E.G.S. PILLAY ENGINEERING COLLEGE

(Autonomous)

Approved by AICTE, New Delhi | Affiliated to Anna University, Chennai

Accredited by NAAC with 'A' Grade | Accredited by NBA (CSE, EEE, MECH)

NAGAPATTINAM – 611 002

B.E. MECHANICAL ENGINEERING

Second Year – Fourth Semester

Course Code	Course Name	L	T	P	C	Maximum Marks		
						CA	ES	Total
Theory Course								
1702MA403	Numerical Methods and Statistics	3	2	0	4	40	60	100
1702ME401	Thermal Engineering	3	2	0	4	40	60	100
1702ME402	Measurements and Metrology	2	0	2	3	50	50	100
1702ME403	Kinematics of Machines	2	2	0	3	40	60	100
1702ME404	Design of Machine Elements	3	2	0	4	40	60	100
1702ME405	Manufacturing Technology -II	3	0	0	3	40	60	100
Laboratory Course								
1702ME451	Thermal Engineering Laboratory	0	0	2	1	50	50	100
1702ME452	Manufacturing Technology Laboratory – II	0	0	2	1	50	50	100
1704ME453	Technical Seminar II	0	0	2	0	100	-	100
1704GE451	Life Skills: Verbal Ability	0	0	2	0	100	-	100

L – Lecture | T – Tutorial | P – Practical | CA – Continuous Assessment | ES – End Semester

1702MA403	NUMERICAL METHODS AND STATISTICS	L	T	P	C
	(Common to B.E - Civil, EEE and Mech.)	3	2	0	4

PREREQUISITE:

1.Engineering Mathematics I
2.Engineering Mathematics II
3.Engineering Mathematics III

COURSE OBJECTIVES:

1.To sole the engineering problem, by use of numerical tools
2.To understand the concept of interpolation
3.To analyze the population and samples using statistics techniques

UNIT I INTERPOLATION AND APPROXIMATION 12 Hours

Interpolation with unequal intervals - Lagrange's interpolation – Newton's divided difference interpolation – Interpolation with equal intervals – Newton's forward and backward difference formulae.

UNIT II NUMERICAL DIFFERENTIATION 12 Hours

Approximation of derivatives using interpolation polynomials-Taylor's series method – Euler's method - Modified Euler's method - Fourth order Runge-Kutta method for solving first order equations

UNIT III NUMERICAL INTEGRATION 12 Hours

Numerical integration using Trapezoidal, Simpson's 1/3 rule – Romberg's method - Two point and three Point Gaussian quadrature formulae – Evaluation of double integrals by Trapezoidal and Simpson's 1/3 rules.

UNIT IV SOLUTION OF ALGEBRAIC AND TRANSCENDENTAL EQUATIONS 12 Hours

Solution of algebraic and transcendental equations - Newton Raphson method- Solution of linear system of equations - Gauss elimination method – Gauss Jordan method – Iterative methods of Gauss Jacobi and Gauss Seidel

UNIT V TESTING OF HYPOTHESIS 12 Hours

Large sample test based on Normal distribution for single mean and difference of means - Tests based on t and F distributions for testing means and variances – Contingency table (Test for Independency) – Goodness of fit

TOTAL: 60 HOURS

FURTHER READING / CONTENT BEYOND SYLLABUS / SEMINAR :

1.Finding Eigen value using power method
2.Cubic Spline

COURSE OUTCOMES:

After completion of the course, Students will be able to

CO1: To find the intermediate values, when huge amounts of experimental data are involved.
CO2: To solve first order differential equation using Numerical methods
CO3: To perform Integration using Numerical methods
CO4: To solve algebraic and transcendental Equations numerically
CO5: Analyses the statistical data

REFERENCES:

1. Johnson R.A.Gupta C. B, Miller and Freunds Probability and statistics for Engineers, 7th edition ,Pearson Education,2007
2. Grewal B.S and Grewal J.S, Nummerical methods in Engineering and Science, 6th edition,Khanna puplishers,2004
3. Walpole R.E. Myers S.L ,Ye.K, Probability and statistics for Engg and scientists, 8th edition Pearson education,2007
4. Gerald C.F Wheatley P.O, Applied Numerical Analysis, 6th edition ,Pearson education Asia 2006
5. Nptel.ac.in/courses/111105035, www.nptelvideos.in/2012/11/Mathematics.html
6. www.learnerstv.com/Free-maths-video lectures - ltv348-page1.html
7. www.indiastudychannel.com

