PANJAB UNIVERSITY, CHANDIGARH

SYLLABI OF FIRST YEAR COURSES IN
B.E. (Mechanical Engineering)

Semester I

S.No	Subject	Code	L-T-P	Credits Theory	Credits Practical	University External Marks	University Internal Marks	Practical Marks Internal	Total Marks
1.	Calculus	MATHS101	4-1-0	4		50	50		100
2.	Engineering Mechanics-I	ME101	3-1-2	3	1	50	50	50	150
3.	Introduction to Manufacturing Processes	ME105	2-0-4	2	2		50	50	100
4.	Applied Chemistry	CH101	4-0-3	3	1	50	50	50	150
5.	Communication Skills	HSS102	2-0-0	2		50	50		100
6.	Introduction to Environmental Science	GS101	3-0-0	3		50	50		100
	Total			29	17 4	250	300	150	700

Semester II

S.No	Subject	Code	L-T-P	Credits Theory	Credits Practical	University External Marks	University Internal Marks	Practical Marks Internal	Total Marks
1.	Differential Equations and Transforms	MATHS201	4-1-0	4		50	50		100
2.	Ethics and Self-Awareness	HSS201	2-0-0	2		50	50		100
3.	Physics Course 1	-	4-0-3/4-0-2	3	1	50	50	50	150
4.	Engineering Mechanics-II	ME201	3-1-2	3	1	50	50	50	150
5.	Engineering Graphics	ME202	1-0-4	1	2		50	50	100
6.	Computer Programming (MATLAB Programming for Engineers)	ME204	2-0-2	2	1	50	50	50	150
	Total			29/28	15 5	250	300	200	750

Paper Title   : Calculus
Paper Code   : MATHS101

Pre Requisite : 10+2

Max (Univ. Exam) Marks : 50   **Time of examination: 3hrs.**

Internal Assessment : 50

Course Duration:45 lectures of one hour each.

Note for the 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.

Objectives
- To understand the behaviour of infinite series and its use.
- To learn the concepts of functions of two and more than two variables and their applications.
- To learn the methods to evaluate multiple integrals and their applications to various problems.
- To understand the concepts of Vector calculus and their use in engineering problems.

S. No.	Topic	No. of Lectures
	PART A	
1.	**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 8, Sections 8.1 – 8.10 of Reference 1). Integral Calculus: Areas of curves, Length of curves, Volume and surface areas of revolution (Scope as in Chapter 5, Sections 5.1, 5.3, 5.5, 5.6 of Reference 1).	9
2.	**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 12, Sections 12.1 – 12.6, 12.8 – 12.9 of Reference 1).	9

3.	**SOLID GEOMETRY** Cylinder, Cone, Quadric surfaces, Surfaces of revolution. (Scope as in: 10.6, 10.7 of Reference 1).	3
	PART B	
4.	**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 13 of Reference 1).	9
5.	**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 11, Sections 11.1, 11.3, 11.4, Chapter 12, Section 12.7 of Reference 1).	8
6.	**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 14 of Reference 1).	7

Outcomes

- The students are able to test the behavior of infinite series.
- Ability to analyze functions of more than two variables and their applications.
- Ability to evaluate multiple integrals and apply them to practical problems.
- Ability to apply vector calculus to engineering problems

References:

1. G. B. Thomas, R. L. Finney. Calculus and Analytic Geometry, Ninth Edition, Pearson Education.
2. E. Kreyszig. Advanced Engineering Mathematics, Eighth Edition, John Wiley.
3. Michael D. Greenberg. Advanced Engineering Mathematics, Second Edition, Pearson Education.
4. Advanced Engineering Mathematics, Wylie and Barrett, McGraw Hill
5. B. V. Ramana. Higher Engineering Mathematics, Tata McGraw Hill.
6. R. K. Jain, S. R. K. Iyenger. Advanced Engineering Mathematics, Narosa Publications.

Paper Title   : Engineering Mechanics - I
Paper Code   : ME101

Max (Univ. Exam) Marks : 50   **Time of examination: 3hrs.**

Internal Assessment : 50

Course Duration:45 lectures of one hour each.

