



### SCHEME OF STUDIES & EXAMINATIONS

#### Department: Mechanical Engineering – 5<sup>th</sup> Semester

S. No.	Course No.	Course Title	Teaching Schedule			Marks of Class work	Examination Marks		Total	Credit	Duration of Exam
			L	T	P		Theory	Practical			
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
<b>Total</b>			<b>19</b>	<b>7</b>	<b>10</b>	<b>300</b>	<b>450</b>	<b>150</b>	<b>900</b>	<b>32</b>	

#### Note:

- 1 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.
- 2 The students will be allowed to use non-programmable scientific calculator. However, sharing/exchange of calculator is prohibited in the examination.
- 3 Electronics gadgets including Cellular phones are not allowed in the examination



**SYLLABUS: B Tech (ME)**

**Department: Mechanical Engineering – 5<sup>th</sup> Semester**

**Subject: Kinematics Of Machines**

**Subject CODE ME 301B**

**Detailed Content**

**UNIT I Introduction, Kinematic Synthesis Of Mechanisms**

- Topic no 1: Links-types, Kinematics pairs-classification
- Topic no 2: Constraints-types, Kinematic chains, Mechanism and machines
- Topic no 3: Degrees of freedom of planar mechanism, Grubler's equation, Inversions of four bar chain
- Topic no 4: Slider crank chain and double slider crank chain number synthesis, Freudenstein's equation
- Topic no 5: Stages of kinematic synthesis and errors, Chebychev spacing of precision points
- Topic no 6: Limit positions and dead centre of four-bar mechanism, Transmission angle in four bar mechanism and Slider crank mechanism, Problems

**UNIT II Velocity In Mechanisms, Acceleration In Mechanisms**

- Topic no 7: Velocity of point in mechanism
- Topic no 8: Relative velocity method
- Topic no 9: Velocities in four bar mechanism
- Topic no 10: Slider crank mechanism and quick return motion mechanism
- Topic no 11: Rubbing velocity at a pin joint
- Topic no 12: Instantaneous center method
- Topic no 13: Types & location of instantaneous centers
- Topic no 14: Kennedy's theorem, Problems
- Topic no 15: Acceleration of a point on a link
- Topic no 16: Four Bar mechanism and slider Crank mechanism
- Topic no 17: Coriolis component of acceleration
- Topic no 18: Analytical method for determining the velocity and acceleration of slider crank mechanism, Problems

**UNIT III Gears, Gear Trains**

- Topic no 19: Classification & terminology
- Topic no 20: Law of gearing
- Topic no 21: Tooth forms & comparisons
- Topic no 22: Length of path of contact
- Topic no 23: Contact ratio, Interference & under cutting in involute gear teeth
- Topic no 24: Minimum number of teeth on gear and pinion to avoid interference
- Topic no 25: Synthesis of simple
- Topic no 26: Compound, epicyclic and planetary gear trains
- Topic no 27: Sun and planet gear
- Topic no 28: Torque in epicyclic gear trains, Problems

**UNIT IV Cams And Followers, Friction Devices**

- Topic no 29: Classification & terminology
- Topic no 30: Cam profile by graphical methods with knife edge and radial roller follower for uniform velocity
- Topic no 31: Simple harmonic and parabolic motion of followers
- Topic no 32: Analytical methods of cam design—tangent cam with roller follower and circular cams with flat faced Follower, Problems
- Topic no 33: Type of friction, Laws of friction
- Topic no 34: Flat pivots and flat collar bearing-uniform pressure and uniform wear
- Topic no 35: Belt and pulley drive
- Topic no 36: Length of open and cross belt drive
- Topic no 37: Ratio of driving tensions for flat belt drive
- Topic no 38: Centrifugal tension
- Topic no 39: V-belt drive, Problems



Study Scheme				Evaluation Scheme			Total Marks
Lectures per week				Internal Assessment	External Assessment (Examination)		
L	T	P	Credits	Max. Marks	Max. Marks	Exam Duration	
3	1	-	4	25	75	3 hours	100

#### TEXT BOOKS:

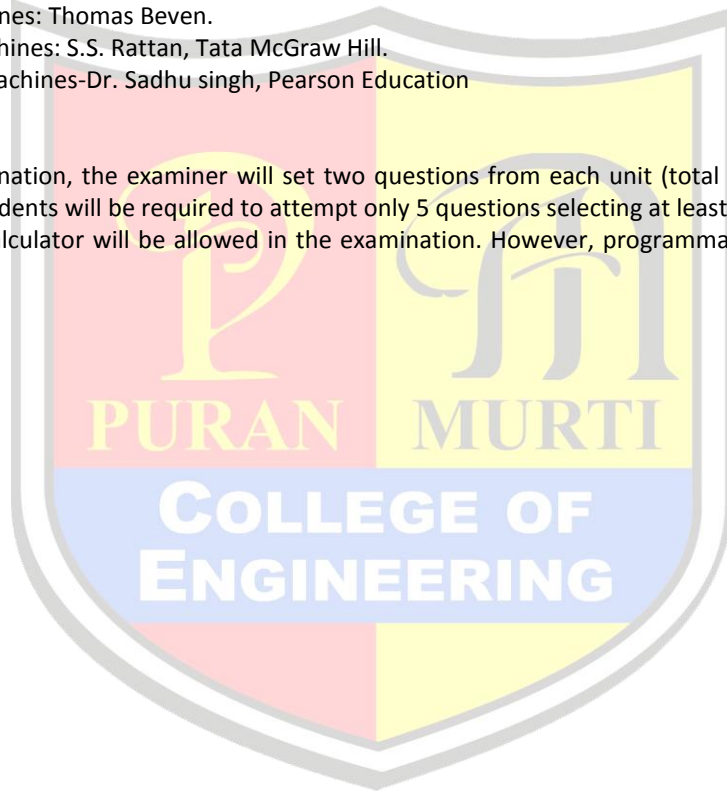
1. Theory of Mechanisms and Machines: Amitabha Ghosh and Ashok Kumar Mallik, Third Edition Affiliated East-West Press.
2. Theory of Machines and Mechanisms: Joseph Edward Shigley and John Joseph Uicker, Jr. Second Edition, MGH, New York.