1702ME401	THERMAL ENGINEERING	L	T	P	C
		3	2	0	4

PREREQUISITE:

1. Engineering Thermodynamics
2. Fundamentals of Mechanical Engineering

COURSE OBJECTIVES:

1. To learn the concept of Brayton cycle and Rankine cycle.
2. To study the components, systems and performance of internal combustion engines
3. To provide knowledge on steam nozzles and steam turbines.
4. To impart knowledge on working principles and performance of air compressors.
5. To study the working principle and applications of refrigeration and air conditioning system.

UNIT I GAS POWER CYCLES 12 Hours

Air standard cycles - Otto, Diesel and Dual - Calculation of mean effective pressure and air standard efficiency. Brayton cycle - Expression for efficiency and work ratio.

UNIT II INTERNAL COMBUSTION ENGINES 12 Hours

Internal combustion engines - Classification - Components and functions - Comparison. Valve timing diagram and port timing diagram - Fuel supply systems - Ignition Systems, Lubrication system and cooling system. Performance calculation, Heat balance sheet preparation - Air-fuel ratio calculation - Knocking and detonation.

UNIT III STEAM NOZZLES AND TURBINES 12 Hours

Flow of steam through Nozzles-Shapes of nozzles, effect of friction, critical pressure ratio, supersaturated flow. Impulse and reaction principles, Compounding of Turbines - velocity diagrams for simple and multistage turbines- Speed regulations - Governors.

UNIT IV AIR COMPRESSOR 12 Hours

Classification and working Principle of air compressor -Work of compression with and without clearance, volumetric efficiency, Isothermal efficiency and isentropic efficiency of reciprocating air compressors. Multistage air compressor and inter cooling, Work of multistage air compressor. Rotary compressors - Centrifugal, vane and roots blowers.

UNIT V REFRIGERATION AND AIR-CONDITIONING 12 Hours

Vapour compression refrigeration cycle - Effect of superheat and sub cooling, performance calculations. Working principle of vapour absorption system – Ammonia-water, Lithium bromide-water systems (Elementary treatment only) and comparison between vapour compression and absorption systems. Air conditioning system – types and working principles - Concept of RSHF, GSHF, ESHF - Cooling load calculations.

TOTAL: 60 HOURS

FURTHER READING / CONTENT BEYOND SYLLABUS / SEMINAR :

Introduction to Super charger and turbo charger - Twin charging, Two-speed and two-stage superchargers. Emissions in an IC engine - Exhaust gas analysis, pollution control norms.

COURSE OUTCOMES:

After completion of the course, Students will be able to

CO1: Derive & Calculate the mean effective pressure and air standard efficiency of different gas power cycles.
CO2: Demonstrate the engine working systems and compute the performance of internal combustion engines.
CO3: Solve the problems involving steam nozzles and steam turbines.
CO4: Illustrate the classification, working and performance of air compressors.
CO5: Explain the various processes involved in refrigeration and air conditioning system.
CO6: Design suitable air conditioning system by cooling load calculation.

REFERENCES:

1. Kothandaraman.C.P., Domkundwar.S. and A.V. Domkundwar., A course in Thermal Engineering, DhanpatRai& Sons, Fifth edition,2002.
2. Rajput. R. K., "Thermal Engineering" S.Chand Publishers, 2000
3. C. P. Kothandaraman, Steam Tables, New Age International Private limited,2007.
4. R. S. Khurmi& J. K. Gupta, Refrigeration Tables with Chart, S Chand & Company Limited, New Delhi, 2008.
5. YunusA. Cengel, Michael A. Boles, Thermodynamics An Engineering Approach, Tata McGraw Hill Publishing Company Pvt. Ltd., New Delhi,2008.
6. Mahesh M. Rathore, Thermal Engineering, Tata McGraw - Hill Education Private Limited, New Delhi, 2011.
7. http://nptel.ac.in/courses/112106133/

1702ME402	MEASUREMENTS AND METROLOGY	L	T	P	C
		2	0	2	3

PREREQUISITE:

1. Engineering Physics
2. Basic Mathematics

COURSE OBJECTIVES:

1. To study the concepts of measurement and characteristics of instruments.
2. To learn the procedure for various linear and angular measurements.
3. To provide knowledge on measurement of gear and thread terminologies using suitable instruments.
4. To study the use of laser and advances in metrology for linear geometric dimensions.
5. To expose the measuring procedure to measure the mechanical parameters using suitable instruments

UNIT I CONCEPT OF MEASUREMENT **4 Hours**

Introduction: Definition, Objectives, Elements of Measuring System, Accuracy and Precision - Units and Standards - Characteristics of measuring instrument: Sensitivity, Stability, Interchangeability, Range of accuracy, Readability, Reliability, Backlash, Repeatability and Reproducibility – Calibration - Errors in Measurement: Static and dynamic errors - Care of Measuring Instruments.

UNIT II MEASUREMENT OF MECHANICAL PARAMETERS **6 Hours**

Measurement of Force - Principle, analytical balance, platform balance, proving ring. Torque - Prony brake, hydraulic dynamometer. Measurement of Power: Linear and Rotational - Pressure Measurement: Principle, use of elastic members, Bridgeman gauge, Mcleod gauge, Pirani gauge - Temperature Measurement: bimetallic strip, thermocouples, metal resistance thermometer, pyrometers.

UNIT III LINEAR AND ANGULAR MEASUREMENTS **6 Hours**

Linear Measurements: Vernier Caliper, Vernier Height and Depth Gauges, Micrometer and depth micrometer, Slip gauge, limit gauge and its classification - Comparator: Mechanical, Pneumatic and Electrical types - Angular Measurements: Bevel protractor, Sine bar, Angle Decker, Autocollimator.

UNIT IV FORM MEASUREMENT **8 Hours**

Thread Measurement: Terminologies, Errors - External Thread Measurement: Pitch Gauge, Tool Maker's microscope, Floating Carriage micrometer with One, Two and Three wires - Internal Thread Measurement: Taper Parallels and Rollers method.Gear Measurement: Terminologies, Errors, Gear Tooth Vernier caliper, Profile Projector, Base pitch measuring instrument, David Brown Tangent Comparator, Involutes tester, Parkinson Gear Tester - External and Internal Radius measurements - Roundness measurement: Circumferential confining gauge, Assessment using V block and Rotating centres.

UNIT V LASER AND ADVANCES IN METROLOGY **6 Hours**

Interferometer: NPL Flatness, Laser, Michelson - Computer Aided Inspection - Digital Devices - Machine Vision System - Coordinate Measuring Machine: Basic concept, Types, Constructional features, Probes, Accessories - Surface Roughness Measurement - Straightness Measurement - Squareness Measurement - Machine Tool Metrology.

LIST OF EXPERIMENTS: **30 HOURS**

1. Comparing the accuracy of Vernier Caliper, Vernier Height Gauge, Vernier Depth Gauge and Micrometer to check the various dimensions of a given specimen.
2. Checking the dimensional limits of ten similar components using Mechanical Comparator.
3. Measurement of taper angle of a given specimen by using Sinebar.
4. Measurement of screw thread specifications by Floating Carriage Micrometer.
5. Measurement of gear tooth specifications by using Gear Tooth Vernier Calliper.
6. Measurement of gear tooth specifications by using Tool maker microscope.
7. Measurement of gear tooth specifications by using Profile projector.
8. Differentiate the work piece by its Surface Roughness value.
9. Measurement of force using Force Measuring Setup.
10. Measurement of Straightness of a given job by using Autocollimator.
11. Temperature measurement by using Thermocouple.
12. Measurement of Torque using Torque Measuring Setup.
13. Measurement of Displacement using LVDT.
14. Measurement of bore diameter using Telescopic Gauge.

TOTAL: 30 HOURS

FURTHER READING / CONTENT BEYOND SYLLABUS / SEMINAR:

1. Angle measurement of V-groove.
2. Checking of angle of taper hole.
3. Tool Maker's microscope for Gear Measurement.
4. Thread measurement using Profile Projector.
5. Industrial expansion thermometers.

COURSE OUTCOMES:

After completion of the course, Students will be able to

CO1: Explain the basic concept of measurement and characteristics of measuring instruments.
CO2: Make use of precision instruments for linear and angular measurements.
CO3: Demonstrate the advanced techniques in metrology for linear geometric dimensions.
CO4: Measure the gear and thread parameters using suitable instruments.
CO5: Perform different machine alignment and surface roughness tests.
CO6: Measure the Power, Flow and Temperature related properties using suitable instruments.