Course Assessment Methods
        End semester Assessment (University Exam)   :50 marks
        Continuous Assessment (Sessional):50marks(30-sessional,20-quiz,objective test)
Course Prerequisites : Prior knowledge of integral and differential calculus and vector algebra are essential prerequisites of this course.
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.

Note for the 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.

SYLLABUS

Note For Examiner: Examiner will set 7 questions of equal marks. First question will cover whole syllabus, having five conceptual questions of 2 marks each and is compulsory. Rest of the paper will be divided into two parts having three questions each and the candidate is required to attempt at least two questions from each part.
Part A
1.   **General Principles** – Mechanics. Fundamental Concepts, Units of Measurement, The International System of Units, Numerical Calculations, General Procedure for Analysis.

2.   **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.

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

4.   **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.

5. **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.

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

Part B

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

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

9. **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 Distribued Force System,

10. **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.\

11. **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

NAME	AUTHOR(S)	PUBLISHER

1. Engineering Dynamics   R.C. HibbelerPearson Publishers
2. Engineering Dynamics   F.P. Beer et al.   McGrawHill Publishers
3. Engineering Dynamics   Merriam and Kraige   Wiley and Sons Publishers

Paper Title   : Engineering Mechanics – I (Practical)

Internal Assessment: 50

Course Assessment Methods
    End semester Assessment (University Exam)   :Nil
    Continuous Assessment :50marks(15-day to day work,20-viva,15-written test)

Course Prerequisites   :Prior knowledge of integral and differential calculus and vector algebra are essential prerequisites of this course.

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.

<div align="center">

SYLLABUS

List of Experiments

</div>

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 od 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.

RECOMMENDED BOOKS

NAME	AUTHOR(S)	PUBLISHER
1. Engineering Dynamics	R.C. Hibbeler	Pearson Publishers
2. Engineering Dynamics	F.P. Beer et al.	McGrawHill Publishers
3. Engineering Dynamics	Merriam and Kraige	Wiley and Sons Publishers

Paper Title	**: Introduction to Manufacturing Processes**

Paper Code : **ME105**
Max (Univ. Exam) Marks :nil

Internal Assessment : 50

Course Assessment Methods
End semester Assessment (University Exam) **:**0 Marks
Continuous Assessment (Sessional) **:**50Marks
Course Prerequisites **:**Basic Workshop Practices

Course Objectives(CO) :	Student will be able to: 1. Know different machines, tools and equipment, Identify different Engineering materials, metals and non-metals. 2. 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 :	This course is designed to help students achieve the following outcomes. 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	Lectures
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

	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

Paper Title   : Introduction to Manufacturing Processes (Practical)

Internal Assessment: 50

Course Assessment Methods
      End semester Assessment (University Exam)   :Nil
      Continuous Assessment :50marks (15-day to day work,20-viva,15-written test)

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

Paper Title   : Applied Chemistry
Paper Code   : CH101 / CH201

Max (Univ. Exam) Marks : 50   **Time of examination: 3hrs.**

Internal Assessment : 50

Course Duration: 45 lectures of one hour each.

Objective: To teach fundamentals of basic chemical sciences essential for the development of new technologies to all branches of engineering.

Note for the 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.

Details of the Course:

S. No.	Contents	Contact hrs
	PART A	
1.	**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 12umerical for calculating w, q, ΔE, ΔH and entropy.	10
2.	**CATALYSIS:** Catalysis and general characteristics of a catalytic reactions, homogenepus 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
3.	**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
	PART B	
4.	**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,	5
5.	**SPECTROSCOPY: UV-** Introduction, Lamber-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	10

	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.	
6.	**COORDINATION CHEMISTRY:** Introduction, Crystal Field Theory, Splitting of octahedral, tetrahedral and square planner complexes, crystal field stabilization energies of octahedral and tetrahedral complexes and its applications.	6

Books suggested:

1. Organic Chemistry by Joseph M.Hornback Brooke/Cole Publishing Company U.S.A.
2. Atkin's Physical Chemistry by Peter Atkins, Julio de Paula, 7th Edition, Oxford University Press.
3. Concise Inorganic Chemistry Vth Edition J D Lee 2003 (Chapman & Hall).
4. A Textbook of Engineering Chemistry by Shashi Chawla, Dhanpat Rai& Co. Pvt. Ltd.
5. Introductory Polymer Chemistry by G.S.Mishra, John Wiley & Sons, New York, 1993.
6. Puri, Sharma and Pathania : Principles of Physical Chemistry, W.H. Freeman & Co, 2008.
7. D. S. Pavia, G.M. Lasmpman and G.S. Kriz : Introduction to spectroscopy, 4th Edition, Thomson learning, Indian Edition 208.
8. Basic Inorganic Chemistry by F.A. Cotton, G. Wilkinson and P.L. Gaus, 3rd Ed., John Wiley & Sons.

Practicals:

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

- Volumetric analysis: iodometric titrations, complexometric titrations, Acid-base titrations
- Analysis of lubricants: Viscosity/surface tension/saponification value/acid value
- Instrumental techniques for chemical analysis: conductometry, potentiometry, UV-visible/IR spectrophotometer.
- Preparation of few organic compounds/inorganic complexes/polymer

Books Recommended:
1. A. I. Vogel : A textbook of Quantitative Inorganic Analysis, 2000, Published by Longman Gp. Ltd, 4th edition.
2. Shashi Chawla: Essentials of Experimental Engineering Chemistry. Published by Dhanpat Rai & Co. Delhi (2001).
3. Vogel's text book of quantitative chemical analysis, 6th Ed by J. Mendham, R. C. Denny, J. D. Barnes and M. J. K. Thomas, Pearson Education.

Paper Title : Communication Skills
Paper Code : HSS102 / HSS202
Max (Univ. Exam) Marks : 50   **Time of examination: 3hrs.**

Internal Assessment : 50

Note for the 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.

Part –A

Lecture Wise Breakup   **No. of Lectures**

1. Fundamentals of Communication Skills   (02)
   Scope and Significance of Communication Skills, Listening, Speaking, Reading and Writing
2. Writing Skills   (04)
   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
3. Vocabulary Building and Writing   (03)
   Word Formations, Synonyms, Antonyms, Homonyms, One-Word Substitutes, Idioms and Phrases, Abbreviations of Scientific and Technical Words

4. Speaking Skills   (03)
   Introduction to Phonetic Sounds, English Phonemes, Stress, Rhythm and Intonation, Countering Stage Fright and Barriers of Communication
5. Reading and Comprehension(02)

Part –B

Lecture Wise Breakup   **No. of Lectures**
1. Advanced Communication Skills   (02)
   Scope, Significance, Process of Communication in an organization, Types and Levels, Communication Networks, Technical Communication, Tools of Effective Communication
2. Speaking Skills and Personality Development   (05)
   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

3. Communication and Media (01)

Social and Political Context of Communication, Recent Developments in Media

4.Advanced Techniques in Speaking Skills (02)

Importance of Listening/Responding to native and global accents, Telephonic
Interviews and Video Conferencing

5. Advanced Techniques in Technical Writing (04)

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

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
1. Ludlow, R. and Panton, F., "The Essence of Effective Communication", Prentice Hall
2. Quirk, Randolph. and Sidney, Greenbaum., "A University Grammar of English", Pearson Education
3. Ashraf, M. Rizvi, "Effective Technical Communication", McGraw Hill
4. Bovee, Courtland L. and John, V. Thill., "Business Communication Today", Pearson Education

REFERNCE BOOKS
1. Guffrey, Mary E., "Essentials of Business Communication", South-Western College Publishing
2. Raman, Minakshi. And Sharma, S., "Technical Communication: Principles and Practice", Oxford University Press
3. Rodrigues, M.V., "Effective Communication", Himalaya Publishing House
4. McCarthy, Michael. and Felicity O' Dell., "English Vocabulary in Use", Cambridge University Press
5. Jones, Daniel., "The Pronunciation of English", Universal Book Stall