#### REFERENCE BOOKS:

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

#### Note:

1. In the semester examination, the examiner will set two questions from each unit (total 08 questions in all), covering the entire syllabus. The students will be required to attempt only 5 questions selecting at least one question from each unit.
2. The use of scientific calculator will be allowed in the examination. However, programmable calculator and cellular phone will not be allowed.





### SYLLABUS: B Tech (ME)

Department: Mechanical Engineering – 5<sup>th</sup> Semester

Subject: Machine Design – I (Theory)

Subject Code ME 303B

#### Detailed Content

##### **UNIT I Design Concepts, Selection Of Materials**

- Topic no 1: Design cycle
- Topic no 2: Phases of design
- Topic no 3: Brain storming
- Topic no 4: Reverse engineering and redesign
- Topic no 5: Role of designer
- Topic no 6: Feasibility study-technical feasibility
- Topic no 7: Economic & financial feasibility
- Topic no 8: Societal & environmental feasibility
- Topic no 9: Selection of Fits and tolerances
- Topic no 10: Classification of Engg. Materials
- Topic no 11: Mechanical properties of the commonly used engineering Materials
- Topic no 12: Hardness
- Topic no 13: Strength parameters with reference to stress-strain diagram
- Topic no 14: Factor of safety

##### **UNIT II Mechanical Joints, Riveted Joints, Cotter & Knuckle Joints:**

- Topic no 15: Isometric screw
- Topic no 16: Threads
- Topic no 17: Bolted joints in tension
- Topic no 18: Eccentrically loaded bolted joints in shear and under combined stresses
- Topic no 19: Design of power screws
- Topic no 20: Design of various types of welding joints under different static load conditions
- Topic no 21: Design of various types of riveted joints under different static loading conditions
- Topic no 22: Eccentrically loaded riveted joints
- Topic no 23: Design of cotter and knuckle joints

##### **UNIT III Belt, Rope And Chain Drives, Keys, Couplings & Flywheel:**

- Topic no 24: Design of belt drives
- Topic no 25: Flat & V-belt drives
- Topic no 26: Condition for Transmission of maximum
- Topic no 27: Power, Selection of belt
- Topic no 28: Design of rope drives
- Topic no 29: Design of chain drives with sprockets
- Topic no 30: Design of Keys – Flat, Kennedy Keys
- Topic no 31: Splines, Couplings design – Rigid & Flexible coupling
- Topic no 32: Turning Moment diagram
- Topic no 33: Coefficient of fluctuation of energy and speed
- Topic no 34: Design of flywheel – solid disk & rimmed flywheels

##### **UNIT IV Clutches, Brakes:**

- Topic no 35: Various types of clutches in use
- Topic no 36: Design of friction clutches – single disc, Multidisc
- Topic no 37: Cone & Centrifugal
- Topic no 38: Torque transmitting capacity
- Topic no 39: Various types of Brakes
- Topic no 40: Self energizing condition of brakes
- Topic no 41: Design of shoe brakes – Internal & external expanding
- Topic no 42: Band brakes,
- Topic no 43: Thermal Considerations in brake designing



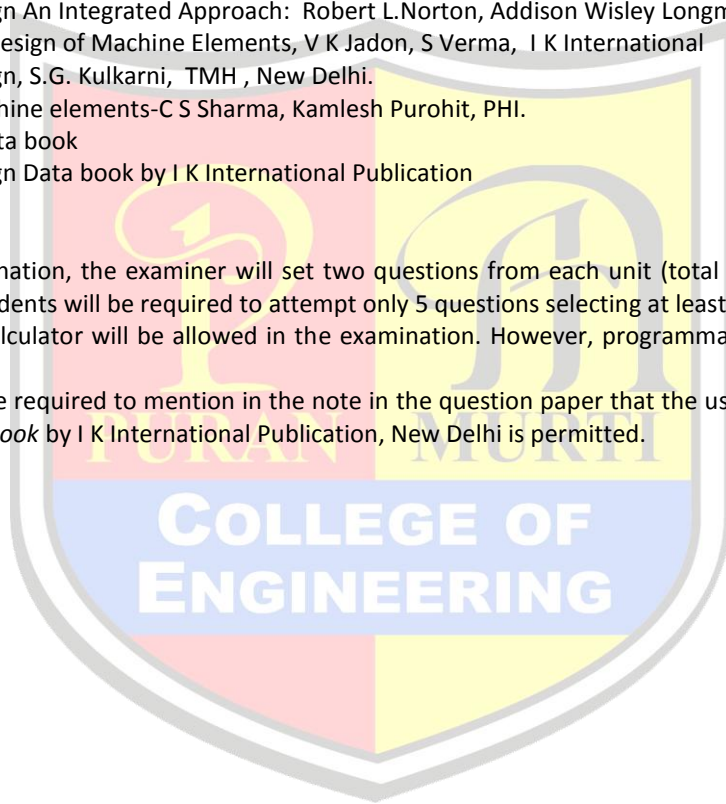
Study Scheme				Evaluation Scheme			Total Marks
Lectures per week				Internal Assessment	External Assessment (Examination)		
L	T	P	Credits	Max. Marks	Max. Marks	Exam Duration	
3	1	-	4	25	75	3 hours	100