REFERENCES:

1. Jain R.K. "Engineering Metrology", Khanna Publishers, 2005.
2. Gupta. I.C., "Engineering Metrology", Dhanpatrai Publications, 2005.
3. Charles Reginald Shotbolt, "Metrology for Engineers", 5th edition, Cengage Learning EMEA, 1990.
4. Backwith, Marangoni, Lienhard, "Mechanical Measurements", Pearson Education, 2006.
5. https://nptel.ac.in/courses/112106179/

1702ME403	KINEMATICS OF MACHINES	L	T	P	C
		2	2	0	3

PREREQUISITE:

1. Engineering Mechanics
2. Engineering Graphics
3. Engineering Mathematics

COURSE OBJECTIVES:

1. To impart the knowledge on the concept of simple mechanisms.
2. To provide knowledge on kinematic analysis of simple mechanisms.
3. To study and construct the cam profile for the various types of follower motion.
4. To learn the kinematics terminologies of spur gear and calculate speed ratio of various types of gear train.
5. To introduce the concept of friction drives in kinematic of machines.

UNIT I FUNDAMENTALS OF MECHANISMS 12 Hours

Basic Terminology - Kinematic link, Pair, joints, Structure, Machine, Degree of freedom, Grubler&Kutzbach Criterion - Inversions of four bar mechanism, Mechanical advantage - Transmission Angle, Inversion of single slider and double slider crank mechanisms. Common Mechanisms - Straight line mechanism, Dwell mechanism.

UNIT II KINEMATIC ANALYSIS OF MECHANISMS 12 Hours

Relative velocity of kinematic link, Rubbing Velocity of kinematic pair, Construction of velocity and acceleration diagram by graphical method (Relative Velocity Method), Four bar mechanism, slider crank mechanisms and complex mechanism.

UNIT III CAM AND FOLLOWER MECHANISMS 12 Hours

Introduction - Terminology, Classifications, Types of follower motion - Uniform Velocity Motion, Simple Harmonic Motion, Uniform Acceleration and Retardation Motion and Cycloidal Motion- Construction of cam profile - Knife edge follower, Roller and flat faced follower.

UNIT IV GEAR AND GEAR TRAIN 12 Hours

Gears - Terminology, Law of gearing, Length of path of contact, Length of arc of contact, contact ratio- Interference and undercutting. Gear trains- Speed ratio, train value. Simple gear train, compound gear train, Epicyclic gear train- speed calculation by tabular method.

UNIT V FRICTION DRIVES 12 Hours

Introduction-Friction clutch, types -single plate, Multi plate and cone clutch. Flat Belt Drives Velocity, slip, creep and Centrifugal effect of belt, length of open and cross belt drives, Maximum power transmitted, ratio of driving tension in flat belt drives - V Belt drives.

TOTAL: 60 HOURS

FURTHER READING / CONTENT BEYOND SYLLABUS / SEMINAR :

1. Intermittent motion mechanisms - calculation of velocity and acceleration of two and four-wheel vehicle.
2. Cam mechanism in milling machine - Automotive transmission gear trains - Gear train in ships and aero planes.
3. Application Ropes and chain drives.

COURSE OUTCOMES:

After completion of the course, Students will be able to

CO1: Differentiate the basic machine mechanisms.
CO2: Calculate velocity and acceleration of machine mechanisms.
CO3: Construct the cam profile for different types of follower motion.
CO4: Describe the kinematic terminologies of spur gear and calculate speed ratio of various types of gear train.
CO5: Solve the amount of power transmitted by friction drives.
CO6: Utilize mechanism for new machine development.

REFERENCES:

1. S. S. Rattan, Theory of Machines, Tata McGraw Hill Publishing Company Pvt. Ltd, New Delhi, 2014.
2. J. J. Uicker, G. R. Pennock and J. E. Shigley, Theory of Machines and Mechanisms, Oxford University Press, New York,2011.
3. Ballaney P L, Theory of Machines and Mechanisms, Khanna Publishers, New Delhi, 2005.
4. Sadhu Singh, Theory of Machines, Pearson Education, Second Edition, 2012.
5. Rao J S and Dukkipati, Mechanism and Machine Theory, Wiley- Eastern Ltd., New Delhi, 2006.
6. http://nptel.ac.in/courses/112104121/1

1702ME404	DESIGN OF MACHINE ELEMENTS	L	T	P	C
		3	2	0	4

PREREQUISITE:

1. Engineering Mechanics
2. Strength of Materials

COURSE OBJECTIVES:

1. To learn the design procedure of machine elements subjected to simple and variable loads.
2. To study the design procedure of shafts and couplings.
3. To provide knowledge on the design of bolted and welded joints.
4. To provide knowledge on the design of helical, leaf and torsional springs subjected to constant and variable loads.
5. To study the selection procedure of sliding and rolling contact bearings.

