

**GAYATRI VIDYA PARISHAD COLLEGE FOR DEGREE AND PG COURSES (A)**

Rushikonda, Visakhapatnam-530 045 | website: www.gvpdpgc.edu.in

(Approved by AICTE | Affiliated to Andhra University | Reaccredited by NAAC | ISO 9001:2015)

**ENGINEERING AND TECHNOLOGY PROGRAM**

**DEPARTMENT OF CIVIL ENGINEERING**

(Program Accredited by NBA)

(R22- With effect from 2022-23)

**I Semester (First year)**

Course code	Category	Course Title	Hours per week			Internal Marks	External Marks	Total Marks	Credits C
			L	T	P				
	BSC	Mathematics – I	3	0	0	30	70	100	3
	BSC	Physics	3	0	0	30	70	100	3
	ESC	Engineering Graphics	0	1	4	30	70	100	3
	ESC	Civil Engineering Materials and construction	3	0	0	30	70	100	3
	ESC	Computer Programming and Numerical Methods	3	0	0	30	70	100	3
	ESC	Workshop Lab	0	0	3	50	50	100	1.5
	BSC	Physics Lab	0	0	3	50	50	100	1.5
	ESC	Computer Programming and Numerical Methods Lab	0	0	3	50	50	100	1.5
<b>Total Credits</b>									<b>19.5</b>

**II Semester (First year)**

Course code	Category	Course Title	Hours per week			Internal Marks	External Marks	Total Marks	Credits C
			L	T	P				
	BSC	Mathematics – II	3	0	0	30	70	100	3
	BSC	Green Chemistry	3	0	0	30	70	100	3
	HSMC	English	3	0	0	30	70	100	3
	ESC	Engineering Mechanics	3	0	0	30	70	100	3
	PCC	Geomatics	3	0	0	30	70	100	3
	HSMC	English Language Lab	0	0	3	50	50	100	1.5
	BSC	Chemistry Lab	0	0	3	50	50	100	1.5
	ESC	Engineering Geology Lab	0	0	3	50	50	100	1.5
<b>Total Credits</b>									<b>19.5</b>

## CIVIL ENGINEERING MATERIALS AND CONSTRUCTION

Subject code:	Credits : 3
Instruction : 3 Lecture / week	Sessional Marks : 30
End Exam : 3 Hours	End Exam Marks : 70

### Course Objectives

The Objectives of this course are:

To introduce different building materials, their properties and uses.

To educate about manufacturing processes of materials and to increase ability to judge quality of materials by IS standards.

To impart knowledge on basic construction equipments and to encourage exploration of modern material innovations.

### Course Outcomes

At the end of the course the student should be able to:

CO1:Identify and recognize characteristics and uses of Timber, wood products and different masonry.

CO2:Demonstrate knowledge on Paints and Varnishes.

CO3:Demonstrate knowledge on Cement and steel.

CO4:Identify and recognize different types of aggregates and construction equipment

CO5:Describe and compare different types of flooring and roofing materials

### SYLLABUS:

#### UNIT-I

##### TIMBER AND MASONRY

**Timber:** Classification of common Indian trees and uses, mechanical properties, types of defects in wood and timber, methods of seasoning and their importance, felling and conversion, decay of timber, preservation methods; Classification of wood based products: Veneers, types of plywood, merits and demerits of plywood and laminated wood.

**Masonry:** Manufacturing of bricks, qualities of Bricks and tests as per IS code, Defects in bricks, transport and storage of bricks; Different types of Brick bonds, Plan, Elevation, Sections of brick and stone masonry (Ashlar and rubble masonry).

#### UNIT-II

##### PAINTS AND VARNISHES

**Paints:** Constituents and characteristics of paints, types of paint and their uses; Interior and exterior wall painting, doors and window painting process. Painting defects, causes and remedies.

**Varnishes:** constituents of varnishes, types and uses of varnishes and polishes.

#### UNIT-III

##### CEMENT AND STEEL

**Cement:** Wet and dry process of manufacturing Ordinary Portland cement (OPC), chemical composition and Hydration of cement, various field and laboratory tests on OPC as per IS code. Transport and Storage of Cement, special cements and admixtures.

**Steel:** Steel Making, Heat Treatment of Steel, Chemical Composition of Steel, Mechanical Properties of Steel, Advantages and Disadvantages of Steel.

#### **UNIT IV**

##### **AGGREGATES**

**Aggregates:** (coarse aggregates and fine aggregates): Classification IS specifications, Properties, Grading of aggregates, Various tests on coarse aggregates and fine aggregates. Quality of water for construction.

##### **Equipment and Construction:**

Classification of construction works, Construction stages, Construction Equipment: Scraper, Bulldozer, Mixer, Concrete Vibrator, Safety aspects of construction, Aesthetics and quality aspects of construction.

#### **UNIT V**

##### **FLOORING AND ROOFING MATERIALS**

Different types of tiles for roofing and flooring; Manufacturing of tiles, Materials used for flooring (Stone, tiles, terrazzo)

Types of roofs and their uses, types of materials used in roofing, types of trusses and Steel truss roofs for large spans.

##### **TEXTBOOKS**

1.S.C. Rangwala, "Engineering Materials", Charotar Publishing House, Anand, 1993.

2.N. Subramanian, "Building Materials Testing and Sustainability", Oxford University Press, New Delhi, 2019.