6. Sharma, R.C. and Mohan, K., "Business Correspondence and Report Writing", Tata McGraw Hill

7. Raman, Minakshi. And Sharma, S., "Technical Communication: Principles and Practice", Oxford University Press

8. Scott, Bill., "Communication for Professional Engineers", Thomas Teleford Ltd.

9. McMurrey, David A. and Joanne, Buckley., "Handbook for TechnicalWriting", Cengage Learning

10. Harve, L., Locke, W. and Morey, A., "Enhancing Employability and Recognizing Diversity", Universities UK and CSU

11. Lock, R., "Student Activities for taking charge of your Career Direction and Job Search", Cole Publishing

12. Pease, A., "Body Language", Sheldon Press

Paper Title   : Introduction to Environment Science
Paper Code   : GS101 / GS 201

Max (Univ. Exam) Marks : 50   **Time of examination: 3hrs.**

Internal Assessment : 50

Note for the 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.

PART A

General (04)

Introduction, components of the environment, environmental degradation.

Ecology (04)

Elements of ecology: Ecological balance and consequences of change, principles of environmental impact assessment.

Air pollution and control (06)

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.

PART B

Water pollution and control (06)

Hydrosphere, natural water, pollutants their origin and effects, river/lake/ground water pollution, standards and control.

Land Pollution (06)

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

Noise Pollution (04)

Sources, effects, standards and control.

Books & References

- Masters, C.M., "Introduction to Environmental Engineering and Science", Prentice Hall of India Pvt. Ltd., 1991.
- Nebel, B.J.,"Environmental Science" Prentice –Hall Inc., 1987.

Paper Title   : Differential Equations and Transforms

Paper Code   : MATHS201

Pre Requisite : Calculus (MATHS101)

Course Duration: 45 lectures of one hour each.

Max (Univ. Exam) Marks: 50   **Time of examination: 3hrs.**

Internal Assessment: 50

Note for the 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.

Objectives

- To learn the methods to formulate and solve linear differential equations and their applications to engineering problems
- To learn the concepts of Laplace transforms and to evaluate Laplace transforms and inverse Laplace transform
- To apply Laplace transforms to solve ordinary differential equations
- To learn the concept of Fourier series, integrals and transforms.
- To learn how to solve heat, wave and Laplace equations.

S. No.	Topic	No. of Lectures
	PART A	
1.	**ORDINARY DIFFERENTIAL EQUATIONS** Review of geometrical meaning of the differential equation $y' = f(x, y)$, directional fields, Exact differential equations (Scope as in Chapter 8, Section 8.7 of Reference 5), Integrating factors (Scope as in Chapter 8, Section 8.8 of Reference 5), Solution of differential equations with constant coefficients: method of differential operators. Non – homogeneous equations of second order with constant coefficients: Solution by method of variation of parameters (Scope as in Chapter 9, Section 9.7 of Reference 5). Power series method of solution (Scope as in Chapter 10, Section 10.2 of Reference 2)	13

2.	**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
	PART B	
3.	**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
4.	**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
5.	**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

Outcomes

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.

References:

1. E. Kreyszig. Advanced Engineering Mathematics, Eighth Edition, John Wiley.
2. B. V. Ramana. Higher Engineering Mathematics, Tata McGraw Hill.

3. R. K. Jain, S. R. K. Iyenger. Advanced Engineering Mathematics, Narosa Publications.

4. Ian N. Sneedon. Elements of Partial Differential Equations, McGraw-Hill, Singapore, 1957.

5. Michael D. Greenberg. Advanced Engineering Mathematics, Second Edition, Pearson Education.

6. Advanced Engineering Mathematics, Wylie and Barrett, McGraw Hill

7. Frank Ayers. Theory and Problems of Differential Equations, Shaum Outline Series, McGraw-Hill, Singapore, 1972.

Paper Title : Ethics and Self Awareness
Paper Code : HSS201 / HSS101

Max (Univ. Exam) Marks : 50   **Time of examination: 3hrs.**

Internal Assessment : 50

Note for the 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.