UNIT I STEADY AND VARIABLE STRESSES 12 Hours

Introduction to the design process - Design of straight and curved beams – 'C' Frame and Crane hook. Stress concentration - Design for variable loading - Soderberg, Goodman, Gerber methods and combined stresses - Theories of failure.

UNIT II DESIGN OF SHAFTS AND COUPLINGS 12 Hours

Design of shafts based on strength, rigidity and critical speed. Design of rigid flange coupling - Design of flexible coupling.

UNIT III DESIGN OF JOINTS 12 Hours

Design of bolted joints - stresses due to static loading, eccentrically loading. Design of welded joints - Butt and Fillet welded Joints - Strength of parallel and traverse fillet welded Joints.

UNIT IV DESIGN OF SPRINGS 12 Hours

Types, End connections and design parameters. Design of helical springs - Circular and noncircular wire - Concentric springs. Design of leaf and torsional springs under constant and varying loads.

UNIT V DESIGN OF BEARINGS 12 Hours

Types and selection criteria - Design of journal bearings - Design of rolling contact bearing Ball and roller bearing.

TOTAL: 60 HOURS

FURTHER READING / CONTENT BEYOND SYLLABUS / SEMINAR :

1. Case study on Design of shock absorbing coupling.
2. Design of advanced bearings.

COURSE OUTCOMES:

After completion of the course, Students will be able to

CO1: Describe the design process and calculate the stress concentration under simple and variable loading.
CO2: Differentiate between rigid and flexible couplings.
CO3: Design the solid, hollow shafts and finding the critical speeds for various engineering applications.
CO4: Determine the design parameters of bolted and welded joints subjected to static load.
CO5: Estimate the design parameters for helical, leaf and torsional springs subjected to constant and variable loads.
CO6: Determine the design parameters of various types of bearings under different loading conditions.

REFERENCES:

1. V. B. Bhandari, Design of Machine Elements, Tata McGraw-Hill Publishing Company Pvt. Ltd., New Delhi, 2010.
2. Faculty of Mechanical Engineering, PSG College of Technology, Design Data Book, M/s.Kalaikathir Achchagam, 2013.
3. J. E. Shigley and C. R. Mischke, Mechanical Engineering Design, Tata McGraw-Hill Publishing Company Pvt. Ltd., New Delhi, 2011.
4. R. C. Juvinall and K. M. Marshek, Fundamentals of Machine Component Design, John Wiley & Sons, New Delhi, 2011.
5. R. L. Norton, Design of Machinery, Tata McGraw-Hill Publishing Company Pvt. Ltd., New Delhi, 2004.
6. https://nptel.ac.in/downloads/112105125/
7. https://nptel.ac.in/courses/112105124/

1702ME405	MANUFACTURING TECHNOLOGY -II	L	T	P	C
		3	0	0	3

PREREQUISITE:

1. Engineering Physics
2. Engineering Chemistry
3. Fundamentals of Mechanical Engineering
4. Manufacturing Technology-1

COURSE OBJECTIVES:

1. To learn the metal cutting theory and calculate the forces involved in it.
2. To study construction, working and operations of centre, semi-automatic and automatic lathes.
3. To provide the knowledge on construction, working of milling and gear cutting machines.
4. To impart knowledge on construction, working and operations of reciprocating, drilling and boring machines.
5. To provide knowledge on construction, working of broaching, grinding and few fine finishing proceses.

UNIT I METAL CUTTING THEORY 9 Hours

Introduction - Orthogonal, Oblique Cutting and types of chip formation. Mechanisms of metal cutting - Shear plane, Stress, Strain and cutting forces. Merchants Circle - Deriving the forces, calculations. Cutting tool - Properties, materials, wear, single point tool nomenclature, tool life and its calculations. cutting fluids - Types and its properties.

