip les, tolerance stacking, accuracy of machining, operation selection, tolerance analysis.

METROLOGY & MACHIN E TOOLS TESTIN G: Tolerances, limits and fits, method s of linear m easu rem ent and angu lar m easu rem ent, Go and N o Go gau ges. Introd u ction to Machine tools testing**,** m easu ring instru m ents u sed for testing, test procedures, acceptance tests of machine tools.

TEXT BOOKS

Manufacturing Technology – Metal cutting and machine Tools: P.N. Rao, T.M.H, New Delhi
Manufacturing Science - A. Ghosh & Mallik A.K., Affliated East West Press, N. Delhi

REFERENCE BOOKS

Principles of Machine Tools – G.C. Sen & A. Bhattacharya, Tata McGraw Hill, New Delhi
Manufacturing Engg.& Tech, Kalpakian, Serope Addison -Wisly Publishing Co. New York.
Modern Machining Processes: P.C. Pandey & H.S. Shan, T.M.H. Company, New Delhi
Text Book of Production Engineering: P.C. Sharma, S.Chand & Sons.
Introduction to Jig and Tool Design: Kempster M.H.A, Hodder & Stoughton, England

Note:

In the sem ester examination, 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 qu estions 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 calcu lator and cellular phone will not be allowed.

ME 311B APPLIED NUMERICAL TECHNIQUES AND COMPUTING

0 Tech. Semester – V (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 TO NUMERICAL COMPUTING: Need of computing, numeric data, analog computing, digital computing, process of numerical computing, characteristic of numerical computing, computational environment.

APPROXIMATE AN D ERROR IN COMPUTATION : Accu racy of nu m bers, Precision, absolu te errors, Relative errors, percentage error, error in the approximate of a function,

SOLUTION OF ALGEBRAIC & TRAN SCEN D EN TAL EQUATION : Bisection Method , Regu la Falsi Method , Secant m ethod , Iteration method , Aitkin ^{2} method, Newton Raphson method, Mullar's method

UNIT-II

SOLUTION OF SIMULTAN EOUS ALGEBRAIC EQUATION BY D IRECT METHOD S: Matrix Inversion Method , Cram er's ru le, Gu ass elimination m ethod , Gu ass Jord on m ethod , factorization method , Iteration Method s **:** Jacobi method, **:**Guass Siedal method, Relaxation method

EMPIRICAL LAWS & CURVE FITTIN G: Principle of Least squ are m ethod , Method of grou p averages and method of moments.

UNIT-III

EIGEN VALUE & EIGEN VECTORS PROBLEMS: Eigen valu e & Eigen vectors by Cayley H amiltion method, properties of Eigen value, power method, Jacobi Method, Given Method, House holder method.

IN TERPOLATION METHOD S: N ew ton Forw ard and N ew ton Backw ard interp olation method , N ew ton d ivid ed difference formula, Spline interpolation, Lagrange interpolation, Lagrange inverse interpolation, Iterative Method

UNIT-IV

N UMERICAL D IFFEREN TIATION AN D N UMERICAL IN TEGRATION : N ew ton Forw ard d ifference Formu la and backw ard d ifference Form u la, N ew ton central d ifference Form u la, Integration by Trap ezoid al ru le, Sim p son One third rule, Simpson three eight rule, Boole's rule, Weddle's Rule

N UMERICAL SOLUTION OF FIRST ORD ER D IFFEREN TIAL EQUATION : Picard m ethod , Tayler's Series m ethod , Eu ler's m ethod s, Mod ified Eu ler's m ethod s, Ru nge Ku tta Method of forth ord er, Pred icator-Corrector m ethod nam ely Milne's m ethod and Ad am s- Bashforth m ethod and solu tion of p roblem s throu gh a stru ctu ral programming in C language

TEXT BOOKS:

Numerical Methods for Mathematics, Science and Engineering by John H.Mathews, PHI New Delhi.
Applied Numerical Methods – Carnahan, B.H., Luthar, H.A. and Wilkes, J.O., Pub.- J. Wiley, New York

REFERENCE BOOKS:

Numerical method in Engg. & science with programs in C & C++ by Khanna pulishers, Dr. B.S Grewal
Numerical methods by Balagurusamy Tata Mc Graw Hill Publishing company Ltd., New Delhi
N u m erical method for Engineers stevan c.chap ra & Raym ond P. Canale Tata Mc Graw H ill Pu blishing company Ltd.
Numerical Solution of Differential Equations, by M.K. Jain, Published by Wiley Eastern, New York.
Introductory Methods of Numerical Analysis by S.D. Sastry, Published by Prentice Hall of India.
Numerical Methods – Hornbeck, R.W., Pub.- Prentice Hall, Englewood Cliffs, N.J.

