

Panjab University, Chandigarh
Scheme of Examination and Syllabi for
B.E. (Mechanical Engineering)
1st and 2nd Semesters for Academic Year 2017-2018

Year: First

Semester: First

S. No.	Course Code	Course Name	Scheme of Teaching			Scheme of Examination			
			L-T-P	Contact hrs/week	Credits	Theory			Practical*
						Internal Assessment	University Assessment	Total	
1.	MATHS101	Calculus	4-1-0	5	4	50	50	100	-
2.	ME101	Engineering Mechanics-I	3-1-2	6	4+1	50	50	100	50
3.	ME105	Introduction to Manufacturing Processes	2-0-4	6	2+2	-	50	50	50
4.	CH101	Applied Chemistry	4-0-3	7	4+1	50	50	100	50
5.	HSS102	Communication Skills	2-0-0	2	2	50	50	100	-
6.	GS101	Introduction to Environmental Science	3-0-0	3	3	50	50	100	-
Total			18-2-9	29	23	250	300	550	150

Year: First

Semester: Second

S.No.	Course Code	Course Name	Scheme of teaching			Scheme of Examination			
			L-T-P	Contact hrs/week	Credits	Theory			Practical*
						Internal Assessment	University Assessment	Total	
1.	MATHS201	Differential Equations and Transforms	4-1-0	5	4	50	50	100	-
2.	HSS201	Ethics and Self Awareness	2-0-0	2	2	50	50	100	-
3.	-	Physics Course 1 [#]	4-0-3	7	4+1	50	50	100	50
4.	ME201	Engineering Mechanics-II	3-1-2	6	4+1	50	50	100	50
5.	ME202	Engineering Graphics	1-0-4	5	1+2	-	50	50	50
6.	ME204	Computer Programming (MATLAB Programming for Engineers)	2-0-2	4	2+1	50	50	100	50
Total			16-2-11	29	22	250	300	550	200

Summer Vacations training (four weeks):

S. No.	Subject Code	Subject Name	L-T-P	Contact hrs/week	Credits	Marks		
						Theory		Practical*
						Internal Assessment	University Exam	
1.	IPD201	Innovative product design	0-0-20	20	0+2	Nil	Nil	50

Note: Students will undergo four week in-house training during summer vacations in their respective branches. They will be trained to handle laboratory and practical aspects in their field of engineering.

The marks and credits of Innovative product design (IPD201) will be added in the second semester mark-sheet.

* Practical marks are for continuous and end semester evaluation

Any one of the following three papers to be chosen by the institute

Paper Title: Oscillation and optics Paper Code: APH 101/ APH 201

Paper Title: Quantum and Statistical Physics Paper Code: APH 103/ APH 203

Paper Title: Physics of Materials Paper Code: APH 207/ APH 107

FIRST SEMESTER

Course Code	MATHS101
Course Title	Calculus
Type of Course	Core
Course Assessment Methods End Semester Assessment(University Exam) Continous Assessment (Sessional, Assignments, Quiz)	50 50
Course Prerequisites	10+2
Course Objectives (CO)	<ol style="list-style-type: none">1. To understand the behaviour of infinite series and its use.2. To learn the concepts of functions of two and more than two variables and their applications.3. To learn the methods to evaluate multiple integrals and their applications to various problems.4. To understand the concepts of Vector calculus and their use in engineering problems.
Course Outcome	<ol style="list-style-type: none">1. The students are able to test the behaviour of infinite series.2. Ability to analyze functions of more than two variables and their applications.3. Ability to evaluate multiple integrals and apply them to practical problems.4. Ability to apply vector calculus to engineering problems

SYLLABUS

Note for Examiner: The semester question paper will be of 50 Marks having 7 questions of equal marks. Students are required to attempt 5 questions in all. First question, covering the whole syllabus and having questions of conceptual nature, will be compulsory. Rest of the paper will be divided into two parts having three questions each and the candidate is required to attempt two questions from each section.

SECTION-A

Functions of one variable

Sequences and Series: Sequences, Limits of sequences, Infinite series, series of positive terms, Integral test, Comparison test, Ratio test, Root test. Alternating series, Absolute and Conditional Convergence, Leibnitz test. Power series: radius of convergence of power series, Taylor's and Maclaurin's Series, Formulae for remainder term in Taylor and Maclaurin series, Error estimates. (Scope as in Chapter 11, Sections 11.1 – 11.9 of Reference 1).

Integral Calculus: Areas of curves, Length of curves, Volume (disk and washer method) and surface areas of revolution (Scope as in Chapter 5, Sections 5.6, Chapter 6, 6.1, 6.3, 6.5 of Reference 1).

(11 hours)

Differential calculus of functions of two and three variables

Concept of limit and continuity of a function of two and three variables, Partial derivatives, total derivative, Euler's theorem for homogeneous functions, composite function, differentiation of an implicit function, chain rule, change of variables, Jacobian, Taylor's theorem, Errors and increments, Maxima and minima of a function of two and three variables, Lagrange's method of multipliers (Scope as in Chapter 14, Sections 14.1-14.4, 14.6-14.10 of Reference 1).

(10 hours)

SECTION-B

Integral calculus of functions of two and three variables

Double and triple integrals, change of order of integration, change of variables, applications to area, volume and surface area.

(Scope as in Chapter 15 of Reference 1).

(9 hours)

Vector differential calculus

Vector-valued functions and space curves, arc lengths, unit tangent vector, Curvature and torsion of a curve, Gradient of a Scalar field, Directional Derivative (Scope as in Chapter 13, Sections 13.1, 13.3-13.5 Chapter 14, Section 14.5 of Reference 1).

(8 hours)

Vector integral calculus

Line integrals, Vector fields, Work, Circulation and Flux, Path Independence, Potential functions and Conservative fields, Green's theorem in the plane, Surface Areas and Surface Integrals, Stoke's Theorem, Gauss Divergence Theorem (Statements only) (Scope as in Chapter 16 of Reference 1).

(7 hours)

RECOMMENDED BOOKS			
S. No.	NAME	AUTHOR(S)	PUBLISHER
1.	Calculus	Maurice D. Weir, Joel Hass, Frank R. Giordano, Thomas	11 th edition, Pearson Education.
2.	Advanced Engineering Mathematics	E. Kreyszig.	8th edition, John Wiley.
3.	Advanced Engineering Mathematics	Michael D. Greenberg	2 nd edition, Pearson Education.
4.	Advanced Engineering Mathematics	Wylie and Barrett	Tata McGraw Hill
5.	Higher Engineering Mathematics	B.V.Ramana	Tata McGraw Hill.
6.	Advanced Engineering Mathematics	R. K. Jain, S. R. K. Iyenger	Narosa Publications

Course Code	ME101
Course Title	Engineering Mechanics – I
Type of Course	Core
Course Assessment Methods	
End Semester Assessment(University Exam)	50
Continous Assessment (Sessional, Assignments, Quiz)	50
Practical (Continuous and end semester evaluation)	50
Course Prerequisites	Prior knowledge of integral and differential calculus and vector algebra
Course Objectives (CO)	The main objective of this course is to develop in the student the ability to analyze any engineering problem in a simple and logical manner with the help of free body diagrams and then to apply the basic principles of mechanics to solve the problem. The students should develop skills to apply equilibrium equations of statics to various problems to determine reactions and also could determine centre of gravity and moment of inertia of various bodies.
Course Outcome	The student can apply the principles of Engineering Mechanics to wide range of applications from Mechanical Engineering, Civil Engineering ,Automotive Engineering to Medicine and Biology and can make use of the concept of free body diagrams and equilibrium equations in statics to solve practical engineering problems that are applicable to engineering design. At the end of the course students can determine centre of gravity and moment of inertia of any lamina which is required to solve practical engineering problems.