UNIT II LATHE, SEMI AUTOMATS AND AUTOMATS 9 Hours

Introduction - Types- Centre Lathe - Construction, specification, operations. Mechanisms - Head stock driven using all geared type and thread cutting. Work holding devices - Centres, chucks, carrier with catch plate and face plates. Calculation of machining time - Capstan and turret lathes - Introduction, turret indexing and bar feeding mechanism. Automats - single spindle, multi spindle and their types

UNIT III MILLING MACHINE AND GEAR CUTTING MACHINES 9 Hours

Milling - Introduction, types, up milling, down milling, operations, and nomenclature of plain milling cutter. Indexing - simple and differential indexing methods. Gear cutting-gear milling, gear shaper and gear hobber.

UNIT IV RECIPROCATING MACHINES, DRILLING AND BORING MACHINES 9 Hours

Shaper, Planer and Slotter - Introduction, types, specification and quick return mechanisms. Drilling - Introduction, types, construction of universal drilling machine, specification, types of drills and nomenclature of twist drill. Introduction to horizontal boring machine.

UNIT V BROACHING AND FINISHING PROCESSES 9 Hours

Broaching - Introduction, types and tool nomenclature. Finishing processes - Grinding -Introduction, types, grinding wheel- specification, selection, glazing, loading, dressing and truing. Fine finishing processes - Honing, lapping, polishing, buffing and super finishing.

TOTAL: 45 HOURS

FURTHER READING / CONTENT BEYOND SYLLABUS / SEMINAR :

Select proper Machines and list the sequence of operations to produce the components – External threaded shafts with key way, Hexagonal bolt and Hexagonal nut.

COURSE OUTCOMES:

After completion of the course, Students will be able to

CO1: Explain the mechanisms of metal cutting, cutting tool materials, tool wear and cutting fluids.
CO2: Discuss about the constructional features of different types of lathe parts and their operations.
CO3: Describe the construction and working of milling and gear cutting machine.
CO4: Illustrate the various types of reciprocating, drilling and boring machines.
CO5: Describe the construction and working of broaching and finishing process.
CO6: Measure the metal removal rate of the work piece in various speeds.

REFERENCES:

1. J. P. Kaushish, Manufacturing Processes, Prentice Hall India Learning Private Limited., NewDelhi, 2013.
2. Serope Kalpakjian and Steven R Schmid, Manufacturing Engineering and Technology,Pearson Education Limited., New Delhi, 2013.
3. P. N. Rao, Manufacturing Technology- Metal Cutting and Machine Tools, Tata McGrawHillPublishing Company Private Limited., New Delhi, 2013
4. S. K. HajraChoudhury, Elements of Workshop Technology. Vol. II, Media Promoters Private Limited., Mumbai, 2013.
5. P.C Sharma, Manufacturing Technology - II, S. Chand & Company Limited. New Delhi, 2012.

1702ME451	THERMAL ENGINEERING LABORATORY	L	T	P	C
		0	0	2	1

PREREQUISITE :

1. Fundamental of Mechanical Engineering.
2. Engineering Thermodynamics.

COURSE OBJECTIVES:

1. To learn the port timing and valve timing diagram of two stroke and four stroke internal combustion engines.
2. To study the fuel properties, performance and emission characteristics of IC engines.
3. To study the performance of IC engine on retardation.
4. To study the performance of two stage reciprocating air compressor.
5. To study the performance of refrigeration and air conditioning system

LIST OF EXPERIMENTS:

1. Port timing and valve timing diagram of IC engines.
2. Determination of flash point and fire point of the given oil sample.
3. Determination of dynamic viscosity of the given oil sample using Red wood viscometer
4. Performance test on 4-Stroke Petrol engine.
5. Performance on 4-Stroke diesel engine with mechanical loading.
6. Performance on 4-Stroke diesel engine with electrical loading
7. Performance on 4-Stroke diesel engine with hydraulic loading.
8. Heat balance test on 4-Stroke diesel engine with mechanical loading.
9. Morse test on multi-cylinder petrol engine.
10. Retardation test on 4-Stroke diesel engine with mechanical loading.
11. Performance of two stage reciprocating air compressor.
12. Determination of Coefficient of Performance of refrigeration system
13. Determination of Coefficient of Performance of Air-conditioning system.

