PHYSICS

**BEG 103SH**

 **YEAR: I SEM.: II**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Teaching scheduleHours/Week | Examination Scheme |  | Total Marks | Remarks |
| Final | Internal Assessment |  |  |
| Theory | Practical | Theory  | Practical |
| L | P | T | Duration | Marks | Duration | Marks |  |  |
| 4 | 2 | 1 | 3 | 80 | 3 | 25 | 20 | - | 125 |  |

**Course Objective:** To provide the concept and knowledge of physics with the emphasis of present day application. The background of physics corresponding to proficiency certificate level /+2 science is assumed.

**Course Details:**

**1. Simple harmonic motion (4 hrs)**

 1.1 Introduction, Hook's law, elastic restoring force, equation of S H M (2 hrs)

* 1. Examples of S H M, suspended mass spring system pendulum (1 hrs)

(bar pendulum)

 1.3 Angular harmonic motion. Torsional pendulum (1 hrs)

**2. Waves in elastic media (5 hrs)**

2.1 Introduction to waves, types of wave; traveling wave, mechanical wave, speed of traveling wave in a stretched string, waves and particles. (2 hrs)

 2.2 Energy and power in traveling waves, Intensity in wave motion. (1 hrs)

 2.3 Reflection of waves, principle of superposition, interference of waves. (1 hrs)

 2.4 Standing waves and resonance (1 hrs)

**3. Acoustics (7 hrs)**

* 1. Sound waves,Sound prorogation in gases, liquid and solids, pressure

variation due to waves. (1½ hrs)

 3.2 Attenuation, reflection and refraction (½ hrs)

 3.3 Beat phenomena and Doppler's effect. (1½ hrs)

 3.4 Energy considerations, intensity level and loudness. (1 hrs)

3.5 Ultrasound and its uses, production of Ultrasound (Introduction) distances measurement, imaging, signaling, cleaning, and neating . (2½ hrs)

**4. Electrostatics (7 hrs)**

 4.1 Electric charge, Interaction between electric charges. (½ hrs)

* 1. Electric field, lines of force, calculation of electric field due to dipole and

quadrupole, electric flux. (1 hrs)

* 1. Gauss law, Application to Gauss law to spherical, linear and planer

symmetric distribution of charges. (2 hrs)

4.4 Electric potential, potential difference, potential due to a point charge, potential gradient. (½ hrs)

 4.5 Potential due, to dipole and quadrupole, electrostatic potential energy. (½ hrs)

* 1. Capacitors; parallel plate capacitor, spherical capacitor, permittivity, conductors and dielectric in electric field, E and D fields, energy stored in electric field and energy density. (2 hrs)
	2. Electrostatic induction, lightning conductors, industrial uses and hazards. (½ hrs)

**5. Direct current (5 hrs)**

* 1. Current flow in solids, liquid and gases. Ohm's law, Resistance in series and

parallel. (½ hrs)

* 1. Current and current density, atomic view of resistivity, effect of temperature

on resistance. (1 hrs)

* 1. Semiconductors: Intrinsic and extrinsic semiconductor, Introduction of PN

junction, NPN & PNP transistor. (2 hrs)

 5.4 Energy loss, heat production, verification of joule's law. (1 hrs)

 5.5 Kirchhoff's law. (½ hrs)

**6. Magnetism and magnetic fields. (10 hrs)**

* 1. Sources of magnetic fields: Current and permanent magnets, earth's magnetic

fields, lines of force flux of magnetic field and permealibility. (1 hrs)

* 1. Biot and savart's law and its application to long straight conductor carrying

current, Amperes theorem and its application to long straight conductor carrying current and solenoid carrying current. (2 hrs)

 6.3 Magnetic scalar potential and potential gradiant. (1 hrs)

6.4 Force on conductor in magnetic fields, force per unit length between parallel

conductors carrying current. (1 hrs)

6.5 Faraday's law of electromagnetic induction, flux linkage, Lenz's law, self induction, Calculation of the coefficient of self-induction for solenoid. (2 hrs)

 6.6 L. R. circuit. Energy stored in magnetic field, Energy density of magnetic field.

(1 hrs)

* 1. Magnetic properties of matter, Domain theory, Ferromagnetism, Saturation

and Hysteresis. (2 hrs)