Lecture Wise Breakup   **No. of Lectures**

PART A

1. Introduction to Ethics   (06)
     Concept of Ethics – Nature, Scope, Sources, Types, Functions and Factors
     influencing Ethics, Approaches to Ethics – Psychological, Philosophical
     and Social, Broader Ethical Issues in Society.
2.   Values, Norms, Standards and Morality   (04)
     Concept and Role, Relation with Ethics, Psycho-Social Theories of Moral
     Development – Kohlberg and Carol Gilligan
3.   Ethics and Business   (05)
     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

PART B

4.Self-Awareness   (04)
     Concept of Self Awareness – Need, Elements, Self Assessment – SWOT
     Analysis, Self Concepts – Self-Knowledge, Assertiveness and
     Self-Confidence, Self-Esteem
5.   Self-Development (11)
     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

BOOKS
1.   Murthy, C.S.V., "Business Ethics – Text and Cases", Himalaya Publishing House

2. Hartman, Laura P. and Chatterjee, Abha, "Business Ethics", Tata McGraw Hill
3. Rao, A.B., "Business Ethics and Professional Values", Excel Books
4. Velasquez, Manuel G., "Business Ethics – Concepts and Cases", Prentice Hall
5. Corey, G., Schneider Corey, M., & Callanan, P., "Issues and Ethics in the Helping Professions", Brooks/Cole.
6. Hall, Calvin S., Lindzey, Dardner. & Cambell, John B., "Theories of Personality", Hamilton Printing Company.
7. Leary, M.R., "The Curse of Self: Self-awareness, Egotism and the Quality of Human Life", Oxford University Press.
8. Twain, Allan, "Self-Awareness"

Physics Course 1

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

Paper Title : Oscillations And Optics (Theory)
Paper Code : APH 101 / APH 201
Course Duration: 45 lectures of one hour each.

Max (Univ. Exam) Marks : 50   **Time of examination: 3hrs.**

Internal Assessment : 50

Note for the 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.

PART A

Ultrasonics: Production and detection of ultrasonics (2)

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

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)

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)

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)

PART B

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

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)

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

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

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)

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

References:

1. Physics for Engineers (Prentice Hall India) - N.K. Verma

2. Physics of Vibrations and Waves (5th Edition, John Wiley & Sons) – H.J.Pain

3. Optics – Ajoy Ghatak

Paper Title : *Oscillations and Optics* Practical

Internal Assessment: 50

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.

Paper Title : <u>Quantum And Statistical Physics</u> (Theory)
Paper Code : APH103 / APH203
Course Duration: 45 lectures of one hour each.

Max (Univ. Exam) Marks : 50   **Time of examination: 3hrs.**

Internal Assessment : 50

Note for the 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.

PART 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)

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)

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

PART 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)

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)

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)

References:

1. Concepts of Modern Physics, by Arthur Beiser (McGraw-Hill)

2. Solid State Physics, by C. Kittel (Wiley Eastern)

3. Solid State Physics, by S.O. Pillai (New Age International)

4. Statistical Physics and Thermodynamics by V.S. Bhatia

Paper Title: Quantum And Statistical Physics (**Practical)**

Internal Assessment: 50

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

Paper Title   : Physics of Materials
Paper Code   : APH207 / APH107
Course Duration: 45 lectures of one hour each.

Max (Univ. Exam) Marks : 50   **Time of examination: 3hrs.**

Internal Assessment : 50

Note for the 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.

Part - 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)   **(14hrs)**

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)   **(3hrs)**

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

Part - 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 **(5hrs)**

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.
(5hrs)

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
(6hrs)

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

References:

1. Material science and Engineering – An Introduction by William D Callister, Jr, Sixth Edition, John Wiley and Sons.
2. Material science and Engineering – A First Course by V.Raghvan Fourth Edition, Eastern Economy Edition
3. Solid State Physics (New Age Publishers) – S.O. Pillai
4. Introduction to Solids (Tata McGraw Hill, Third Edition) - Leonid V Azaroff

Paper Title   : Physics of Materials (Practical)

Internal Assessment : 50

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.

Paper Title   : Engineering Mechanics - II
Paper Code   : ME201
Course Duration:45 lectures of one hour each.