Total: 30 Hours

ADDITIONAL EXPERIMENTS / INNOVATIVE EXPERIMENTS :

1. Study on steam Generators and Turbines.

COURSE OUTCOMES:

After completion of the course, Student will be able to

CO1: Draw the port timing and valve timing diagram of two stroke and four stroke internal
CO2: Determine the flash point and fire point of the given oil sample.
CO3: Determine the viscosity of the given oil sample.
CO4: Test the performance of four stroke petrol engine.
CO5: Test the performance of four stroke diesel engine
CO6: Conduct heat balance test on four stroke diesel engine.
CO7: Conduct Morse test on multi cylinder petrol engine.
CO8: Assess the performance of IC engine on retardation.
CO9: Assess the performance of two stage reciprocating air compressor.
CO10: Calculate the COP of refrigeration and air conditioning systems.
CO11: Analyze the performance of four stroke engine by using alternate fuels.

REFERENCES:

1. Kothandaraman.C.P., Domkundwar.S. and A.V. Domkundwar., A course in Thermal Engineering, Dhanpat Rai& Sons, Fifth edition,2002.
2. C. P. Kothandaraman, Steam Tables, New Age International Private limited, 2007.
3. R. S. Khurmi & J. K. Gupta, Refrigeration Tables with Chart, S Chand & Company Limited, New Delhi, 2008.
4. YunusA. Cengel, Michael A. Boles, Thermodynamics An Engineering Approach, Tata McGraw Hill Publishing Company Pvt. Ltd., New Delhi, 2008.
5. Mahesh M. Rathore, Thermal Engineering, Tata McGraw - Hill Education Private Limited, New Delhi, 2011.
6. http://nptel.ac.in/courses/112106133/

1702ME452 MANUFACTURING TECHNOLOGY LABORATORY – II

L	T	P	C
0	0	2	1

PREREQUISITE :

1. Workshop Practice Laboratory
2. Manufacturing Technology I Lab

COURSE OBJECTIVES:

1. To learn the metal cutting theory and calculate the forces involved in it.
2. To study construction, working and operations of centre, semi-automatic and automatic lathes.
3. To provide the knowledge on construction, working of milling and gear cutting machines.
4. To impart knowledge on construction, working and operations of reciprocating, drilling and boring machines.
5. To provide knowledge on construction, working of broaching, grinding and few fine finishing processes.

LIST OF EXPERIMENTS:

1. Contour milling using vertical milling matching.
2. Spur gear cutting in milling machine.
3. Gear generation in hobbing machine.
4. Gear generation in gear shaping machine.
5. Horizontal surface grinding.
6. Cylindrical grinding.
7. Tool angle grinding with tool and Cutter Grinder.
8. Measurement of cutting forces in Milling.
9. Square Head Shaping.
10. Hexagonal Head Shaping.
11. Vertical surface grinding.
12. Make a v-block using planner machine

Total: 60 Hours

ADDITIONAL EXPERIMENTS / INNOVATIVE EXPERIMENTS :

1. Select proper Machines and list the sequence of operations to produce the components.
2. External threaded shafts with key way, Hexagonal bolt and Hexagonal nut.

COURSE OUTCOMES:

After completion of the course, Student will be able to

CO1: Make use of vertical milling machine to perform contour operation.
CO2: Produce of spur gear by using universal milling machine
CO3: Produce of spur gear by using hobbing machine
CO4: Produce of spur gear by using gear shaping machine
CO5: Do the surface grinding operation using horizontal grinding machine.
CO6: Do the surface grinding operation using vertical grinding machine.
CO7: Do the grinding operation using cylindrical grinding machine.
CO8: Produce a single point tool using tool and cutter grinder
CO9: Use the planner machine to make a key way on machine element.
CO10: Measure the cutting force using milling tool dynamometer.
CO11: Do the square head shaping and hexagonal head shaping using shaper machine

REFERENCES:

1. J. P. Kaushish, Manufacturing Processes, Prentice Hall India Learning Private Limited., New Delhi, 2013.
2. SeropeKalpakjian and Steven R Schmid, Manufacturing Engineering and Technology, Pearson Education Limited, New Delhi, 2013.
3. P. N. Rao, Manufacturing Technology- Metal Cutting and Machine Tools, Tata McGraw Hill Publishing Company Private Limited., New Delhi, 2013
4. S. K. HajraChoudhury, Elements of Workshop Technology. Vol. II, Media Promoters & Publishers Private Limited., Mumbai, 2013.
5. P.C Sharma, Manufacturing Technology - II, S. Chand & Company Limited. New Delhi, 2012.
6. http://nptel.ac.in/courses/112105126