SYLLABUS

Note for Examiner: The semester question paper will be of 50 Marks having 7 questions of equal marks. Students are required to attempt 5 questions in all. First question, covering the whole syllabus and having questions of conceptual nature, will be compulsory. Rest of the paper will be divided into two parts having three questions each and the candidate is required to attempt two questions from each section.

SECTION-A

General Principles: Mechanics. Fundamental Concepts, Units of Measurement, The International System of Units, Numerical Calculations, General Procedure for Analysis.

Force Vectors: Scalars and Vectors, Vector Operations, Vector Addition of Forces, Addition of a System of Coplanar Forces, Cartesian Vectors, Addition and Subtraction of Cartesian Vectors, Position Vectors, Force Vector Directed Along a Line, Dot Product.

Equilibrium of a Particle: Condition for the Equilibrium of a Particle, the Free-Body Diagram, Coplanar Force Systems, Three-Dimensional Force Systems.

Force System Resultants: Cross Product, Moment of a Force - Scalar Formulation, Moment of a Force - Vector Formulation, Principle of Moments, Moment of a Force about a specific Axis, Moment of a Couple, Movement of a Force on a Rigid Body, Resultants of a Force and Couple System, Further reduction of a Force and Couple System, Reduction of a Simple Distributed Loading.

Equilibrium of a Rigid Body: Conditions for Rigid-Body Equilibrium, Equilibrium in Two Dimensions and Free-Body Diagrams, Equations of Equilibrium, Two-Force and Three-Force Members, Equilibrium in Three Dimensions, Free-Body Diagrams, Equations of Equilibrium, Constraints for a Rigid-Body.

Structural Analysis: Simple Trusses, The Method of Joints, Zero-Force Members, The Method of Sections, Space Trusses, Frames and Machines.

SECTION-B

Internal Forces: Internal Forces developed in Structural Members, Shear and Moment Equations and Diagrams, Relationships between Distributed Load and Shear and Moment, Cables.

Friction – Characteristics of Dry Friction, Problems Involving Dry Friction, Wedges, Rolling Resistance.

Center of Gravity and Centroid – Center of Gravity and Center of Mass for a System of Particles, Center of Gravity and Center of Mass and Centroid for a Body, Composite Bodies, Theorems of Pappus and Goldinus, Resultant of a General Distributed Force System,

Moments of Inertia – Definition of Moments of Inertia for Areas, Parallel-Axis Theorem for an Area, Radius of Gyration of an Area, Moments of Inertia for an Area by Integration, Moments of Inertia for Composite Areas, Product of Inertia for an Area, Moments of Inertia for and Area about Inclined Axes, Mohr's Circle for Moments of Inertia, Mass Moment of Inertia.

Virtual Work – Definition of Work and Virtual Work, Principle of Virtual Work for a Particle and a Rigid Body, Principle of Virtual Work for a System of Connected Rigid Bodies, Conservative Forces, Potential Energy.

RECOMMENDED BOOKS			
S.No.	NAME	AUTHORS	PUBLISHER
1.	Engineering Dynamics	R.C. Hibbeler	Pearson
2.	Engineering Dynamics	F.P. Beer et al.	McGrawHill
3.	Engineering Dynamics	Merriam and Kraige	Wiley and Sons Publishers

Course Code	ME101
Course Title	Engineering Mechanics – I (Practical)
Type of Course	Core
Course Assessment Methods Internal Assessment (15-day to day work,20- viva,15-written test)	50
Course Prerequisites	Prior knowledge of integral and differential calculus and vector algebra
Course Objectives (CO)	To become science engineers, having thorough knowledge of mathematics and physical science, a broad grasp of the principles and methods of mechanics, and an ability to apply those fundamentals in practical situations.
Course Outcome	1)An ability to design and conduct experiments as well as to analyze and interpret data. 2)An ability to design a system ,component or a process to meet desired needs with realistic constraints such as economic, environmental, social ,political, ethical, health and safety, manufacturability and sustainability.

List of Experiments:

1. Fundamentals of Statics - Accumulation and resolution of forces with force Parallelogram.
2. Equilibrium of forces. Law of levers, determination of moments and equilibrium of moments
3. Inclined Plane and Friction - Dynamic friction as a function of the normal force, contact area and surface properties of the friction body. Determination of the friction coefficient. Rolling friction.
4. To verify the law of Moments using Parallel Force apparatus. (simply supported type)
5. To verify the law of moments using Bell crank lever.
6. Experimental and analytical study of a 3 bar pin jointed Truss
7. Forces in a Simple Bar Structure – Measurement and Calculation of bar forces by the method of joints. Comparison of measurement result and calculation also use graphical method
8. Equilibrium of Moments on a Two Arm Lever - Fundamentals of the equilibrium of moments: applied forces, generated moments and equilibrium. Action of forces dependent on the lever arm
9. Crank and Connecting Rod - conversion of smooth rotary motion into reciprocating motion
10. To find CG and moment of Inertia of an irregular body using Computation method.
11. Inertia in Rotational Motion - Determination of the moment of inertia of various bodies.

Course Code	ME105
Course Title	Introduction to Manufacturing Processes
Type of Course	Core
Course Assessment Methods End Semester Assessment(University Exam) Continous Assessment (Sessional, Assignments, Quiz) Practical (Continuous and end semester evaluation)	50 Nil 50
Course Prerequisites	Basic Workshop Practices
Course Objectives (CO)	<ol style="list-style-type: none"> 1. To know different machines, tools and equipment, Identify different Engineering materials, metals and non-metals. 2. To understand different Mechanisms, Use of Machines, Tools and Equipment. 3. Knowledge of basic Manufacturing Processes in Electronics, Electrical, Machine, Welding, Fitting, Sheet Metal.Smithy, Foundry and Carpentry Workshops.
Course Outcome	<ol style="list-style-type: none"> 1. Familiarity with common machines, Tools and Equipment in basic Workshop Practices. 2. On hand basic workshop practices in Electronics, Electrical, Machine, Welding, Fitting, Sheet Metal. Smithy, Foundry and Carpentry Workshops in Engineering professions. 3. Applications of Basic Workshop Practices.

SYLLABUS

Instruction for Students: The candidate will be attending a laboratory session of three hours weekly.

Practice of basic exercises related with different shops. On hand basic workshop practices in Electronics, Electrical, Machine, Welding, Fitting, Sheet Metal. Smithy, Foundry and Carpentry Workshops in Engineering professions.

Welding Workshop :

(Theory) Joining Processes, Welding and its Classification, Welding Processes, Fusion Welding, Pressure Welding, Electric Arc Welding, Gas Welding, Resistance Welding, Metal Inert gas Welding, Welding Joints, Welding Positions, Welding defects, Welding Applications, Basic welding design and Procedures, identification of materials,

Jobs: Butt Joint in Flat Position using SMAW, Lap Joint using Spot Welding, Edge Joint in Horizontal Position using SMAW, Tee Joint in Flat position using SMAW, Corner Joint in vertical position using SMAW.

Defect Identification and marking, Edge preparation and Fillet making, Tacking, Distortion identification.

Electronics Workshop

To know about Soldering mechanism and techniques, Familiarity with Electronic Components / symbols, Testing of electronic components, Application of Soldering : Circuit Assembly

List of Jobs :

Practice of Soldering and de-soldering, Identification and testing of a) passive electronic components
b) Active electronic components, Assembly of Regulated Power supply circuit.