Note:

In the sem ester examination, 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 qu estions 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 calcu lator and cellular phone will not be allowed.

ME 313B KINEMATICS OF MACHINES LAB

B. Tech. Semester – V (Mechanical Engineering)

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

LIST OF EXPERIMENTS:

To study various types of Kinematic links, pairs, chains and Mechanisms.

To study inversions of 4 Bar Mechanisms, Single and Double slider crank mechanisms.

To plot slider displacement, velocity and acceleration against crank rotation for Single slider crank mechanism.

To study the different type of the belt drives.

To study various type of cam and follower arrangements.

To plot follower displacement v/s cam rotation for various Cam Follower systems.

To study various types of gears-Spur, Helical, Double helical, Spiral, Bevel gear, Hypoid

To study various types of gear trains – Simple, Compound and Epicyclic

To find co-efficient of friction between belt and pulley.

Draw the involute and cycloidal teeth profile.

Note:

Ten experiments are to be performed in the Semester.

At least eight experiments should be performed from the above list. Remaining two experiments may either be performed from the above list or designed & set by the concerned institute as per the scope of the syllabus.

ME 315B I. C. ENGINES LAB							
B. Tech. Semester – V (Mechanical & Aeronautical Engineering)							
L	**T**	**P**	**Credits**		**Class Work**	**:**	**20 Marks**
--	**--**	**2**	**1**		**Examination**	**:**	**30 Marks**
					Total	**:**	**50 Marks**
					Duration of Examination	**:**	**3 Hours**

LIST OF EXPERIMENTS:

1. To stu d y the constru ctional d etails & w orking p rincip les of tw o-stroke/ fou r stroke p etrol engine.

To study the constructional detail & working of two-stroke/ four stroke diesel engine.

Analysis of exhau st gases from single cylind er/ m u lti cylind er d iesel/ p etrol engine by Orsat Apparatus.

To prepare heat balance sheet on multi-cylinder diesel engine/petrol engine.

To find the indicated horse power (IHP) on multi-cylinder petrol engine/diesel engine by Morse Test.

To p rep are variable sp eed p erform ance test of a m u lti-cylind er/ single cylind er p etrol engine/ d iesel engine and p rep are the cu rves (i) bhp, ihp ,fhp , vs sp eed (ii) volu m etric efficiency & indicated specific fuel consumption vs speed.

To find fhp of a m u lti-cylind er d iesel engine/ p etrol engine by Willian's line m ethod & by motoring method.

To p erform constant sp eed p erform ance test on a single cylind er/ m u lti-cylind er d iesel engine & d raw cu rves of (i) bhp vs fu el rate, air rate and A/ F and (ii) bhp vs m ep , m ech efficiency & sfc.

To measure CO & Hydrocarbons in the exhaust of 2- stroke / 4-stroke petrol engine.

To find intensity of smoke from a single cylinder / multi-cylinder diesel engine.

To draw the scavenging characteristic curves of single cylinder petrol engine.

To stu d y the effects of second ary air flow on bhp , sfc, Mech . Efficiency & em ission of a two-stroke petrol engine.

Note:

At least Ten experiments are to be performed in the Semester.

At least eight experiments should be performed from the above list. Remaining tw o experiments may either be performed from the above list or as designed & set by the department as per the scope of the syllabus (ME307B)

ME 317B COMPUTER AIDED MANUFACTURING PRACTICES							
B. Tech. Semester – V (Mechanical Engineering)							
L	**T**	**P**	**Credits**		**Class Work**	**:**	**40 Marks**
1	**--**	**2**	**2**		**Examination**	**:**	**60 Marks**
					Total	**:**	**100 Marks**
					Duration of Examination	**:**	**3 Hours**

THEORY

IN TROD UCTION TO CAM: Introd u ction to Com p u ter aid ed Manu factu ring, N u m erical Control, Computer Numerical Control, Direct Numerical Control, Adaptive Control, G-code and M- codes, Design of Pre & Post Processors.

NON – TRADITION MACHINING: introduction to Non –Tradition Machining, EDM & Wire EDM

PART PROGRAMMIN G: N C Program m ing: APT Program m ing, Manu al Part Programm ing, Com pu ter Aid ed Part Program ming, Program m ing on CN C -Tu rning & Machining Centre; Interfacing of tools and machines with Computers,

ROBOTICS AN D AUTOMATION : Introd u ction to Robotics, Au tom ation and Its Ap p lication In Manufacturing

PRACTICES

To m ake a sp u r gear of given p art d raw ing involving op erations nam ely d rilling, boring, reaming, honing, key slotting, gear teeth machining, lapping and gear teeth finishing.