### Text Books :

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

### Note:

1. In the semester examination, the examiner will set two questions from each unit (total 08 questions in all), covering the entire syllabus. The students will be required to attempt only 5 questions selecting at least one question from each unit.
2. The use of scientific calculator will be allowed in the examination. However, programmable calculator and cellular phone will not be allowed.
3. The paper setter will be required to mention in the note in the question paper that the use of only *PSG Design Data book / Machine Design Data book* by I K International Publication, New Delhi is permitted.





**SYLLABUS: B Tech (ME)**

**Department: Mechanical Engineering – 5<sup>th</sup> Semester**

**Subject: Quality Engineering (Theory)**

**Subject Code ME 305B**

**Detailed Content**

**UNIT I Philosophies And Fundamentals, Some Philosophies And Their Impact On Quality**

Topic no 1: Introduction to Quality Control and Total Quality System-Evolution of Quality Management  
Philosophy, Quality,

Topic no 2: Quality control, Quality Assurance,

Topic no 3: Quality circles and quality improvement, TQM, Cost of quality.

Topic no 4: Deming, Juran, Crossby,

Topic no 5: Ishikawaquality MANAGEMENT:

Topic no 6: Practices, Tools, and standards- Tools for quality improvement- 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 Descriptive Statistics**

Topic no 7: Data collection and presentation,

Topic no 8: Measures of central tendency,

Topic no 9: Measures variation and skewness,

Topic no 10: Measures of association,

Topic no 11: Probability distribution- discrete probability distribution, and continuous probability distribution.

**Inferential Statistics**

Topic no 12: Drawing conclusions on Product and Process Quality-Sampling distribution,

Topic no 13: Estimation of product and process parameters-Point estimation,

Topic no 14: Interval Estimation,

**Hypothesis Testing**

Topic no 15: Concepts, errors, steps, testing of mean,

Topic no 16: Difference between two means, proportion,

Topic no 17: Difference between two proportions,

Topic no 18: Difference between two binomial proportions,

Topic no 19: Variance, ratio of two variances,

Topic no 20: Concepts of sampling-introduction,

Topic no 21: Sampling design and schemes,

Topic no 22: Sample size determination. -Numerical Problems

**UNIT III Statistical Process Control, Acceptance Sampling, Process Capability**

Topic no 23: Introduction, causes of variation,

Topic no 24: Control charts for variables and attributes- X, R, P, and C charts,

Topic no 25: Advantages and disadvantages of sampling,

Topic no 26: Producer's risk and consumer's risk,

Topic no 27: curve, types of sampling plans.

Topic no 28: Introduction,

Topic no 29: Specification limits and control limits,

Topic no 30: Process Capability Indices,

Topic no 31: Taguchi Method, brief of six sigma approach.Numerical Problems

**UNIT IV Advancements In Quality Management & Total Quality Management, Quality In Service Sector**

Topic no 32: A Management Philosophy,

Topic no 33: Employee involvement, Continuous Improvement,

Topic no 34: The costs of Poor Quality

Topic no 35: Introduction, Service Industries and their characteristics, a model for service quality, applications.



Study Scheme				Evaluation Scheme			Total Marks
Lectures per week				Internal Assessment	External Assessment (Examination)		
L	T	P	Credits	Max. Marks	Max. Marks	Exam Duration	
3	1	-	4	25	75	3 hours	100

#### Text Book:

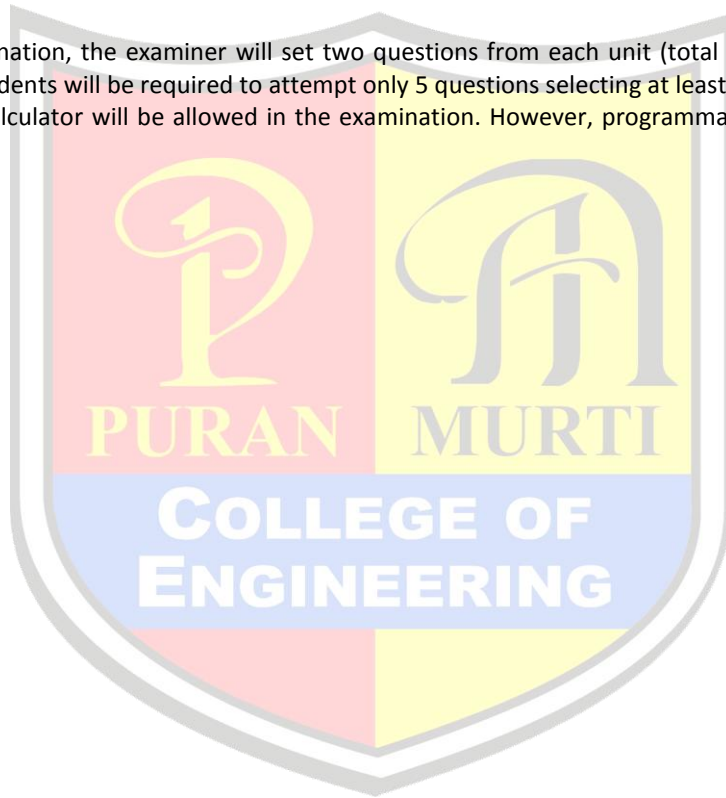
1. Fundamentals of Quality Control and Improvement by Amitava Mitra- PHI, New Delhi
2. Managing for Total Quality-N. Logothetis- PHI