Electrical Workshop

Introduction of Various Electric wirings, Wiring Systems, Electrical wiring material and fitting, different type of cables, Conduit pipe and its fitting, inspection points, switches of all types, Distribution boards, M.C.B's etc., Electric Shock and its management.

Electric Tools: Conversance with various tools and to carry out the following:

- a) Measurement of wire sizes using SWG and micrometer
- b) Identification of Phase and neutral in single phase supply

Jobs:

To control a lamp with a single way switch

To control a lamp from two different places

To assemble a fluorescent lamp with its accessories

To control a lamp, fan and a three pin socket in parallel connection with single way switches

Fitting Shop

Introduction of Fitting, different type of operations, Tools, materials, precision instruments like Vernier caliper and Micrometer etc, Safety precautions and Practical demonstration of tools and equipments

Jobs:

To make a square from MS Flat, Punching, Cutting, Filling techniques and practice, Tapping, Counter Drilling.

Smithy Workshop

Introduction of Smithy and Forging process, Tools and Equipment's, Operations, Heat Treatment processes, Advantages, Dis-advantages, Defects and Safety precautions.

Jobs:

Drawing and Upsetting Practice using Open Hearth Furnace, Cold working process practice, Heat Treatment \: Annealing and hardening process

Machine Shop

Application, Function and different parts, Operations of Lathe, Type of Cutting Tools and their materials, Drill machine Types, applications and Functions. Hacksaw machines and functions, Work Holding devices and tools, chucks, Vices, machine Vices, V Block, Measuring Instruments uses, Shaper and Milling machine Applications.

Jobs:

To perform Marking, Facing, Turning, taper Turing, Grooving, Knurling, parting, Drilling, Reaming operations on lathe machine, Hacksawing practice on Power hacksaw, Shaping operation practice on Shaper.

Carpentry Shop

Classification of Tree, Timber. Advantages and uses of Timber, Seasoning of Wood, Tools Used, Defects and Prevention of Wood,

Jobs:

Tee Joint, Cross Joint, Tenon Joint, L Shape Joint, Practice of Wood Working Lathe, Practice on multi-purpose Planer.

Foundry Shop

Introduction to Foundry, Advantages and Disadvantages of castings process, Introduction to pattern and various hand tools, Ingredients of Green sands, Various Hand Molding processes, Introduction to Casting Defects.

Jobs:

Identification and uses of hand tools, Preparation of Green sand in Muller, Preparation of Sand Mould of Single piece solid pattern, Split pattern, Preparation of Green sand Core, casting of a Mould and study its defects.

RECOMMENDED BOOKS			
S.No.	NAME	AUTHOR(S)	PUBLISHER
1.	Introduction to Basic Manufacturing Processes and Workshop Technology	Rajender Singh	New Age International Publication
2	Manufacturing Processes	Chapman	Viva Books Private Limited

Students are required to make various jobs in the workshop based on theory studied in the subject.

Course Code	CH101 / CH201
Course Title	Applied Chemistry
Type of Course	Core
Course Assessment Methods	
End Semester Assessment(University Exam)	50
Continous Assessment (Sessional, Assignments, Quiz)	50
Practical (Continuous and end semester evaluation)	50
Course Prerequisites	10+2
Course Objectives (CO)	To teach the fundamentals of basic chemical sciences essential for the development of new technologies to all branches of engineering.
Course Outcome	<ol style="list-style-type: none"> 1) Thermodynamics will help the students learn different thermodynamic laws, heat changes and energy calculations. 2) Studying catalysis will be beneficial to understand the role and mechanism of various heterogeneous and homogeneous catalysts in increasing reactions rate of many synthetically important chemical reactions. 3) By studying corrosion, the students will learn about basic nature and reasons of corrosion, its impact in many sectors of our lives. 4) Studying spectroscopy will help to understand the basic principles of spectroscopy and its use to determine chemical structures. 5) By studying coordination chemistry and CFT, explanation about different properties of coordination compounds will be given.

SYLLABUS

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SECTION - A

Thermodynamics: Review of objectives and limitations of chemical thermodynamics, State functions, Thermodynamic equilibrium, work, heat, internal energy, enthalpy, heat capacity, Zeroth law of thermodynamics, First law of thermodynamics, Reversible, isothermal and adiabatic expansion & compression of an ideal gas. Irreversible isothermal and adiabatic expansion of an ideal gas. Carnot cycle and efficiency of reversible engines, Enthalpy change and its measurement. Flame temperature, Second and third law of thermodynamics. Concept of entropy. Gibb's and Helmholtz

equations. Simple numerical for calculating w , q , ΔE , ΔH and entropy.
(10 hours)

Catalysis: Catalysis and general characteristics of a catalytic reactions, homogeneous catalysis, kinetics of acid, base and enzyme catalysis – Michealis Menten equations. Heterogenous catalysis. Application of catalysis for industrially important processes– hydrogenation (Wilkinson’s catalyst), hydroformylation, acetic acid process and Wacker process. (6 hours)

Electrochemistry: Introduction to electrochemistry, types of electrodes, Ion selective electrodes, Reference electrodes, Fuel cells (hydrogen-oxygen, propane-oxygen, methanol-oxygen fuel cells), Corrosion: Types of corrosion, dry and wet corrosion and their mechanisms, types of electrochemical corrosion (galvanic, pitting, waterline, differential aeration, soil, microbiological, inter-granular, stress corrosion), Factors influencing corrosion, Prevention of corrosion. (8 hours)

SECTION - B

Polymer chemistry: Classification of polymers, Mechanism and methods of polymerisation, idea of number average and weight average molecular masses of polymers, preparation, properties and uses of polystyrene, polyester, polyamide, phenol-formaldehyde, silicones and epoxy resins. (5hours)

Spectroscopy: UV- Introduction, Lambert-Beer’s Law, selection rules, electronic transitions, Application to simple organic molecules (auxochrome, chromophore), effect of conjugation and solvent on transition of organic molecules, Woodward-Fieser Rules for calculating λ_{max} for dienes. IR- Introduction, Principle of IR spectroscopy-Fundamental vibrations, Application to simple organic molecules (effect of masses of atoms, bond strength, nature of substituent, hydrogen bonding on IR frequency), sample preparation for IR. (10 hours)

Coordination chemistry: Introduction, Crystal Field Theory, Splitting of octahedral, tetrahedral and square planar complexes, crystal field stabilization energies of octahedral and tetrahedral complexes and its applications. (6 hours)

RECOMMENDED BOOKS			
S.No.	NAME	AUTHOR(S)	PUBLISHER
1.	Organic Chemistry	Joseph M. Hornback Brooke	Cole Publishing Company U.S.A.
2.	Atkin’s Physical Chemistry	Peter Atkins, Julio de Paula	7 th Edition, Oxford University Press.
3.	Concise Inorganic Chemistry	J D Lee	Vth Edition, Chapman & Hall, 2003
4.	A Textbook of Engineering Chemistry	Shashi Chawla	Dhanpat Rai & Co. Pvt. Ltd
5.	Introductory Polymer Chemistry	G.S.Mishra	John Wiley & Sons, New York, 1993.
6.	Principles of Physical Chemistry	Puri, Sharma and Pathania	W.H. Freeman & Co, 2008.

7.	Introduction to spectroscopy	D. S. Pavia, G.M. Lasmpman and G.S. Kriz	4 th Edition, Thomson learning, Indian Edition 208.
8	Basic Inorganic Chemistry	F.A. Cotton, G. Wilkinson and P.L. Gaus	3rd Ed., John Wiley & Sons.

List of Experiments

Instruction for Students: The candidate will be attending a laboratory session of three hours weekly and has to perform any eight experiments.