**7. Electromagnetic Oscillations. (4 hrs)**

 7.1 LC Oscillation, analogy to SHM. (1 hrs)

* 1. Electromagnetic oscillation (quantitative) forced oscillation and resonance,

Induced magnetic field. (2 hrs)

 7.3 Displacement current and its applications. (1 hrs)

**8. Electromagnetic waves. (4 hrs)**

 8.1 Maxwell's equation-Differential and Integral form (2 hrs)

* 1. Application of Maxwell's equation, wave equations in free space and medium (1 hrs)
	2. Speed of electromagnetic wave. Energy of electromagnetic wave, pointing vector (1hrs)

**9. Optics**

 **9.1 Geometrical optics (15 hrs)**

* + 1. Nature and source of light, different theories of light, different types of sources. 1 hrs)
		2. Review of optics of mirror and lenses, reflection and reflection both in plane and spherical surfaces, refraction through prism. (1 hrs)
		3. Combination of lenses in contact and at a separation, cardinal points, achromatic combination of two lenses, separated by distance. (2 hrs)
		4. Monochromatic aberration of lenses, spherical aberration, astigmatism,

coma, curvature of field and distortion, causes and their minimization. (1 hrs)

* + 1. Fibre optics: Introduction to optical fibre, Types of optical fibres, Uses in communication. (1 hrs)

 9.1.6 Lasers: Principal of the generation of laser light Uses of laser. (1 hrs)

**9.2 Physical Optics. (8 hrs)**

* + 1. Interference: Interference of light waves, Young's experiment, coherent

sources, path difference and phase difference, condition for constructive and destructive interference, interference in thin films and wedge shape. Newton's ring and determination of wave length, blooming of lenses. (3 hrs)

* + 1. Diffraction: Introduction of Fresnel's and fraunhoffer diffraction for a

single and double slits and multiple slits. Diffraction grating, intensity variation in order, wave length measurement by diffraction gratings . (2 hrs)

* + 1. Polarization: Introduction, Polarization by reflaction. Malu's law, double refraction, Nicol prism, plane, circular, elliptical polarization of light waves, Optical activity, polarimeter. (2 hrs)
		2. Use of light, distance measurement, single transmission, optical stress analysis, spectrometric analysis of gases. (1 hrs)

**Laboratory: (Minimum 9 Experiments)**

1. Physical pendulum, Torsional pendulum
2. Resonance tube
3. Newton's Ring, Diffraction grating, prism.
4. Carryfoster bridge, Low resistance, resistivity, LC circuits
5. Polarimeter. Junction transistor

**Recommended books:**

1. Physics by Resnick, Haliday 2nd/4th edition
2. Concept of Modern Engineering Physics by A.S.Vasudeva
3. Optics by subrhamanyam and Brij Lal
4. Practical Physics by C.L. Arora

**MATHEMATICS II**

BEG 102SH

 **YEAR: I SEMESTER: II**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Teaching ScheduleHours/Week | Examination Scheme |  | Total Marks | Remarks |
| **Final** | Internal Assessments |
| Theory | Practical | Theory | Practical  |
| L | P | T | Duration | Marks | Duration | Marks |  |  |  |  |
| 3 | - | 2 | 3 | 80 | - | - | 20 | - | 100 |  |

 **Objectives**: The basic objective of the course is to provide a sound knowledge of vectors, 3-D

 analytical geometry, Infinite series and ordinary differential equations.

1. **Analytic Geometry of 3-D**: Planes, Straight lines, Standard equation of sphere, cylinder and

 cone. (12 hrs)

1. **Infinite Series** : Infinite Series and sequences, convergence, ratio, root and Integral tests,

 absolute convergence, power series, radius of convergence. (6 hrs)

1. **Plane curves and polar coordinates** : Planes curves, parametric equations, polar

coordinates, integral in the polar coordinates. (4 hrs)

1. **Vector Calculus**: Differentiation and Integration of vectors, gradients, divergence and curl.