#### Reference Books:

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

#### Note:

1. In the semester examination, the examiner will set two questions from each unit (total 08 questions in all), covering the entire syllabus. The students will be required to attempt only 5 questions selecting at least one question from each unit.
2. The use of scientific calculator will be allowed in the examination. However, programmable calculator and cellular phone will not be allowed.





### SYLLABUS: B Tech (ME)

Department: Mechanical Engineering – 5<sup>th</sup> Semester

Subject: Internal Combustion Engines And Gas Turbines

Subject Code: ME 307B

#### Detailed Content

##### **UNIT I Air Standard Cycles, Carburetion, Fuel Injection And Ignition Systems**

- Topic no 1: Internal and external combustion engines; classification of I.C. Engines
- Topic no 2: Cycles of operation in four stroke and two stroke I.C. Engines, Wankel Engines
- Topic no 3: Assumptions made in air standard cycle
- Topic no 4: Otto cycle; diesel cycle, dual combustion cycle
- Topic no 5: Comparison of Otto, diesel and dual combustion cycles
- Topic no 6: Sterling and Ericsson cycles
- Topic no 7: Air standard efficiency, specific work output, specific weight; work ratio; mean effective pressure
- Topic no 8: Deviation of actual engine cycle from ideal cycle. Problems
- Topic no 9: Mixture requirements for various operating conditions in S.I. Engines; elementary carburetor
- Topic no 10: Requirements of a diesel injection system; types of injection systems; petrol injection
- Topic no 11: Requirements of ignition system; types of ignition systems ignition timing; spark plugs. Problems

##### **UNIT II Combustion In I.C. Engines , Lubrication And Cooling Systems**

- Topic no 12: S.I. engines; Ignition limits; stages of combustion in S.I. Engines; Ignition lag
- Topic no 13: Velocity of flame propagation; detonation
- Topic no 14: Effects of engine variables on detonation; theories of detonation; octane rating of fuels
- Topic no 15: Pre-ignition; S.I. engine combustion chambers
- Topic no 16: Stages of combustion in C.I. Engines; delay period; variables affecting delay period; knock in C.I. engines
- Topic no 17: Cetane rating; C.I. engine combustion chambers
- Topic no 18: Functions of a lubricating system, Types of lubrication system; mist, wet sump and dry sump systems
- Topic no 19: Properties of lubricating oil; SAE rating of lubricants, engine performance and lubrication
- Topic no 20: Necessity of engine cooling; disadvantages of overcooling; cooling systems; air-cooling, water cooling; radiators

##### **UNIT-III Engine Testing And Performance, Air Pollution From I.C. Engines And Its Remedies**

- Topic no 21: Performance parameters: BHP, IHP, mechanical efficiency
- Topic no 22: Brake mean effective pressure and indicative mean effective pressure
- Topic no 23: Torque, volumetric efficiency; specific fuel consumption (BSFC, ISFC), thermal efficiency
- Topic no 24: Heat balance; Basic engine measurements; fuel and air consumption
- Topic no 25: Brake power, indicated power and friction power
- Topic no 26: Heat lost to coolant and exhaust gases; performance curves. Problems
- Topic no 27: Pollutants from S.I. and C.I. Engines, Methods of emission control
- Topic no 28: Alternative fuels for I.C. Engines; the current scenario on the pollution front

##### **UNIT-IV Rotary Compressor, Gas Turbines**

- Topic no 29: Root and vane blowers; Static and total head values;
- Topic no 30: Centrifugal compressors- Velocity diagrams, slip factor, ratio of compression, pressure coefficient,
- Topic no 31: Pre-whirl; Axial flow compressor- Degree of reaction, polytropic efficiency,
- Topic no 32: Surging, choking and stalling, performance characteristics, Problems.
- Topic no 33: Brayton cycle; Components of a gas turbine plant; open and closed types of gas turbine plants;
- Topic no 34: Optimum pressure ratio; Improvements of the basic gas turbine cycle;
- Topic no 35: Multi stage compression with inter-cooling; multi stage expansion with reheating between stages;
- Topic no 36: Exhaust gas heat exchanger, Applications of gas turbines. Problems





Study Scheme				Evaluation Scheme			Total Marks
Lectures per week				Internal Assessment	External Assessment (Examination)		
L	T	P	Credits	Max. Marks	Max. Marks	Exam Duration	
3	1	-	4	25	75	3 hours	100