Max (Univ. Exam) Marks: 50   **Time of examination: 3hrs.**

Internal Assessment : 50
Course Assessment Methods
      End semester Assessment (University Exam)   :50 marks
      Continuous Assessment (Sessional):50marks (30-sessional,20-quiz,objective test)

Course Prerequisites : Prior knowledge of integral and differential calculus and vector algebra are essential prerequisites of this course.

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: Examiner will set 7 questions of equal marks. First question will cover whole syllabus, having five conceptual questions of 2 marks each and is compulsory. Rest of the paper will be divided into two parts having three questions each and the candidate is required to attempt at least two questions from each part.
Part A

1.   **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.
2.   **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.

3.   **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.

4.   **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.

5.   **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.

Part B

6.   **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.

7.   **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.

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

9.   **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.

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

11.   **Vibrations -** Undamped Free Vibration. Energy Methods. Undamped Forced Vibration. Viscous Damped Free Vibration. Viscous Damped Forced Vibration. Electrical Circuit Analogs.

RECOMMENDED BOOKS
NAME   **AUTHOR(S)**   **PUBLISHER**

 1. Engineering Dynamics   R.C. HibbelerPearson Publishers
2. Engineering Dynamics   F.P. Beer et al.   McGrawHill Publishers
3. Engineering Dynamics   Merriam and Kraige   Wiley and Sons Publications

Paper Title: Engineering Mechanics – II (Practical)
Internal Assessment: 50

Course Assessment Methods
     End semester Assessment (University Exam)   :Nil
     Continuous Assessment :50marks(15-day to day work,20-viva,15-written test)

Course Prerequisites :Prior knowledge of integral and differential calculus and vector algebra are essential prerequisites of this course.

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.

<div align="center">SYLLABUS</div>

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.

RECOMMENDED BOOKS

NAME	AUTHOR(S)	PUBLISHER
1. Engineering Dynamics	R.C. Hibbeler	Pearson Publishers
2. Engineering Dynamics	F.P. Beer et al.	McGrawHill Publishers
3. Engineering Dynamics	Merriam and Kraige	Wiley and Sons Publishers

Paper Title   : Engineering Graphics
Paper Code   : ME202
Course Duration: 45 lectures of one hour each.

Max (Univ. Exam) Marks : NIL

Internal Assessment : 50

Course Assessment Methods
    End semester Assessment (University Exam)   **:** Nil
    Continuous Assessment (Sessional)   **:** 50 marks

Course Prerequisites   **:**

Course Objectives(CO)   **:**
.
- Learn basic engineering drawing formats
- Learn to sketch and take field dimensions
- Learn basic Auto Cad skills

Course Outcome   **:**

- The students will able to draw orthographic, isometric projections and sections
- Students will become familiar with Auto Cad, two dimensional drawings
- 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

NAME	AUTHOR(S)	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

Paper Title   : Engineering Graphics (Practical)

Course Assessment Methods
      End semester Assessment (University Exam)   : Nil
      Continuous Assessment: 50marks (15-day to day work, 20-viva, 15-written test)

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

Paper Title   :Computer Programming (MATLAB Programming for Engineers)
Paper Code   :   ME204
Course Duration:45 lectures of one hour each.

Max (Univ. Exam) Marks : 50   **Time of examination: 3hrs.**

Internal Assessment : 50
Course Assessment Methods
End semester Assessment (University Exam)   :50 marks
Continuous Assessment (Sessional):50 marks (30-sessional, 20-quiz, objective test)

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.

Note for the 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.

	PART-A	**Lectures**
1	**Introduction:** Introduction to basic features of Matlab and Matlab desktop	(2)
2	**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)
3	**Advance Programming Operations:** Functions, M-file debugging and profiling, File and directory management, Set, bit and base functions, Time computations	(6)

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

PART-B

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

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

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

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

Books Suggested:

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

Paper Title   : **Matlab Programming for Engineers(Practical)**

Internal Assessment : 50

Course Assessment Methods
End semester Assessment (University Exam)   :Nil
Continuous Assessment: 50 marks (25 day to day work, 25 assignments)

Course   Prerequisites: No   specific   prerequisites   are   needed.
It is advisable to have a 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.

Syllabus

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.