1. Volumetric analysis: Iodometric titrations, complexometric titrations, Acid-base titrations (conductometric), Precipitation titrations
2. Analysis of lubricants: Viscosity/surface tension/saponification value/acid value
3. Instrumental techniques for chemical analysis: Conductometry, potentiometry, UV-visible/IR spectrophotometer.
4. Preparation of few organic compounds/inorganic complexes/polymer.

RECOMMENDED BOOKS			
S.No.	NAME	AUTHOR(S)	PUBLISHER
1.	A textbook of Quantitative Inorganic Analysis	A. I. Vogel	Longman Gp. Ltd, 4 th editon
2	Essentials of Experimental Engineering Chemistry	Shashi Chawla	Dhanpat Rai and Co. Delhi (2001)
3	Vogel's text book of quantitative chemical analysis	J. Mendham, R. C. Denny, J. D. Barnes and M. J. K. Thomas	Pearson Education

Course Code	HSS102 / HS202
Course Title	Communication Skills
Type of Course	Core
Course Assessment Methods	
End Semester Assessment(University Exam)	50
Continous Assessment (Sessional, Assignments, Quiz)	50
Course Prerequisites	
Course Objectives (CO)	
Course Outcome	

SYLLABUS

Note for Examiner: The semester question paper will be of 50 Marks having 7 questions of equal marks. Students are required to attempt 5 questions in all. First question, covering the whole syllabus and having questions of conceptual nature, will be compulsory. Rest of the paper will be divided into two parts having three questions each and the candidate is required to attempt two questions from each section.

SECTION - A

Fundamentals of Communication Skills

Scope and Significance of Communication Skills, Listening, Speaking, Reading and Writing
(2 hours)

Writing Skills

Basics of Grammar – Word Order, Sentence Construction, Placing of Subject and Verbs, Parts of Speech, Use of Tenses, Articles, Prepositions, Phrasal Verbs, Active-Passive, Narration
(4 hours)

Vocabulary Building and Writing

Word Formations, Synonyms, Antonyms, Homonyms, One-Word Substitutes, Idioms and Phrases, Abbreviations of Scientific and Technical Words
(3 hours)

Speaking Skills

Introduction to Phonetic Sounds, English Phonemes, Stress, Rhythm and Intonation, Countering Stage Fright and Barriers of Communication
(3 hours)

Reading and Comprehension

(2 hours)

SECTION-B

Advanced Communication Skills

Scope, Significance, Process of Communication in an organization, Types and Levels, Communication Networks, Technical Communication, Tools of Effective Communication
(2 hours)

Speaking Skills and Personality Development

Interpersonal Communication, Presentation Skills, Body Language and Voice Modulation, Persuasion, Negotiation and Linguistic Programming, Public Speaking, Group Discussions, Interviews and Case Studies, Power Point Presentations , Relevant to the context and locale, Technical Presentations, Conducting , Meeting and Conferences
(5 hours)

Communication and Media

Social and Political Context of Communication, Recent Developments in Media (1 hour)

Advanced Techniques in Speaking Skills

Importance of Listening/Responding to native and global accents, Telephonic Interviews and Video Conferencing (2 hours)

Advanced Techniques in Technical Writing

Job Application, CV Writing, Business Letters, Memos, Minutes, Reports and Report Writing Strategies, E-mail Etiquette, Blog Writing, Instruction Manuals and Technical Proposals (4 hours)

Practical Sessions

1. Individual presentations with stress on delivery and content
2. Overcoming Stage Fright - Debates, extempore
3. How to discuss in a group - Group Discussion
4. Discussion on recent developments and current debates in the media
5. How to prepare for an Interview and face it with confidence
6. Conducting meeting and conferences
7. Exercises on Composition & Comprehension, Reading Improvement

TEXT BOOKS			
S.No.	NAME	AUTHORS	PUBLISHER
1.	The Essence of Effective Communication	R. Ludlow and F. Panton	Prentice Hall
2.	Unversity Grammer of English	Randolph. Quirk and Greenbaum Sidney	Pearson Education
3.	Effective Technical Communication	M. Rizvi Ashraf	McGraw Hill
4.	Business Communication Today	Bovee L. Courtland, V. Thill John	Pearson Education
RECOMMENDED BOOKS			
S.No.	NAME	AUTHOR(S)	PUBLISHER
1.	Essential of Business Communications	Mary E. Guffrey	South-Western College Publishing
2.	Technical Communications : Principles and Practice	Minakshi Raman and S. Sharma	Oxford University press
3.	Effective Communication	M. V. Rodrigues	Himalaya Publishing House
4.	English Vocabulary in Use	Michael. McCarthy, Felicity O'Dell	Cambridge University Press
5.	The Pronunciation of English	Daniel Jones	University Book Stall
6.	Business Correspondence and Report Writing	R. C. Sharma and K. Mohan	Tata McGraw Hill
7.	Communications for Professional Engineers	Bill Scott	Thomas Teleford Ltd.

8	Handbook for Technical Writing	David A. McMurrey, Buckley Joanne	Cengage Learning
9	Enhancing Employability and Recognizing Diversity	L. Harve, W. Locke, A. Morey	Universities UK and CSU
10	Student Activities for taking charge of your carrer direction and Job Search	R. Locke	Core Publishing
11	Body Language	A. Pease	Sheldon Press
12	Technical Communication: Principles and Practice	Minakshi Raman and S. Sharma	Oxford university Press

Course Code	GS 101 / GS 201
Course Title	Introduction to Environment Science
Type of Course	Core
Course Assessment Methods	
End Semester Assessment(University Exam)	50
Continous Assessment (Sessional, Assignments, Quiz)	50
Course Prerequisites	10+2
Course Objectives (CO)	
Course Outcome	

SYLLABUS

Note for Examiner: The semester question paper will be of 50 Marks having 7 questions of equal marks. Students are required to attempt 5 questions in all. First question, covering the whole syllabus and having questions of conceptual nature, will be compulsory. Rest of the paper will be divided into two parts having three questions each and the candidate is required to attempt two questions from each section.

SECTION - A

General: Introduction, components of the environment, environmental degradation. (4 hours)

Ecology: Elements of ecology: Ecological balance and consequences of change, principles of environmental impact assessment. (4 hours)

Air pollution and control: Atmospheric composition, energy balance, climate, weather, dispersion, sources and effects of pollutants, primary and secondary pollutants, green house effect, depletion of ozone layer, standards and control measures. (6 hours)

SECTION - B

Water pollution and control: Hydrosphere, natural water, pollutants their origin and effects, river/lake/ground water pollution, standards and control. (6 hours)

Land Pollution: Lithosphere, pollutants (municipal, industrial, commercial, agricultural, hazardous solid wastes): their origin and effects, collection and disposal of solid waste, recovery and conversion methods. (6 hours)

Noise Pollution: Sources, effects, standards and control. (6 hours)

RECOMMENDED BOOKS			
S.No.	NAME	AUTHORS	PUBLISHER
1.	Introduction to Environmental Engineering and Science	C. M. Masters	Prentice Hall of India Pvt. Ltd., 1991
2.	Environmental Science	B. J. Nebel	Prentice Hall Inc., 1987

SECOND SEMESTER

Course Code	MATHS201
Course Title	Differential Equations and Transforms
Type of Course	Core
Course Assessment Methods End Semester Assessment(University Exam) Continous Assessment (Sessional, Assignments, Quiz)	50 50
Course Prerequisites	Calculus (MATHS101)
Course Objectives (CO)	<ol style="list-style-type: none">1.To learn the methods to formulate and solve linear differential equations and their applications to engineering problems2.To learn the concepts of Laplace transforms and to evaluate Laplace transforms and inverse Laplace transform3.To apply Laplace transforms to solve ordinary differential equations4.To learn the concept of Fourier series, integrals and transforms.5.To learn how to solve heat, wave and Laplace equations.
Course Outcome	<ol style="list-style-type: none">1. The student will learn to solve Ordinary Differential equations.2. The students will be able to apply the tools of Laplace Transforms to model engineering problems and solve the resulting differential equations.3. Students will understand the nature and behavior of trigonometric (Fourier) series and apply it to solve boundary value problems.