#### TEXT BOOKS:

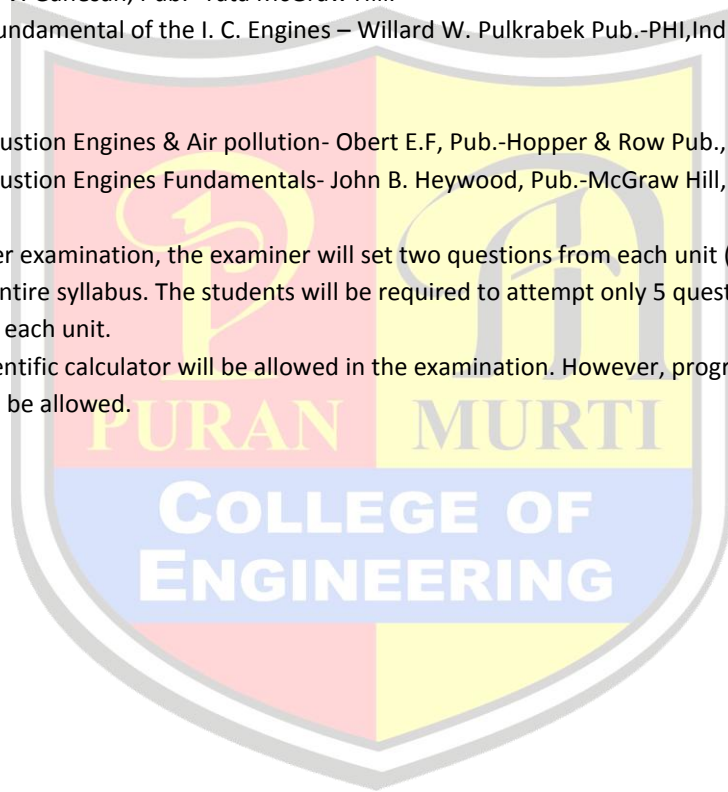
1. Internal Combustion Engines –V. Ganesan, Pub.-Tata McGraw-Hill.
2. Gas Turbines - V. Ganesan, Pub.- Tata McGraw Hill.
3. Engineering fundamental of the I. C. Engines – Willard W. Pulkrabek Pub.-PHI,India

#### REFERENCE BOOKS:

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

#### Note:

1. In the semester examination, the examiner will set two questions from each unit (total 08 questions in all), covering the entire syllabus. The students will be required to attempt only 5 questions selecting at least one question from each unit.
2. The use of scientific calculator will be allowed in the examination. However, programmable calculator and cellular phone will not be allowed.





**SYLLABUS: B Tech (ME)**

**Department: Mechanical Engineering – 5<sup>th</sup> Semester**

**Subject: Manufacturing Science (Theory)**

**Subject Code 309B**

**Detailed Content**

**UNIT I Mechanism Of Metal Cutting**

- Topic no 1: Deformation of metal during machining
- Topic no 2: Nomenclature of lathe, milling tools
- Topic no 3: Mechanics of chip formation, built-up edges
- Topic no 4: Mechanics of orthogonal cutting
- Topic no 5: Merchant cutting force circle and shear angle relationship in orthogonal cutting
- Topic no 6: Factors affecting tool forces: Cutting speed, feed and depth of cut, surface finish
- Topic no 7: Temperature distribution at tool chip interface. Numericals

**UNIT II Cutting Tool Materials&Cutting Fluids, Tool Wear And Machinability,Tool Wear And Machinability,Gear Manufacturing**

- Topic no 8: Characteristics of tool materials
- Topic no 9: Various types of cutting tool materials, coated tools, cutting tool selection
- Topic no 10: Purpose and types of cutting fluids
- Topic no 11: Basic actions of cutting fluids, effect of cutting fluid on tool life, selections of cutting fluid
- Topic no 12: Types of tool wear, tool life, factors governing tool life, Machinability
- Topic no 13: Definition and evaluation. Economics of machining. Numericals on tool life
- Topic no 14: Introduction, methods of manufacture
- Topic no 15: Gear generation and forming
- Topic no 16: Gear cutting by milling, single point form tool
- Topic no 17: Gear hobbing and shaping. Gear finishing operations
- Topic no 18: Gear shaving, gear burnishing, gear grinding, lapping

**UNIT III Unconventional Machining Processes**

- Topic no 19: Abrasive jet machining: Principles, applications
- Topic no 20: Process parameters
- Topic no 21: Ultrasonic machining: Principles, applications
- Topic no 22: Analysis of process parameters
- Topic no 23: Electro-chemical machining and grinding: Principles, classifications
- Topic no 24: Choice of electrolytes, applications
- Topic no 25: Electric discharge machining: Principles
- Topic no 26: Selection of tool materials and dielectric fluid
- Topic no 27: Electron beam machining: Generation of electron beam
- Topic no 28: Relative merits and demerits. Laser beam machining: Principles and applications

**UNIT IV Jigs & Fixtures, Manufacturing Accuracy, Metrology & Machine Tools Testing**

- Topic no 29: Introduction, location and location devices
- Topic no 30: Clamping and clamping devises
- Topic no 31: Drill jigs, milling fixtures
- Topic no 32: Product cycle in manufacturing
- Topic no 33: Part print analysis, location, principles
- Topic no 34: Tolerance stacking, accuracy of machining, operation selection, tolerance analysis
- Topic no 35: Tolerances, limits and fits
- Topic no 36: Methods of linear measurement and angular measurement, go and no go gauges
- Topic no 37: Introduction to machine tools testing
- Topic no 38: measuring instruments used for testing
- Topic no 39: Test procedures, acceptance tests of machine tool