To stu d y EDM m achining set u p and m ake a job on it involving op erations nam ely m achining, engraving, groove cutting and slot cutting on die steel material.

To stu d y CN C lathe trainer and its comp onents (hard w are and softw are) esp ecially controllers (Fanuc and Siemens) and m ake a CN C p rogram m e u sing APT langu age of given part d raw ing for machining cylindrical job involving op erations nam ely tu rning, step tu rning, tap er tu rning, thread ing, rad iu s contou r cu tting, cham fering and ru n the p rogramm e in sim u lation and actu al m od e in Cu t View er or other software and run the program in actual mode using CNC controllers.

To study CNC milling trainer and its components (hardware and software) especially controllers (Fanuc and Siem ens) and make a CN C p rogram m e u sing APT langu age of given d raw ing for m illing job operations namely end cutting, side cutting, contour cutting, face cutting, etc and run the programme in sim u lation and actu al mod e in Cu t View er or other softw are and ru n the p rogram in actu al m od e using CNC controllers.

To stu d y the Score-Base- Robots & its com p onents (hard w are and softw are) and m ake a p rogram m e for loading and unloading a job on CNC machine.

To m ake p rogram m e of a given p art d raw ing for op erations namely w eld ing and sp ray p ainting u sing Score-Base - Robotic Arm and run the programme in simulation mode only..

Books

Computer Aided Manufacturing by P.N RAO, N K Tew ari and T.K Kundra, Tata McGraw Hill Education Private Limited New Delhi
CAD /CAM Theory and Practices by Ibrahim Zeid and R Sivasubramanian Tata McGaw Hill Education Private Limited New Delhi
CAD/CAM Applications by P.N. Rao, Tata McGraw Hill Education Private Limited New Delhi
Manuals of CNC Machines and CNC Softwares

Note:

At least FIVE experiments are to be performed in the semester.
At least four experiments should be performed from the above list. Remaining one experiment may either be performed from the above list or designed & set by the department as per the scope of the theory part.

ME 319B APPLIED NUMERICAL TECHNIQUES AND COMPUTING LAB

B. Tech. Semester – V (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, that are based on the theory course ME311B: APPLIED N UMERICAL TECHN IQUES AN D COMPUTIN G, w ith the help of MATLAB softw are / Sci lab/ C / C++ on personal computer.

Solution of Non-linear equation in single variable using the method of successive bisection.

Solu tion of N on -Linear equ ation in single variable u sing the N ew ton Rap hson, Secant, Bi – Section and Modified Euler's, method.

Solution of a system of simultaneous algebraic equations using the Gaussian elimination procedure.

Solution of a system of simultaneous algebraic equations using the Gauss-Seidel iterative method.

Solu tion of a system of sim u ltaneou s algebraic equ ations u sing the Gau ss-Seid el iterative m ethod em p loying the technique of successive relaxation.

Numerical solution of an ordinary differential equation using the Euler's method.

Numerical solution of an ordinary differential equation using the Runge - Kutta 4^{th} order method.

Numerical solution of an ordinary differential equation using the Predictor – corrector method.

Numerical solution of a system of two ordinary differential equation using Numerical intergration.

Numerical solution of an elliptic boundary value problem using the method of Finite Differences.

Note:

At least ten experiments are to be performed in the semester.

At least eight experiments should be performed from the above list. Remaining tw o experiments may either be performed from the above list or designed & set by the department as per the scope of the syllabus (ME311B)

ME 321B PROFESSIONAL TRAINING I

B. Tech. Semester – V (Mechanical Engineering)

L	**T**	**P**	**Credits**		**Class Work**	**:**	**50 Marks**

--	--	2	2		**Total**	:	**50 Marks**

At the end of 4th sem ester each stu d ent w ou ld u nd ergo fou r w eeks Professional Training in an Ind u stry/ Institu te/ Professional Organization/ Research Laboratory etc. w ith the p rior ap p roval of the Training and Placem ent Officer of the University and submit in the department a typed report along with a certificate from the organization.

The typed report should be in a prescribed format.

The rep ort w ill be evalu ated in the V Sem ester by a Comm ittee consisting of three teachers from d ifferent sp ecialization to be constitu ted by the Chairp erson of the d ep artm ent. The basis of evalu ation w ill p rimarily be the knowledge and exposure of the student towards different processes and the functioning of the organization.

The student will interact with the committee through presentation to demonstrate his/her learning.

Teachers associated with evaluation work will be assigned 2 periods per week load.