SYLLABUS

Note for Examiner: The semester question paper will be of 50 Marks having 7 questions of equal marks. Students are required to attempt 5 questions in all. First question, covering the whole syllabus and having questions of conceptual nature, will be compulsory. Rest of the paper will be divided into two parts having three questions each and the candidate is required to attempt two questions from each section.

SECTION – A

Ordinary differential equations : Review of geometrical meaning of the differential equation, directional fields, exact differential equations(scope as in chapter 8, sections 8.1 – 8.10 of reference 2), solution of differential equations with constant coefficients; methods of differential operators (scope as in chapter 9, sections 9.1 – 9.5 of reference 2). Non-homogeneous equations of second order with constant coefficients: Solution by method of variation of parameters, reduction by order (scope as in chapter 9, section 9.7, 9.10 of reference 2). Power series method of solution(scope as in chapter 10, section 10.2 of reference 2)

(13 hours)

Laplace Transforms : Laplace transform, Inverse transforms, shifting, transform of derivatives and integrals. Unit step function, second shifting theorem, Dirac's Delta function. Differentiation and integration of transforms. Convolution Theorem on Laplace Transforms. Application of Laplace transforms to solve ordinary differential equations with initial conditions (Scope as in Chapter 5, Sections 5.1 – 5.5 of Reference 1).

(10 hours)

SECTION – B

Fourier Series and Transforms: Periodic functions, Fourier series, Even and odd series, half range expansions, Complex Fourier Series, Approximation by trigonometric polynomials. Fourier integrals, Fourier Cosine and Sine transforms, Fourier Transforms (Scope as in Chapter 10, Sections 10.1 – 10.5, 10.7 – 10.10 of Reference 1).

(8 hours)

Partial Differential Equations: Partial differential equations of first order, origin, solution of linear partial differential equations of first order, Integral surfaces passing through a given curve (Scope as in Chapter 2, Sections 1, 2, 4, 5 of Reference 4).

(6 hours)

Boundary Value Problems: D'Alembert's solution of wave equation, separation of variables: one dimension and two dimension heat and wave equation, Laplace equation in Cartesian and Polar coordinates (Scope as in Chapter 11, Sections 11.1, 11.3 – 11.5, 11.8 – 11.9 of Reference 1).

(8 hours)

RECOMMENDED BOOKS			
S.No.	NAME	AUTHORS	PUBLISHER
1.	Elements of Partial Differential Equations	Ian N. Sneedon	McGraw Hill, Singapore 1957.
2.	Advanced Engineering Mathematics	E. Kreyszig.	8th edition , John Wiley.
3.	Advanced Engineering Mathematics	Michael D. Greenberg	2 nd edition, Pearson Education.
4.	Advanced Engineering Mathematics	Wylie and Barrett	Tata McGraw Hill
5.	Higher Engineering Mathematics	B.V.Ramana	Tata McGraw Hill.
6.	Advanced Engineering Mathematics	R. K. Jain, S. R. K. Iyenger	Narosa Publications
7.	Theory and problems of Differential Equations	Frank Ayers	Shuam outline series, McGraw-Hill, Singapore, 1957

Course Code	HSS 201 / HSS 101
Course Title	Ethics and Self Awareness
Type of Course	Core
Course Assessment Methods	
End Semester Assessment(University Exam)	50
Continous Assessment (Sessional, Assignments, Quiz)	50
Course Prerequisites	10+2
Course Objectives (CO)	
Course Outcome	

SYLLABUS

Note for Examiner: The semester question paper will be of 50 Marks having 7 questions of equal marks. Students are required to attempt 5 questions in all. First question, covering the whole syllabus and having questions of conceptual nature, will be compulsory. Rest of the paper will be divided into two parts having three questions each and the candidate is required to attempt two questions from each section.

SECTION - A

Introduction to Ethics: Concept of Ethics – Nature, Scope, Sources, Types, Functions and Factors influencing Ethics, Approaches to Ethics – Psychological, Philosophical and Social, Broader Ethical Issues in Society. (6 hours)

Values, Norms, Standards and Morality: Concept and Role, Relation with Ethics, Psycho-Social Theories of Moral Development – Kohlberg and Carol Gilligan. (4 hours)

Ethics and Business

Concept of Business Ethics – Nature, Objectives and Factors influencing Business Ethics, 3 C's of Business Ethics, Ethics in Business Activities, Ethical Dilemmas in Business, Managing Ethics (5 hours)

SECTION – B

Self-Awareness: Concept of Self Awareness – Need, Elements, Self Assessment – SWOT Analysis, Self Concepts – Self-Knowledge, Assertiveness and Self-Confidence, Self-Esteem. (4 hours)

Self-Development :Concept of Self-Development, Social Intelligence, Emotional Intelligence, Managing Time and Stress, Positive Human Qualities (Self-Efficacy, Empathy, Gratitude, Compassion, Forgiveness and Motivation), Personality Development Models – Johari Window, Transactional Analysis, Myers Briggs Type Indicator, Self-Awareness and Self-Development Exercises. (11hours)

RECOMMENDED BOOKS			
S.No.	NAME	AUTHORS	PUBLISHER
1.	Business Ethics – Text and Cases	C.S.V. Murthy	Himalaya Publishing House
2.	Business Ethics	Hartman, Laura P. And Chatterjee, Abha	Tata McGraw Hill
3.	Business Ethics and Professional Values	A. B. Rao	Excel Books
4.	Business Ethics – Concepts and cases	Manuel G. Velasquez	Prentice Hall
5.	Issues and Ethics in the Helping Professions	G. Corey, M. Schneider Corey, P. Callanan	Brooks/Cole
6.	Theories of Personality	S. Calvin Hall, Dardner Lindzey and John B. Cambell	Hamilton Printing Company
7.	The Curse of Self-awareness, Egotism and the Quality of Human Life	M. R. Leary	Oxford University Press
8.	Self – Awareness	Allan Twain	

Physics Course 1

Any one of the following three papers to be chosen by institute

Course Code	APH 101 / APH 201
Course Title	Oscillations and Optics
Type of Course	Core
Course Assessment Methods	
End Semester Assessment(University Exam)	50
Continous Assessment (Sessional, Assignments, Quiz)	50
Practical (Continuous and end semester evaluation)	50
Course Prerequisites	10+2
Course Objectives (CO)	
Course Outcome	

SYLLABUS

Note for Examiner: The semester question paper will be of 50 Marks having 7 questions of equal marks. Students are required to attempt 5 questions in all. First question, covering the whole syllabus and having questions of conceptual nature, will be compulsory. Rest of the paper will be divided into two parts having three questions each and the candidate is required to attempt two questions from each section.