(8 hrs)

1. **Differential Equations**: First order differential equation, variable separation, homogeneous, linear

 and exact. Second order differential equations, linear equations with constant coefficients,

 homogeneous equation with constant coefficients, general solutions, initial value problems,

 non-homogeneous equations, solutions in series, Legendre, Bessel equations. (15 hrs)

**Recommended books:**

1. Three- dimensional Geometry-Y.R Sthapit and B.C Bajracharya

2. Algebra - G. D. Pant

3. A Text Book of Vector Analysis- M.B Singh and B.C Bajracharya

4. Integral Calculus and Differential Equations - G.D. Pant & G.S. Sth.

5. Calculus and Analytic Geometry- Thomas & Finney, Narosa Publication House, India.

6. Advanced Engineering Mathematics – E Kreyszig, 5th Edition, Wiley, New York

**Fundamental of Thermodynamics and Heat**

**BEG 249 ME**

 **YEAR: I SEM.: II**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Teaching ScheduleHours/Week | Examination Scheme |  | Total Marks | Remarks |
| Final | Internal Assessments |  |  |
| Theory | Practical | Theory Marks | Practical Marks |  |  |
| L | P | T | Duration | Marks | Duration | Marks |  |  |  |  |
| 3 | 2/2 | 1 | 1.5 | 40 | - | - | 10 | 25 | 75 |  |

**Course Objectives**: To provide the students with a basic understanding and norms of Thermodynamics and

 Heat Transfer

**1.0 Basic Concepts (2 Hrs**)

1.1 The nature of Thermodynamics

1.2 Social value of energy

1.3 Application of energy balance approach in engineering

1.4 Work and heat transfer

**2. Energy and Energy Transfer (4 Hrs**)

2.1 The meaning of energy and energy transfer

 Thermodynamic systems: boundary of closed, heterogeneous, homogeneous, isolated

2.2 Thermodynamic equilibrium and quasi-static process

2.3 Thermodynamic properties, state and process

2.4 Energy transfer as heat and work

**3.0 Properties of Pure Substances (Stream): (3 Hrs**)

3.1 Pure substances, phase and wet steam (Two phase mixture)

3.2 Thermodynamic properties: Specific Volume, internal energy, enthalpy entropy and specific heats

3.3 Common process: Throttling, Isothermal and Isobaric

3.4 Common diagram for a pure substance: P-V, P-T, T-S, H-S or mollier

3.5 Steam Tables, Quality or Dryness fraction and measurement of stream quality

**4.0 First Law of thermodynamics and its applications: (8 Hrs**)

4.1 Definitions and law of conservation of energy

4.2 Application of the law to a closed system (Non-flow process)

4.3 Application of the first law of Thermodynamics to some common process:

 Constant Volume, Adiabatic, Reversible Polytropic, Constant Pressure, Constant Internal Energy.

4.4 Steady flow process

4.5 Application of the first law to open system (General Energy Equation)

4.6 Energy of an isolated system

4.7 Perpetual Motion Machine of the kind PMM I

**5.0 Second Law of Thermodynamics and Entropy: (4 Hrs)**

5.1 Statements of second law: Clausius, Kelvin-Plank, Principle of degradation of

 energy, Principles of increase of entropy

5.2 The principles and properties of Entropy

5.3 Entropy and disorder, Absolute entropy and Entropy balance in open and closed system.

5.4 Reversible and Irreversible processes

5.5 Consequences of the second law and Isentropic process

5.6 Carnot cycle and its efficiency

**6.0 Thermodynamic Power Cycles, Refrigeration and Air Conditioning (5 Hrs)**

6.1 Heat engine cycles

6.2 External heat transfer cycles

6.3 Rankine cycles and Modified Rankine cycle

6.4 Air standard cycles: Air standard ottocycle, Diesel cycle and dual cycle

6.5 Refrigeration, air-conditioning and heat pump cycles

6.6 Psychrometric chart and process

**7.0 Introduction to Engineering Heat Transfer: (4 Hrs)**

7.1 Basic concepts and modes of heat transfer

7.2 The common laws of heat transfer: Fourier's Law, Newton's law and Stefan –

 Bortzman law

7.3 Conduction: Critical insulation thickness of pipes, R values and electric analogies;

 Overall coefficient

**Laboratories:**

 Six laboratory exercises will be performed in this course. These are:

1. Pressure and Temperature measurement
2. Experiment on compression and expansion of gases
3. Heat conduction and convection
4. Operation of refrigeration or heat pump
5. Performance of small I-C engine
6. Experiment on Thermal radiation

**Tutorials:**

1. Three assignments in each before first and second assessments.
2. Quiz before first and second assessments.

**Recommended Books**

1. “Fundamental of Engineering Thermodynamics”, John R. Howell and Richard O. Bucckius, Mc Graw Hill Publishers, 1987
2. “Engineering Thermodynamics”, Gupta C.P. and Prakash R., Nemchand & Broj, Roorkee 1991
3. “Engineering Thermodynamics” Nag P.K., Tata Mc Graw Hill, New Delhi, Second Edition.
4. “Engineering Heat Transfer”,Gupta C.P. and Prakash R., Nemchand and Broj Roorkee, 1994.