Study Scheme				Evaluation Scheme			Total Marks
Lectures per week				Internal Assessment	External Assessment (Examination)		
L	T	P	Credits	Max. Marks	Max. Marks	Exam Duration	
3	1	-	4	25	75	3 hours	100

### TEXT BOOKS

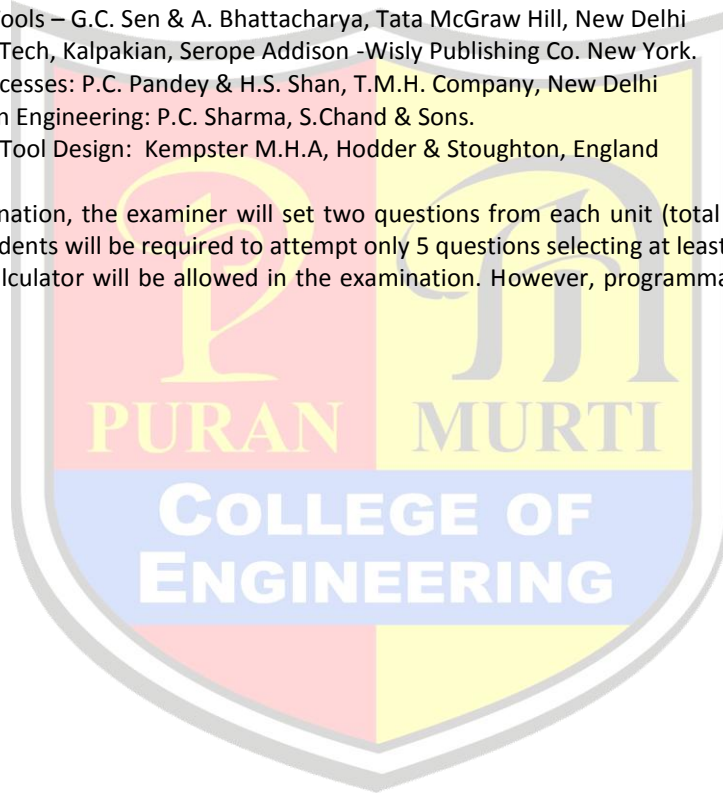
1. Manufacturing Technology – Metal cutting and machine Tools: P.N. Rao, T.M.H, New Delhi
2. Manufacturing Science - A. Ghosh & Mallik A.K., Affiliated East West Press, N. Delhi

### REFERENCE BOOKS

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

### Note:

3. In the semester examination, the examiner will set two questions from each unit (total 08 questions in all), covering the entire syllabus. The students will be required to attempt only 5 questions selecting at least one question from each unit.
4. The use of scientific calculator will be allowed in the examination. However, programmable calculator and cellular phone will not be allowed.





**SYLLABUS: B Tech (ME)**

**Department: Mechanical Engineering – 5<sup>th</sup> Semester**

**Subject: Applied Numerical Techniques And Computing**

**Subject CODE: ME 311B**

**Detailed Content**

**UNIT-I Introduction To Numerical Computing, Approximate And Error In Computation, solution Of Algebraic & Transcendental Equation:**

- Topic no 1 Need of computing, numeric data, analog computing, digital computing
- Topic no 2 Process of numerical computing, characteristic of numerical computing
- Topic no 3 Computational environment., Accuracy of numbers, Precision, absolute errors
- Topic no 4 Relative errors, percentage error, error in the approximate of a function
- Topic no 5 Bisection Method, Regula Falsi Method, Secant method
- Topic no 6 Iteration method, Aitkin  $\Delta^2$  method
- Topic no 7 Newton Raphson method, Mullar's method

**UNIT-II Solution Of Simultaneous Algebraic Equation By Direct Methods, Empirical Laws & Curve Fitting:**

- Topic no 8 Matrix inversion method
- Topic no 9 Cramer's rule, guass elimination method
- Topic no 10 Guass jordon method, factorization method
- Topic no 11 Iteration methods : jacobi method, :guass siedal method
- Topic no 12 Relaxation method
- Topic no 13 Principle of least square method
- Topic no 14 Method of group averages and method of moments

**UNIT-III Eigen Value & Eigen Vectors Problems, Interpolation Methods**

- Topic no 15 Eigen value & Eigen vectors by Cayley Hamilton method
- Topic no 16 Properties of Eigen value, power method, Jacobi Method, Given Method, House holder method
- Topic no 17 Newton Forward and Newton Backward interpolation method
- Topic no 18 Newton divided difference formula, Spline interpolation, Lagrange interpolation
- Topic no 19 Lagrange inverse interpolation, Iterative Method

**UNIT-IV Numerical Differentiation And Numerical Integration, Numerical Solution Of First Order Differential Equation**

- Topic no 20 Newton Forward difference Formula and backward difference Formula
- Topic no 21 Newton central difference Formula
- Topic no 22 Integration by Trapezoidal rule, Simpson One third rule
- Topic no 23 Simpson three eight rule, Boole's rule, Weddle's Rule
- Topic no 24 Picard Method
- Topic no 25 Tayler's Series method, Euler's methods, Modified Euler's methods
- Topic no 26 Runge Kutta Method of forth order
- Topic no 27 Predictor-Corrector method namely Milne's method and Adams
- Topic no 28 Bashforth method and solution of problems through a structural programming in C language