1704ME453	TECHNICAL SEMINAR II	L	T	P	C
		0	0	2	-

COURSE OBJECTIVES:

1. To develop self-learning skills of utilizing various technical resources to make a technical presentation.
2. To promote the technical presentation and communication skills.
3. To impart the knowledge on intonation, word and sentence stress for improving communicative competence, identifying and overcoming problem sounds.
4. To promote the ability for Interacting and sharing attitude.
5. To encourage the commitment-attitude to complete tasks.

The students are expected to make two presentations on advanced topics (recent trends) related to II year/ III semester subjects. A faculty guide is to be allotted and he / she will guide and monitor the progress of the student and maintain attendance also. Students are encouraged to use various teaching aids such as power point presentation and demonstrative models.

TOTAL: 30 HOURS

COURSE OUTCOMES:

On the successful completion of the course, students will be able to

CO1 Identify and utilize various technical resources available from multiple field.
CO2 Improve the technical presentation and communication skills.
CO3 Improve communicative competence.
CO4 Interact and share their technical knowledge.
CO5 Understand and adhere to deadlines and commitment to complete the assignments.

EVALUATION SCHEME:

Continuous Assessment (100 Marks)

Distribution of Marks for Continuous Assessment	**Marks**
Presentation I	40
Report	10
Presentation II	40
Report	10
Total	**100**

1704GE451	LIFE SKILLS: VERBAL ABILITY	L	T	P	C
		0	0	2	-

PREREQUISITE:

Technical English – I and II

COURSE OBJECTIVES:

1. To help students comprehend and use vocabulary words in their day to day communication.
2. To apply appropriate reading strategies for interpreting technical and non-technical documents used in job-related settings.
3. To ensure students will be able to use targeted grammatical structures meaningfully and appropriately in oral and written production.
4. To enable the students to arrange the sentences in meaningful unit and to determine whether constructions rely on active or passive voice.
5. To apply the principles of effective business writing to hone communication skills.

UNIT I VOCABULARY USAGE **6 Hours**

Introduction - Synonyms and Antonyms based on Technical terms – Single word Substitution – Newspaper, Audio and video listening activity.

UNIT II COMPREHENSION ABILITY **6 Hours**

Skimming and Scanning – Social Science passages – Business and Economics passages – latest political and current event based passages – Theme detection – Deriving conclusion from passages.

UNIT III BASIC GRAMMAR AND ERROR DETECTION **6 Hours**

Parallelism – Redundancy – Ambiguity – Concord - Common Errors – Spotting Errors – Sentence improvement – Error Detection FAQ in Competitive exams.

UNIT IV REARRANGEMENT AND GENERAL USAGE **6 Hours**

Jumble Sentences – Cloze Test - Idioms and Phrases – Active and passive voice – Spelling test.

UNIT V APPLICATION OF VERBAL ABILITY **6 Hours**

Business Writing - Business Vocabulary - Delivering Good / Bad News - Media Communication - Email Etiquette – Report Writing - Proposal writing – Essay writing– Indexing –Market surveying.

Total: 30 Hours

ASSESSMENT PATTERN

1. Two assignments (2 x 25 marks = 50 marks)
2. Pragmatic assessment (50 marks)

COURSE OUTCOMES:

After completion of the course, Student will be able to

CO1: Use new words in their day to day communication.

CO2: Gather information swiftly while reading passages.

CO3: Students are proficient during their oral and written communication.

CO4: Rearrange the sentences and able to identify the voice of the sentence.

CO5: Students use their knowledge of the best practices to craft effective business documents

REFERENCES:

1. Arun Sharma and Meenakshi Upadhyav, How to Prepare for Verbal Ability and Reading Comprehension for CAT, McGrawHill Publication, Seventh Edition 2017.
2. R S Aggarwal and Vikas Aggarwal , Quick Learning Objective General English, S.Chand Publishing House, 2017.
3. Dr.K.Alex , Soft Skills, S.Chand Publishing House, Third Revise Edition, 2014.
4. Raymond Murphy, Essential English Grammar in Use, Cambridge University press, New Delhi, Third Edition, 2007.