5. “Heat Transfer”, J.P. Holman, Mc GrawHill, 1981.

 6. “Heat Transfer – A Basic Approach” M.N. Ozicik Mc Graw Hill, 1985

**ENGINEERING DRAWING- II**

**BEG 147ME**

 Year:1 Semester: II

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Teaching scheduleHours/ Week | Examination Scheme |  | Total Marks | Remarks |
| Final | Internal Assessments |  |  |
| Theory | Practical | Theory  | Practical  |  |  |
| L | P  | T | Duration | Marks | Duration | Marks |  |  |  |  |
| 1 | 3 | - | - | - | 3 | 40 | 10 | 50 | 100 |  |

**Course Objectives:** To develop a good understanding of isometric and orthographic projection drawings, assembly & disassembly drawing of machine components and other basic engineering drawings in civil, electronic, electrical and geographical.

1. **Pictorial Projections : (12 Hrs)**
	1. Introduction: Character, advantage and disadvantages.
	2. Axonometric Projection: Isometric drawing, diametric and trimetric drawing
	3. Oblique Projection
	4. Perspective projection
2. **Design and Production Drawing- Machine Drawing : (16 Hrs)**
	1. Introduction: Production of complete design and assembly drawings
	2. Fundamental Techniques: Size and location dimensioning

Placement of dimension lines and general procedures

Standard dimensioning practice (SI system)

* 1. Limit Dimensioning: Nominal and basic size, allowance, tolerance, limits of size, clearance fit, interference fit

Basic whole system and shaft systems

* 1. Threads and standard machine Assembly Elements

Screw threads: ISO standards, representation and dimensioning

Fasteners: type and drawing representation keys, collars, joints, springs, bearings

**3.0 Welding and Riveting: (6 Hrs)**

3.1 Representing joints and welds for Gas, Arc and Resistance welding; Types:

 Spot, Seam, Flash, Fillet, Back-Back, Surface and Upset welds

3.2 Drawing symbols for welds

3.3 Rivets and riveted joints: Types and drawing representation

**4.0 Piping Diagrams: (4 hrs)**

4.1 Piping, Tubing and Types of joints

4.2 Specification of threads, Fittings and valves

4.3 Standard Piping symbols

4.4 Piping Drawing and Symbolic Diagrams

**5.0 Other Engineering Drawing (10 Hrs)**

5.1 Civil Drawings: Steel Construction, Wood Construction, Concrete Construction,

 Masonry and stone Construction.

5.2 Electrical and Electronic diagram Standards

 Types of Diagrams, Line diagrams, schematics and pictorials Symbol for

 Components Printed Circuits, Integrated circuits

5.3 Geographical Drawing

 Topographical Maps, Cadastral Maps, Engineering Maps

5.4 Graphs, Charts and Nomograms: Rectangular Coordinate Graphs, Charts,

 Nomograms

5.5 Duplicating and Reproduction of Engineering Drawings: Blue prints, Brown

 Prints and Blue-Line prints Duplicate, Tracings, Photocopies

**6.0 Computer Software used in Drawings (12 hrs)**

 6.1 An introduction to Auto CAD (Computer Aided Design)

**LABORATORIES: (3hr/week, 12 weeks)**

1. Isometric and Oblique Drawings
2. Oblique drawing, Perspective Drawing
3. Machine Drawing: Sizing and dimensioning
4. Machine Drawing : Detail drawing, dimensioning and tolerance
5. Threads and Fasteners
6. Welding, Joining and Piping
7. Structural Drawing
8. Electrical and Electronics Diagrams
9. Topographical and Engineering Maps, Graphs, Chart and Nonograms and Drawing, Reproduction of Drawings.
10. Machine Drawing by using Auto CAD 2007.
11. Building Drawing by using Auto CAD 2007 .