Study Scheme				Evaluation Scheme			Total Marks
Lectures per week				Internal Assessment	External Assessment (Examination)		
L	T	P	Credits	Max. Marks	Max. Marks	Exam Duration	
3	1	-	4	25	75	3 hours	100

**TEXT BOOKS:**

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



# PM

## COLLEGE OF ENGINEERING

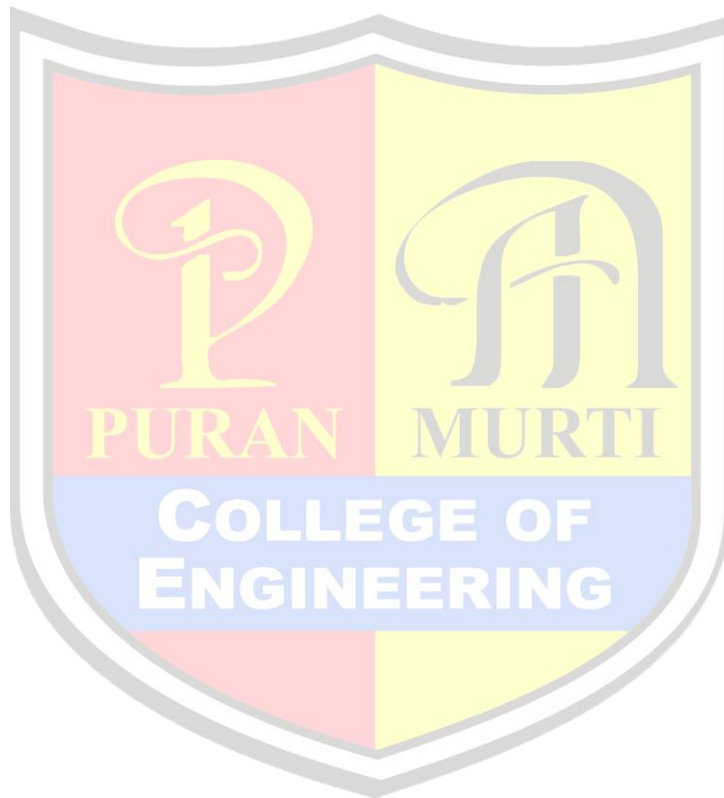
A Unit of Puran Murti Educational Society  
Approved by AICTE, Ministry of HRD, Govt. of India,  
Affiliated to Deenbandhu Chhotu Ram University of Science & Technology

### REFERENCE BOOKS:

1. Numerical method in Engg. & science with programs in C & C++ by Khanna publishers, Dr. B.S Grewal
2. Numerical methods by Balagurusamy Tata Mc Graw Hill Publishing company Ltd., New Delhi
3. Numerical method for Engineers stevan c.chapra & Raymond P. Canale Tata Mc Graw Hill Publishing company Ltd.
4. Numerical Solution of Differential Equations, by M.K. Jain, Published by Wiley Eastern, New York.
5. Introductory Methods of Numerical Analysis by S.D. Sastry, Published by Prentice Hall of India.
6. Numerical Methods – Hornbeck, R.W., Pub.- Prentice Hall, Englewood Cliffs, N.J.

### Note:

5. In the semester examination, the examiner will set two questions from each unit (total 08 questions in all), covering the entire syllabus. The students will be required to attempt only 5 questions selecting at least one question from each unit.
6. The use of scientific calculator will be allowed in the examination. However, programmable calculator and cellular phone will not be allowed.





### SYLLABUS: B Tech (ME)

Department: Mechanical Engineering – 5<sup>th</sup> Semester

Subject: Kinematics Of Machines Lab

Subject Code: ME 313B

### Detailed Content

#### List of Experiments:

1. To study various types of Kinematic links, pairs, chains and Mechanisms.
2. To study inversions of 4 Bar Mechanisms, Single and Double slider crank mechanisms.
3. To plot slider displacement, velocity and acceleration against crank rotation for Single slider crank mechanism.
4. To study the different type of the belt drives.
5. To study various type of cam and follower arrangements.
6. To plot follower displacement v/s cam rotation for various Cam Follower systems.
7. To study various types of gears-Spur, Helical, Double helical, Spiral, Bevel gear, Hypoid
8. To study various types of gear trains – Simple, Compound and Epicyclic
9. To find co-efficient of friction between belt and pulley.
10. Draw the involute and cycloidal teeth profile.

Study Scheme				Evaluation Scheme			Total Marks
Lectures per week				Internal Assessment	External Assessment (Examination)		
L	T	P	Credits	Max. Marks	Max. Marks	Exam Duration	
		2	1	20	30	3 hours	

#### Note:

1. Ten experiments are to be performed in the Semester.
2. 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.



**SYLLABUS: B Tech (ME)**

Department: Mechanical Engineering – 5<sup>th</sup> Semester

Subject: I.C.Engines Lab

Subject Code: ME 315B

**Detailed Content**

**List of Experiments:**

1. To study the constructional details & working principles of two-stroke/ four stroke petrol engine.
2. To study the constructional detail & working of two-stroke/ four stroke diesel engine.
3. Analysis of exhaust gases from single cylinder/multi cylinder diesel/petrol engine by Orsat Apparatus.
4. To prepare heat balance sheet on multi-cylinder diesel engine/petrol engine.
5. To find the indicated horse power (IHP ) on multi-cylinder petrol engine/diesel engine by Morse Test.
6. 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 fuel consumption vs speed.
7. To find fhp of a multi-cylinder diesel engine/petrol engine by Willian's line method & by motoring method.
8. To perform constant speed performance test on a single cylinder/multi-cylinder diesel engine & draw curves of (i) bhp vs fuel rate, air rate and A/F and (ii) bhp vs mep, mech efficiency & sfc.
9. To measure CO & Hydrocarbons in the exhaust of 2- stroke / 4-stroke petrol engine.
10. To find intensity of smoke from a single cylinder / multi-cylinder diesel engine.
11. To draw the scavenging characteristic curves of single cylinder petrol engine.
12. To study the effects of secondary air flow on bhp, sfc, Mech. Efficiency & emission of a two-stroke petrol engine.