SECTION-A

Ultrasonics: Production and detection of ultrasonics (2 hours)

SHM: Review of SHM, superposition of two SHM in one dimension, charge oscillations in LC circuits (3 hours)

Damped Oscillations: Concept and cause of damping, differential equation of a damped oscillator and different kinds of damping, Methods of describing damping of an oscillator - logarithmic decrement, relaxation time, quality factor, band width. Series LCR circuit as a damped oscillator. (3 hours)

Forced Oscillations: States of forced oscillations, differential equation of forced oscillator – its displacement, velocity and impedance, behaviour of displacement and velocity with driver's frequency, Power, bandwidth, Quality factor and amplification of forced oscillator, resonance in forced oscillators, forced oscillations in series LCR circuit (4 hours)

Wave Motion: Wave equation and its solution, characteristic impedance of a string, reflection and transmission of waves on a string at a boundary, reflection and transmission of energy, the matching of impedances (3 hours)

SECTION – B

Interference: Division of wave front and amplitude; Fresnel's biprism, Newton's rings, Michelson interferometer and its applications for determination of λ and $d\lambda$. (4 hours)

Diffraction: Fresnel and Fraunhofer diffraction, qualitative changes in diffraction pattern on moving from single slit to double slit, plane transmission grating, dispersive power & resolving power of a grating. (5 hours)

Polarization: Methods of polarization, analysis of polarized light, quarter and half wave plates, double refraction. (4 hours)

Lasers: Elementary idea of LASER production, spontaneous emission, stimulated emission, Einstein's coefficients, Helium-Neon, Ruby and semiconductor lasers, applications of lasers. (4 hours)

Fibre Optics: Basics of optical fibre - its numerical aperture, coherent bundle, step index and graded index fibre, material dispersion, fibre Optics sensors, applications of optical fibre in communication systems. (3 hours)

Holography: Basic principle, theory and requirements, applications (2 hours)

RECOMMENDED BOOKS			
S.No.	NAME	AUTHORS	PUBLISHER
1.	Physics for Engineers	N. K. Verma	Prentice Hall India
2.	Physics of Vibrations and Waves	H. J. Pain	5 th edition, John Wiley & Sons
3.	Vibrations and Waves	A. P. French	CBS Publishers
4.	Optics	Ajoy Ghatak	McGraw Hill Publications

List of Experiments

1. To study Lissajous figures obtained by superposition of oscillations with different frequencies and phases.
2. To find the wavelength of sodium light using Fresnel's biprism.
3. (i) To determine the wavelength of He-Ne laser using transmission grating.
(ii) To determine the slit width using the diffraction pattern.
4. To determine the wave length of sodium light by Newton's rings method.
5. To determine the wave length of sodium light using a diffraction grating.
6. To find the specific rotation of sugar solution using a Bi-quartz Polarimeter.
7. To design a hollow prism and used it find the refractive index of a given liquid.
8. To determine the wavelength of laser using Michelson interferometer.

Course Code	APH 103 / APH 203
Course Title	Quantum and Statistical Physics
Type of Course	Core
Course Assessment Methods	
End Semester Assessment(University Exam)	50
Continous Assessment (Sessional, Assignments, Quiz)	50
Practical (Continuous and end semester evaluation)	50
Course Prerequisites	10+2
Course Objectives (CO)	
Course Outcome	

SYLLABUS

Note for Examiner: The semester question paper will be of 50 Marks having 7 questions of equal marks. Students are required to attempt 5 questions in all. First question, covering the whole syllabus and having questions of conceptual nature, will be compulsory. Rest of the paper will be divided into two parts having three questions each and the candidate is required to attempt two questions from each section.

SECTION-A

Special Theory of Relativity: Inertial and non-inertial frames of reference, Galilean transformation, Michelson Morley Experiment, postulates of special theory of relativity, Lorentz transformation, Simultaneity, Length contraction, Time dilation, Doppler effect, Addition of velocities, variation of mass with velocity, mass-energy relation . (7 hours)

Origin and Postulates of Quantum Physics: Quantum theory of light, X-rays production, spectrum & diffraction (Bragg's law), photoelectric effect, Compton effect, pair production, photons & gravity, black holes, de-Broglie hypothesis, particle diffraction, uncertainty principle and applications (7 hours)

Postulates of quantum mechanics, Schrodinger theory, time-dependent and time-independent Schrodinger equation, wave function, Born interpretation and normalization, expectation values (3 hours)

SECTION - B

Applications of Quantum Physics: Particle in a box (infinite potential well), finite potential step and barrier problems, tunneling, linear harmonic oscillator (one-dimensional). (4 hours)

Hydrogen atom (qualitative), radiative transitions and selection rules, Zeeman effect, Spin-orbit coupling, electron spin, Stern-Gerlach experiment, exclusion principle, symmetric and antisymmetric wavefunctions (5 hours)

Statistical Physics: Maxwell-Boltzmann statistics, molecular energies in an ideal gas, Bose-Einstein and Fermi-Dirac statistics, black body radiation, Rayleigh-Jeans and Planck's radiation laws, free electrons in a metal, electron-energy distribution, Fermi energy, electronic specific heat, conduction in metals, thermionic emission. (10 hours)

RECOMMENDED BOOKS			
S.No.	NAME	AUTHORS	PUBLISHER
1.	Concepts of Modern Physics	Arthur Beiser	McGraw Hill Publications
2.	Solid State Physics	C. Kittel	Wiley Eastern Publications
3.	Solid State Physics	S. O. Pillai	New Age International
4.	Statistical Physics Thermodynamics	V. S. Bhatia	

List of Experiments

- 1) To study the quantized energy level of the first excited state in the Argon using the Frank-Hertz setup.
- 2) To find the value of Planck's constant and evaluate the work function of cathode material by used of photoelectric cell.
- 3) To study various characteristics of photo-voltaic cell: (a) Voltage-current characteristics, (b) loading characteristics, (c) power-resistance characteristics and (d) inverse square law behavior of the photo-current with distance of source of light from photo-voltaic cell
- 4) To study the response of a photo-resistor to varying intensity of light falling on it and deduce spectral sensitivity of its semiconductor material.
- 5) To study the Balmer Series of Mercury and Hydrogen spectrum using diffraction grating and calculate Rydberg constant.
- 6) To evaluate charge on an oil drop using Millikan's oil drop method.
- 7) To verify Rutherford's alpha scattering formula using a mechanical model.

Course Code	APH 107 / APH 207
Course Title	Physics of Materials
Type of Course	Core
Course Assessment Methods	
End Semester Assessment(University Exam)	50
Continous Assessment (Sessional, Assignments, Quiz)	50
Practical (Continuous and end semester evaluation)	50
Course Prerequisites	10+2
Course Objectives (CO)	
Course Outcome	

SYLLABUS

Note for Examiner: The semester question paper will be of 50 Marks having 7 questions of equal marks. Students are required to attempt 5 questions in all. First question, covering the whole syllabus and having questions of conceptual nature, will be compulsory. Rest of the paper will be divided into two parts having three questions each and the candidate is required to attempt two questions from each section.