**Recommended Books**

1. "Fundamentals of Engineering Drawing ", W.J. Luzadder, prentice Hall,8th Edition,1981
2. "Engineering Drawing and Graphic Technology",T.E. French,C.J.vierck and R.J.foster, Mc Graw Hill, 1981
3. "Technical Drawing ", F.E.Giesecke,A.Mitchell,H.C. Spencer and J.C. Dygdone ,Macmillan, 8th Edition, 1986

 4. Machine Drawing

 5. “Text book of Engineering Drawing ’’, Gurucharan Singh and Jagdishlal

 6. “ Auto CAD 2000”, George Omura

**COMMUNICATIVE ENGILISH**

**BEG105SH**

**Year: I**  **Semester: II**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Teaching Schedule Hours/week | Examination Scheme | Internal Assessment | Total Marks | Remarks |
| Final |
| Theory | Practical | Theory Marks | Practical Marks |  |  |
| L | P | T | Duration | Marks | Duration | Marks |  |  |  |  |
| 3 | - | 1 | 3 hrs | 80 | - |  | 20 | - | 100 |  |

**Course Description**:

This course is designed for the students of B.E. level: first year, first semester of Purbanchal University who have completed either Diploma level in Engineering or I.Sc. or +2 from any institution recognized by this university. It attends to develop and strength in students the basic and communicative skills in the English language with emphasis on speaking, reading and writing.

**Course Objectives**:

This course intends to develop:

- Skills needed for group discussion, meeting conduction and technical talk.

- Intensive and extensive reading skills in technical and non-technical reading materials.

- Skills in writing description, official letters and letters of application, proposals and formal

 technical reports.

**Course in detail**:

**Unit 1: Oral Communication (12 Hrs)**

A. Fundamental of effective speaking : posture, gesture, facial expression voice, eye contact,

 space distancing etc.

B. Group discussion on objects of general and technical interest.

C. Meetings

 a. Notice preparation

 b. Agenda preparation

 c. Minutes preparation

 d. Meeting conduction

 e. Writing minutes

D. Technical talk/ writing and presenting a seminar paper

 a. Writing complete manuscript for technical talk.

 b. Presenting technical talk based on manuscript.

**Unit 2: Reading: Intensive and Extensive (16Hrs)**

A. Intensive Reading**:**

 a. How to tackle intensive reading materials.

 b. Practicing on contextual grammar

 (i) preposition (ii) Voice (Active/Passive) (iii) Tense based practice

 c. Reading Techniques

 (i) Skinning (ii) Scanning (iii) Note Making

 (iv) Summary Writing (v) 4 levels

B. Extensive Reading:

 a. How to tackle extensive reading materials.

 b. Practicing extensive reading.

C. Reading

 i. ‘The mother of A Traitor’by maxim Gorky.

 ii. ‘A Tale’by B.P. Koirala.

 iii. ‘Who Was To Blame’ by Anton Chekhov.

 iv. ‘Marriage is A Private Affair’ by Chinua Achebe.

 v.‘ Keeping Errors At Bay’- By Butraned Russel.

**Unit 3: Writing (17 Hrs)**

A. Fundamental of effective writing. Unity,coherences, conciseness, clarity.

B. Description Writing. Mechanical, electrical or electronic objectives, tables, table graphs,

 charts, landscape, technical process

C. Letters

 a. Official letters

 i. standard letter formats.

 ii. Writing letters for asking and giving instruction, letters of request, apology

 and explanation, complaint and order

 b. Letter of application

 i. Standard format

 ii. Preparing Bio-data and resume

 iii. Writing letters of application

D. Proposal Writing

 a. Format of technical proposals.

 b. Writing technical proposals.

E. Technical Report Writing

 a. Format for technical reports

 b. Writing technical reports

F .a. Memo Writing

 b. Instrucitons-User’s Manual

Prescribed Books:

1.English for Engineers and Technologist

2.Orient Longman, Anna University, Chennai 1990, ( reading and language focus all and oral and writing as mentioned in the syllabus)

Reference Books:

1.Adhikari Usha,et,al. Communicative Skills in English, Research Training Unit,

 Department of Science and Humanities, Institute of Engineering, Pulchowk Campus 2002

2.“Technical Writing “, Sharon J. Gerson/Steven M. Gerson-Pearson Educaiton

3. Study Skills in English- Michal J. Wallacve.

4. A Communicative Grammar of Englsih –Leeach, G.& Savertink, j.

5. Oxford English Dictionary.

6. Developing Communication Skills- Krishna Mohan, Meena Baneifi

**BUILDING CONSTRUCTION**

**BEG 155CI**

 **Year: I Semester: II**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Teaching Schedule Hours/Week | Examination Scheme |  | Total Marks | Remarks |
| Final | Internal Assessments |  |  |
| Theory | Practical | Theory | Practical |
| L | P | T | Duration | Marks | Duration | Marks |  |  |
| 3 | - | 1 | 3 | 80 | - | - | 20 | - | 100 |  |