Study Scheme				Evaluation Scheme			Total Marks
Lectures per week				Internal Assessment	External Assessment (Examination)		
L	T	P	Credits	Max. Marks	Max. Marks	Exam Duration	
		2	1	20	30	3 hours	50

**Note:**

1. At least Ten experiments are to be performed in the Semester.
2. At least eight experiments should be performed from the above list. Remaining two experiments may either be performed from the above list or as designed & set by the department as per the scope of the syllabus (ME307B)



### SYLLABUS: B Tech (ME)

Department: Mechanical Engineering – 5<sup>th</sup> Semester

Subject: Computer Aided Manufacturing Practices Lab

Subject Code: ME 317B

### Detailed Content

#### List of Experiments:

1. To make a spur gear of given part drawing involving operations namely drilling, boring, reaming, honing, key slotting, gear teeth machining, lapping and gear teeth finishing.
2. To study EDM machining set up and make a job on it involving operations namely machining, engraving, groove cutting and slot cutting on die steel material.
3. To study CNC lathe trainer and its components (hardware and software) especially controllers (Fanuc and Siemens) and make a CNC programme using APT language of given part drawing for machining cylindrical job involving operations namely turning, step turning, taper turning, threading, radius contour cutting, chamfering and run the programme in simulation and actual mode in Cut Viewer or other software and run the program in actual mode using CNC controllers.
4. To study CNC milling trainer and its components (hardware and software) especially controllers (Fanuc and Siemens) and make a CNC programme using APT language of given drawing for milling job operations namely end cutting, side cutting, contour cutting, face cutting, etc and run the programme in simulation and actual mode in Cut Viewer or other software and run the program in actual mode using CNC controllers.
5. To study the Score-Base- Robots & its components (hardware and software) and make a programme for loading and unloading a job on CNC machine.
6. To make programme of a given part drawing for operations namely welding and spray painting using Score-Base - Robotic Arm and run the programme in simulation mode only..

Study Scheme				Evaluation Scheme			Total Marks
Lectures per week				Internal Assessment	External Assessment (Examination)		
L	T	P	Credits	Max. Marks	Max. Marks	Exam Duration	
1		2	2	40	60	3 hours	100

#### Books

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

#### Note:

1. At least FIVE experiments are to be performed in the semester.
2. 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.





**SYLLABUS: B Tech (ME)**

Department: Mechanical Engineering – 5<sup>th</sup> Semester

Subject: Applied Numerical Techniques And Computing Lab

Subject Code: ME 319B

**Detailed Content**

**List of Experiments:**

1. Solution of Non-linear equation in single variable using the method of successive bisection.
2. Solution of Non-Linear equation in single variable using the Newton Raphson, Secant, Bi – Section and Modified Euler’s,method.
3. Solution of a system of simultaneous algebraic equations using the Gaussian elimination procedure.
4. Solution of a system of simultaneous algebraic equations using the Gauss-Seidel iterative method.
5. Solution of a system of simultaneous algebraic equations using the Gauss-Seidel iterative method employing the technique of successive relaxation.
6. Numerical solution of an ordinary differential equation using the Euler’s method.
7. Numerical solution of an ordinary differential equation using the Runge - Kutta 4<sup>th</sup> order method.
8. Numerical solution of an ordinary differential equation using the Predictor – corrector method.
9. Numerical solution of a system of two ordinary differential equation using Numerical intergration.
10. Numerical solution of an elliptic boundary value problem using the method of Finite Differences.

Study Scheme				Evaluation Scheme			Total Marks
Lectures per week				Internal Assessment	External Assessment (Examination)		
L	T	P	Credits	Max. Marks	Max. Marks	Exam Duration	
		2	1	20	30	3 hours	50

**Note:**

1. At least ten experiments are to be performed in the semester.
2. 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 department as per the scope of the syllabus (ME311B)



### SYLLABUS: B Tech (ME)

Department: Mechanical Engineering– 5<sup>th</sup> Semester

Subject: Professional Training I

Subject Code: ME-321B

#### Detailed Content

At the end of 4<sup>th</sup> semester each student would undergo four weeks Professional Training in an Industry/ Institute/ Professional Organization/ Research Laboratory etc. with the prior approval of the Training and Placement 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 report will be evaluated in the V Semester by a Committee consisting of three teachers from different specialization to be constituted by the Chairperson of the department. The basis of evaluation will primarily 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.

Study Scheme				Evaluation Scheme			Total Marks
Lectures per week				Internal Assessment	External Assessment (Examination)		
L	T	P	Credits	Max. Marks	Max. Marks	Exam Duration	
-	-	2	2	50	-	-	50