SECTION - A

Crystal structure: Bonding forces and energies, Primary and Secondary bonds, Space Lattices, Symmetries in a cubic lattice, Crystal Structures (cubic and hexagonal cells), Assignment of coordinates, directions and planes in crystals, Linear, Planar and Space densities in crystals, close packed morphology (Hexagonal and cubic close packing), single and polycrystalline structures, interstitial spaces (trigonal, tetrahedral and octahedral voids)

Structure of ceramics (NaCl, Zinc blende, silica and silicates, diamond crystal, Graphite, Fullerenes and carbon nanotubes)

Structure of polymers, crystallinity of long chain polymers

Crystal Structure analysis, X-ray diffraction and Bragg's law, Powder method for study of X-ray diffraction pattern

Crystal Defects (Point, line, surface and volume imperfections) (14 hours)

Diffusion: Diffusion mechanisms, steady state diffusion, non-steady state diffusion, factors affecting diffusion, applications based on diffusion (corrosion resistance of Duralumin, carburization of steel, decarburization of steel, doping of semiconductors) (3 hours)

Elastic, Anelastic and Viscoelastic Behaviour Elastic behaviour and its atomic model, rubber like elasticity, anelastic behaviour, relaxation processes, viscoelastic behaviour, spring-dashpot model (3 hours)

SECTION - B

Plastic Deformations and strengthening mechanisms : Tensile properties (Yield strength, Tensile Strength, Ductility, Resilience, Toughness), Dislocations and plastic deformation, characteristics of dislocations, slip systems, slip in single crystals, plastic deformation of polycrystalline materials, mechanisms of strengthening in metals (grain size reduction, solid-solution strengthening, strain hardening), recovery, recrystallization and grain growth (5hours)

Fracture, Fatigue and Creep : Fracture (Ductile and brittle fractures), principles of fracture mechanics, fracture toughness, ductile to brittle transitions Cyclic stresses, S-N curve, crack initiation and propagation, factors that affect fatigue life, environmental effects, generalized creep behavior, stress and temperature effects. (5 hours)

Phase Diagrams : One-Component (or Unary) Phase Diagrams, Binary Isomorphous Systems, Interpretation of Phase Diagrams, Development of Microstructure in Isomorphous Alloys, Mechanical Properties of Isomorphous Alloys ,Binary Eutectic Systems, Development of Microstructure in Eutectic Alloy, Equilibrium Diagrams Having Intermediate Phases or Compounds, Eutectic and Peritectic Reactions, The Gibbs Phase -Rule (6 hours)

Phase Transformations: Kinetics of phase transformation, kinetics of solid state reactions, Isothermal transformation diagrams, continuous cooling transformation, temper embrittlement (4 hours)

RECOMMENDED BOOKS			
S.No.	NAME	AUTHORS	PUBLISHER
1.	Material science and engineering – An Introduction	William D Callister	6 Th edition, John Willey and Sons.
2.	Material Science and Engineering – A First Course	V. Raghvan	4 th edition, Eastern economy edition
3.	Solid State Physics	S. O. Pillai	New Age International
4.	Introduction to Solids	Leonid V Azaroff	Tata McGraw Hill, 3 rd edition.

List of Experiments

1. To find the energy band gap of the given semiconductor by four probe method.
2. To study the Hall Effect of a given semiconductor.
3. To determine the dielectric constant of the given materials.
4. To study the B-H curve of the ferromagnetic materials.
5. To determine the value of e/m for electron by long solenoid (helical) method.
6. To study the variation of magnetic field with distance along the axis of a circular coil carrying current by plotting a graph.
7. To find the Curie temperature of a Ferroelectric material by measuring Capacitance as a function of temperature.
8. To determine the thermal conductivity of an insulator material using guarded plate method (Lee's disc method).
9. To Study (a) Voltage-current characteristics (b) loading characteristics (c) Power-Resistance characteristics and (d) intensity response of photovoltaic cell.

Course Code	ME201
Course Title	Engineering Mechanics – II
Type of Course	Core
Course Assessment Methods	
End Semester Assessment(University Exam)	50
Continous Assessment (Sessional, Assignments, Quiz)	50
Practical (Continuous and end semester evaluation)	50
Course Prerequisites	Prior knowledge of integral and differential calculus and vector algebra
Course Objectives (CO)	The main objective of this course is to develop in the student the ability to analyze any engineering problem in a simple and logical manner with the help of free body diagrams and then to apply the basic principles of mechanics to solve the problem.
Course Outcome	The student can apply the principles of Engineering Mechanics to wide range of applications from Mechanical Engineering, Civil Engineering, Automotive Engineering to Medicine and Biology and can make use of the concept of free body diagrams to solve practical engineering problems that are applicable to engineering design.

SYLLABUS

Note for Examiner: The semester question paper will be of 50 Marks having 7 questions of equal marks. Students are required to attempt 5 questions in all. First question, covering the whole syllabus and having questions of conceptual nature, will be compulsory. Rest of the paper will be divided into two parts having three questions each and the candidate is required to attempt two questions from each section.

SECTION - A

Kinematics of a Particle: Introduction. Rectilinear Kinematics: Continuous Motion. Rectilinear Kinematics: Erratic Motion. General Curvilinear Motion. Curvilinear Motion: Rectangular Components. Motion of a Projectile. Curvilinear Motion: Normal and Tangential Components. Curvilinear Motion: Cylindrical Components. Absolute Dependent Motion Analysis of Two Particles. Relative-Motion Analysis of Two Particles Using Translating Axes.

Kinetics of a Particle: Force and Acceleration - Newton's Laws of Motion. The Equation of Motion. Equation of Motion for a System of Particles. Equations of Motion: Rectangular Coordinates. Equations of Motion: Normal and Tangential Coordinates. Equations of Motion: Cylindrical Coordinates. Central-Force Motion and Space Mechanics.

Kinetics of a Particle: Work and Energy - The Work of a Force. Principle of Work and Energy. Principle of Work and Energy for a System of Particles. Power and Efficiency. Conservative Forces and Potential Energy. Conservation of Energy.

Kinetics of a Particle: Impulse and Momentum - Principle of Linear Impulse and Momentum. Principle of Linear Impulse and Momentum for a System of Particles. Conservation of Linear Momentum for a System of Particles. Impact. Angular Momentum. Relation Between Moment of a Force and Angular Momentum. Angular Impulse and Momentum Principles. Steady Fluid Streams. Propulsion with Variable Mass.

Planar Kinematics of a Rigid Body - Rigid-Body Motion. Translation. Rotation About a Fixed Axis. Absolute General Plane Motion Analysis. Relative-Motion Analysis: Velocity. Instantaneous Center of Zero Velocity. Relative-Motion Analysis: Acceleration. Relative-Motion Analysis Using Rotating Axes.

SECTION- B

Planar Kinetics of a Rigid Body: Force and Acceleration - Moment of Inertia. Planar Kinetic Equations of Motion. Equations of Motion: Translation. Equations of Motion: Rotation About a Fixed Axis. Equations of Motion: General Plane Motion.

Planar Kinetics of a Rigid Body: Work and Energy - Kinetic Energy. The Work of a Force. The Work of a Couple. Principle of Work and Energy. Conservation of Energy.

Planar Kinetics of a Rigid Body: Impulse and Momentum - Linear and Angular Momentum. Principle of Impulse and Momentum. Conservation of Momentum. Eccentric Impact.

Three-Dimensional Kinematics of a Rigid Body: Rotation About a Fixed Point. The Time Derivative of a Vector Measured from a Fixed and Translating-Rotating System. General Motion. Relative-Motion Analysis Using Translating and Rotating Axes.

Three-Dimensional Kinetics of a Rigid Body: Moments and Products of Inertia. Angular Momentum. Kinetic Energy. Equations of Motion. Gyroscopic Motion. Torque-Free Motion.

Vibrations: Undamped Free Vibration. Energy Methods. Undamped Forced Vibration. Viscous Damped Free Vibration. Viscous Damped Forced Vibration. Electrical Circuit Analogs.

RECOMMENDED BOOKS			
S.No.	NAME	AUTHORS	PUBLISHER
1.	Engineering Dynamics	R.C. Hibbeler	Pearson
2.	Engineering Dynamics	F.P. Beer et al.	McGrawHill
3.	Engineering Dynamics	Merriam and Kraige	Wiley and Sons Publishers

List of Experiments

1. Wheel and Axle - Demonstration of the formation of an equilibrium of moments in static systems
2. Determination of parameters of System of pulleys.
3. To determine the mechanical advantage, Velocity ratio and efficiency of a screw jack.
4. Determine the mechanical advantage, Velocity ratio and Mechanical efficiency of Wheel and Axle.
5. To determine the MA, VR of Worm Wheel (double-start)

6. To find the time period of a simple and compound pendulum.
7. To calculate the mass moment of inertia and radius of gyration of the compound pendulum of two bodies different in shapes and compare them to the theoretical values.
8. To study various types of gears – Helical, Cross helical, Worm, Bevel gear.
9. To Study various types of gear trains – Simple, Compound, reverted, Epicyclic and Differential.
10. To obtain by experiment the velocity ratios of a simple or a compound train of gears and to verify calculated values.