**1. Building Sciences (7 hrs)**

 1.1 Moisture and its movement through building components

 1.2 Condensation and its reasons

 1.3 Effects if moisture and condensation on building components and materials

 1.4 The use of vapour barriers and other damp proof courses in building

 1.5 Thermal properties on building components and materials

 1.6 Thermal insulation: thermal resistance and thermal capacity

 1.7 Acoustical properties of building materials: absorptive and reflective materials

 1.8 Noise control and constructional precaution to reduce noise

 1.9 Lighting: natural and artificial

 1.10 Energy conches design: renewable and non-renewable source of energy, active and

 passive methods of solar cooling and heating

**2. Foundations and Basements (4 hrs)**

 2.1 Some common problems with existing foundations

 2.2 Underpinning of foundation of existing building

 2.3 Shoring of existing buildings during foundation strengthening

 2.4 Retaining properties and waterproofing of basements

 2.5 Sealing of cracks in basements

**3. Roofs (3 hrs)**

 3.1 Single timber roofs: their types, comparative advantages and some construction details

 3.2 Double and triple roofs: situations for their use, their elements and construction details

 3.3 Roof coverings; tiles, slates, CCT sheets etc.

**4. Staircases (2 hrs)**

 4.1 Elements of staircase

 4.2 Types of staircases

 4.3 Relationship between rise and tread of a stair

**5. Doors and windows (3 hrs)**

 5.1 Doors parts: frame, shutter and their details

 5.2 Windows: types and details

 5.3 Ventilators types and details

**6. Joints (4 hrs)**

 6.1 Types of joints: construction and expansion joints

 6.2 The need for provision of joints

 6.3 Treatment and detailing of joints at the roof levels

 6.4 Treatment and detailing of joints at the floor levels

 6.5 Treatment of joints in external walls

**7. Temporary Construction (3 hrs)**

 7.1 Scaffolding: single and double scaffolds

 7.2 Formwork for excavations and trenches

 7.3 Formworks for reinforced concrete construction

 7.4 Shoring: horizontal, slant and vertical shores

**8. Cladding and external finishing (4 hrs)**

 8.1 Load bearing and non-load bearing cladding

 8.2 Brick facing

 8.3 Cladding in stone

 8.4 Cladding in concrete panels and their construction details

 8.5 Plastering

 8.6 Painting and important properties of the paint

**9. Internal finishing (2 hrs)**

 9.1 Non-load bearing partitions: types, functions and methods of connection to the

 surrounding structure

 9.2 Suspended Ceilings: types, functions and methods of construction

**10. Electrical services (2 hrs)**

 10.1 Residential and commercial requirements

 10.2 General principles

 10.3 Wiring systems

 10.4 Trunkings, busbars and ducts for electrical distribution

 10.5 Safety precautions

**11. Water Supply and Drainage services (5 hrs)**

 11.1 Generals principles

 11.2 Mains of water supply: storage and distribution system

 11.3 Hot water supply

 11.4 Drainage of sewage and waste

 11.5 Rainwater pipes and gutters

 11.6 Septic tanks

**12. Other miscellaneous services in buildings (4 hrs)**

 12.1 Lifts and escalators: general principles and practices

 Ventilation and heating systems: general principles and construction standards

 12.2 Telecommunication

 12.3 Air conditioning

**Tutorials:** Six assignments and two quizzes

**Textbooks:**

1. "Understanding Buildings", Reid, E., MIT Press
2. "Construction principles, Methods & Materials", Olin, H.B.
3. "Building Construction Illustrated", Ching, F.D.k.

**APPLIED MECHANICS II (DYNAMICS)**

**BEG157CI**

 **YEAR-I SEMESTER-II**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Teaching Schedule Hours/Week | Examination Scheme |  | Total Marks | Remarks |
| Final | Internal Assessments |  |  |
| Theory | Practical | Theory Marks | Practical Marks |  |  |
| L | P | T | Duration | Marks | Duration | Marks |  |  |  |  |
| 3 | - | 3 | 3 | 80 | - | - | 20 | - | 100 |  |

**1. Introduction to Dynamics 1 hrs**

 1.1 Definition, branches, importance of dynamics

**2. Rectilinear Motion of particles 3 hrs**

 2.1 Position, Velocity and Acceleration

 2.2 Determination of particles

 2.3 Uniform Rectangular Motion

 2.4 Uniformly Accelerated Rectilinear Motion

 2.5 Motion of several particles

 2.6 Graphical Solution of Rectilinear- Motion Problems

**3. Curvilinear Motion of particles 4 hrs**

 3.1 Position vector, velocity and Acceleration body

 3.2 Derivative of vector function

 3.3 Rectangular Components of Velocity and acceleration

 3.4 Motion relative to a frame in Translation

 3.5 Tangential and normal components

 3.6 Radial and Transverse Components

**4. Kinetics of particles: Newton's Second law 6 hrs**

 4.1 Newton's second law of Motion

 4.2 Linear Momentum and Rate of change

 4.3 System of units

 4.4 Equations of Motion and dynamic equilibrium

 4.5 Angular momentum and rate of change

 4.6 Equations of Motion-Radial and Transverse Components

 4.7 Motion due to a central force-Conservation of Momentum

 4.8 Newton's law of Gravitation

 4.9 Applications to Space Mechanics

**5. Kinetics of particles: Energy and Momentum methods 6 hrs**

 5.1 Work done by a force

 5.2 Kinetic energy of a particles

 5.3 Principles of Work and energy: Application

 5.4 Power and Efficiency

 5.5 Potential Energy

 5.6 Conservation of energy

 5.7 Principle of Impulse and Momentum

 5.8 Impulsive Motion and Impact

 5.9 Direct Central Impact

 5.10 Oblique Impact

**6.0 Systems of Particles 6 hrs**

 6.1 Newton's laws and a system of particles

 6.2 Linear and Angular Moment for a systems of particles

 6.3 Motion of the mass centre

 6.4 Conservation of momentum

 6.5 Kinetic energy of a system of particles

 6.6 Work energy principle; Conservation of Energy for a System of Particles

 6.7 Principle of Impulse and Momentum for a system of particles

 6.8 Steady stream of Particles, Systems with variable mass

**7.0 Kinematics of Rigid Bodies 7 hrs**

 7.1 Introduction

 7.2 Translation

 7.3 Rotation

 7.4 General Plane Motion

 7.5 Absolute and Relative Velocity in plane motion

 7.6 Instantaneous Centre of Rotation

 7.7 Absolute and Relative Frame; Coriolis acceleration in plane motion

 7.8 Rate of Change of a General Vector with Respect to a Rotating Frame; Coriolis

Acceleration

 7.9 Motion about a fixed point

 7.10 General motion

* 1. Three Dimensional Motion of a particle relative to a rotating frame: Coriolis

Acceleration

**8.0 Plane Motion of Rigid Bodies: Forces, Moments and Accelerations 4 hrs**

 8.1 Equations of motion for a rigid body

 8.2 Angular Momentum for a rigid Body in plane motion

 8.3 Plane motion of a rigid Body; D. Alembert's Principle

 8.4 Application of rigid Body Motion in the plane

 8.5 Constrained Motion in the Plane

**9.0 Plane Motion in rigid Bodies: Energy and Momentum methods 5 hrs**

 9.1 Principles of work and Energy for a rigid Body

 9.2 Work done by external forces

 9.3 Kinetic energy for a system

 9.4 Conservative and Non-conservative system

 9.5 Work-Energy Applications

 9.6 Impulse and Momentum for systems of rigid Bodies

 9.7 Conservation of Angular and Linear Momentum

 9.8 Impulsive motion and Eccentric Impact

**10.0 Mechanical vibrations 3 hrs**

* 1. Undraped free vibrations of particles and Rigid Bodies: Simple harmonic motion, frequency and period of Oscillation

 10.2 Steady Harmonic Forcing of Undraped Systems

**Tutorials**  12 Assignment and 12 Quizzes

**Textbook** "Engineering Mechanics -Static and Dynamic" Shames, P.H. 3rd Edition New

 Delhi, Prentice Hall of India,1990

**Reference** "Mechanics for Engineers- Static and Dynamic" E.P. Beer and F.R. Johnston,

 Jr. 4th Edition, McGraw-Hall, 1987.