Course Code	ME202
Course Title	Engineering Graphics
Type of Course	Core
Course Assessment Methods	
End Semester Assessment(University Exam)	Nil
Continous Assessment (Sessional, Assignments, Quiz)	50
Practical (Continuous and end semester evaluation)	50
Course Prerequisites	
Course Objectives (CO)	<ol style="list-style-type: none"> 1. Learn basic engineering drawing formats 2. Learn to sketch and take field dimensions 3. Learn basic Auto Cad skills
Course Outcome	<ol style="list-style-type: none"> 1. The students will able to draw orthographic, isometric projections and sections 2. Students will become familiar with Auto Cad, two dimensional drawings 3. The students will able to read drawings

SYLLABUS

Introduction to Engineering Graphics, Methods of projections, Theory of orthographic projection.
Introduction to CAD software
Conventional practices, dimensioning as per BIS SP 46-1988
Pictorial sketching
Projection of points, lines and planes on principal planes
Projection on auxiliary planes
Projection of solids, solid modeling
Section of solids
Elementary development and intersection of solids
General introduction to isometric views
Applications: Drawing of threaded fasteners, Electrical and Electronic drawings using first angle projection

RECOMMENDED BOOKS			
S.No.	NAME	AUTHORS	PUBLISHER
1.	AutoCAD	James D. Bethune	Pearson Publishers
2.	A textbook of engineering Drawing	R. K.Dhawan	S. Chand & Co. Ltd.
3.	Understanding AutoCAD 2006	Sham Tickoo	Wiley Publication

List of Experiments

The candidates will be required to make various drawing sheets covering syllabus of Engineering Graphics (ME202) using the software such as AutoCAD.

Course Code	ME 204
Course Title	Computer Programming (MATLAB Programming for Engineers)
Type of Course	Core
Course Assessment Methods	
End Semester Assessment(University Exam)	50
Continous Assessment (Sessional, Assignments, Quiz)	50
Practical (Continuous and end semester evaluation)	50
Course Prerequisites	No specific prerequisites are needed. It is advisable to have a have a good familiarity with PC operations and a working knowledge of some basic application software (Excel). Basic knowledge of computer programming and an understanding of matrix and linear algebra are highly beneficial.
Course Objectives (CO)	The course provides a gentle introduction to the MATLAB computing environment, and is intended for beginning users and those looking for a review. It is designed to give students a basic understanding of MATLAB, including popular toolboxes. The course consists of lectures and sample MATLAB problems given as assignments and discussed in class. No prior programming experience or knowledge of MATLAB is assumed. Concepts covered include basic use, graphical representations and tips for designing and implementing MATLAB code. The main objectives are: understanding the MATLAB environment; being able to do simple calculations using MATLAB; being able to carry out simple numerical computations and analyses using MATLAB.
Course Outcome	Upon successful completion of this course, the student should be able to: understand the main features of the MATLAB development environment; use the MATLAB GUI effectively; design simple algorithms to solve problems; write simple programs in MATLAB to solve scientific and mathematical problems; know where to find help.

SYLLABUS

Note for Examiner: The semester question paper will be of 50 Marks having 7 questions of equal marks. Students are required to attempt 5 questions in all. First question, covering the whole syllabus and having questions of conceptual nature, will be compulsory. Rest of the paper will be divided into two parts having three questions each and the candidate is required to attempt two questions from each section.

SECTION-A

Introduction: Introduction to basic features of Matlab and Matlab desktop. (2 hours)

Basic Programming Operations: Script M-files, Arrays and array operations, Multidimensional arrays, Numeric data types, Cell arrays and structures, Character strings, Relational and logical operations, Control flow. (6 hours)

Advance Programming Operations: Functions, M-file debugging and profiling, File and directory management, Set, bit and base functions, Time computations. (6 hours)

Basic Mathematical Applications: Matrix Algebra, Data analysis, Data interpolation, Polynomials, Cubic splines. (6 hours)

SECTION-B

Advance Mathematical Applications: Fourier analysis, Optimization, Integration, Differentiation, Differential equations. (5 hours)

Basic Graphical Operations: Two-dimensional graphics, Three-dimensional graphics, Use of colors and light in graphics, Generation of images. (5 hours)

Advance Graphical Operations: Development of movies and sounds, Printing and exporting graphics, Handling graphics, Development of graphical user interfaces. (5 hours)

Classes and Interfacing: Matlab classes and Object-Oriented Programming, Matlab programming interfaces. (5 hours)

RECOMMENDED BOOKS			
S.No.	NAME	AUTHORS	PUBLISHER
1.	Mastering MATLAB 7	D. Hanselman and B. Littlefiels	Pearson Education, New Delhi, 2009
2.	Getting started with Matlab: A quick introduction for scientists and engineers	Rudra Pratap	Oxford University Press, USA, 2009.
3.	Programming in MATLAB for Engineers	Chapman Stephen J.	Cengage Learning, New Delhi, 2009.

4.	MATLAB An Introduction with Applications	Amos Gilat	John Wiley and Sons, New Delhi, 2009
5.	Essential Matlab for Engineers and Scientists	Brian HHahn	Elsevier India
6.	Matlab: A practical Introduction To Programming	Attaway	Elsevier India

Course Code	ME 204
Course Title	Computer Programming (MATLAB Programming for Engineers)
Type of Course	Core
Course Assessment Methods Continuous Assessment: 50 marks (25 day to day work, 25 assignments)	50
Course Prerequisites	No specific prerequisites are needed. It is advisable to have a good familiarity with PC.
Course Objectives (CO)	The course provides a gentle introduction to the MATLAB computing environment. It is designed to give students a basic understanding of MATLAB, including popular toolboxes. The main objectives are: understanding the MATLAB environment; being able to do simple calculations using MATLAB; being able to carry out simple numerical computations and analyses using MATLAB.
Course Outcome	Upon successful completion of this course, the student should be able to: understand the main features of the MATLAB development environment; use the MATLAB GUI effectively; design simple algorithms to solve problems; write simple programs in MATLAB to solve scientific and mathematical problems; know where to find help.

List of Experiments

1. Basics such as command window, workspace, m-files, clc, clear, who, save, load, format, if, else, switch, for, while, continue, break, try, catch, return, ctrl+C, entering matrices, transpose, subscripts, colon operator, modifying or deleting rows and columns, addition, subtraction, matrix multiplication, element-by-element multiplication / division / left-division, sum, diag, eye, zeros, ones, rand, randn, det, inv, variables, numbers, strings, numeric operators, relational operators, functions.
2. 2-D and 3-D plotting. Modifying graph properties such as title, labels, limits, colors, line-types, line-weights, lights etc. using graphic handles. Exporting graphs as TIFF, PDF and JPEG files.
3. Application of matrix inversion in solving a system of simultaneous linear equations. Measurement of time consumed in solving the problem.
4. Curve fitting and simple regression analysis of some simulated data.
5. Use of FFT method to find the frequency components of a signal buried in a noisy time domain signal.

6. Solution of a multi-variable optimization problem.
7. Differentiation and integration of a function using symbolics.
8. Solution of an ordinary differential equation and development of a corresponding GUI.