##### **REFERENCES**

1.S.K. Sharma, "Civil Engineering Construction Materials", KBP House, 2019.

2.S.K. Duggal, "Building Materials", Fourth Edition, New Age International Publishers, 2008.

3.B.C. Punmia, "Building Construction", Eleventh Edition, Laxmi Publications, 1984.

## ENGINEERING MECHANICS

<b>Subject code:</b>	<b>Credits : 3</b>
Instruction : 3 Lecture & 1 Tutorial / week	Sessional Marks : 30
End Exam : 3 Hours	End Exam Marks : 70

Pre-requisites: Engineering Mathematics, Engineering Physics.

### Course Learning Objectives:

The objective of this course is to:

1. To study and describe static equilibrium of particles and rigid bodies both in two dimensions and also in three dimensions.
2. To draw complete and correct free-body diagrams and write the appropriate equilibrium equations from the free-body diagram.
3. To determine the connection forces in trusses and in general frame structures, analyze systems that include frictional forces.
4. Locate the centroid of an area Calculate the second moment of an area.
5. To study Dynamic equilibrium of particles,rigid bodies. To learn about the laws of motion, kinematics of motion and their interrelationship

### Course Outcomes:

At the end of this course student will be able to:

- CO1: Determine the resultant forces, moment for a given system of forces and the ability to analyse and solve simple problems in mechanics.
- CO2: Calculate the motion characteristics of a body subjected to a given force system
- CO3: Analyze planar and spatial systems to determine the forces in members of trusses, frames and problems related to friction
- CO4: Determine the centroid and second moment of area
- CO5: Calculate the motion characteristics of a body subjected to a given force system

## SYLLABUS

### UNIT-I

#### BASIC CONCEPTS

Basic Concepts : Introduction to Engineering Mechanics – Scalar and Vector quantities – Forces – Characteristics of a force – Definitions and examples of various types of force systems – Definition of resultant – Composition and resolution of forces – Moment of a force – Principles of moments of force– Couples – characteristics of a couple – on Transformations of a couple – Resolution of a force into a force and couple. Resultants of Force Systems, Possible resultants of different types of force systems.

### UNIT-II

#### EQUILIBRIUM OF BODIES

Equilibrium: Free body diagrams – Equations of equilibrium for a concurrent coplanar force system – Equilibrium of Bodies acted on by two or three forces – Equilibrium of bodies acted on by non-concurrent coplanar force system – Equilibrium of bodies acted on by parallel, non-coplanar force system – Equilibrium of non-concurrent, non-coplanar non-parallel force system. Analysis of statically determinate trusses by (a) Method of joints and (b) Method of sections.

### **UNIT-III**

**FRICITION:** Nature of friction – Laws of friction – Coefficient of friction – Angle of friction – Cone of friction – Problems involving frictional forces

### **UNIT-IV**

**CENTROID AND CENTRE OF GRAVITY:** Centre of gravity of parallel forces in a plane – Centre of gravity of parallel forces in space – centroids and centers of gravity of Rectangular, Square, Triangle, Circle, Spandrel, composite bodies, Hollow sections, I-section, T-section, C-section, L-section and Z-section, – Theorems of Pappus.

### **MOMENT OF INERTIA**

Moments of Inertia, Definition – Parallel axis theorem for areas – Second moments of areas by integration – Radius of gyration of areas – Moments of inertia of composite areas – Parallel axis and parallel plane theorems for masses – Moments of inertia of masses by integration – Radius of gyration of mass – Moments of inertia of composite masses.

### **UNIT-V**

**KINEMATICS:** Absolute Motion : Introduction – Recapitulation of basic terminology of mechanics – Newton’s Laws – Introduction to Kinematics of Absolute Motion – Rectilinear motion of a particle – Angular motion of a line .

**KINETICS:** Introduction to Kinetics – Newton’s Laws of motion – Equation of motion for a particle. Motion of the mass center of a system of particles – D Alembert’s principle – Rectilinear translation of a rigid body –Work and Energy approach – Work done by a force – Work done by a couple – Work done by a force system – Energy: Potential energy – Kinetic energy of a particle – Kinetic energy of a rigid body – Principle of Work – energy and application to particle and rigid body in planar motion – Conservation of energy

#### **TEXT BOOKS:**

1. A.K.Tayal, “Engineering Mechanics Statics and Dynamics”, 14<sup>th</sup> Edition, Umesh Publication.
2. S.Singer,”Engineering Mechanics”, 13th Edition, BS Publications,2018.

#### **REFERENCES:**

1. S.Timoshenko and D.H.Young,”Engineering Mechanics”, 13<sup>th</sup> Edition, Tata Mcgrawhill, 2010.
2. J.L. Meriam, “Engineering Mechanics”, 18th Edition, John Wiley & Sons (Asia) Pvt.Ltd. 2018
3. S.Bhavikatti,”Engineering Mechanics”, 2nd Edition, New Age International Publishers.2018.
4. R.C.Hibbler,”Engineering Mechanics”,14th Edition, Pearson Publications,2015

## GEOMATICS

<b>Subject code:</b>	<b>Credits : 3</b>
Instruction : 3 Lectures /week	Sessional Marks : 30
End Exam : 3 Hours	End Exam Marks : 70

### Course Objectives:

The objective if the course is to:

1. Provide theoretical and practical exposure to measure the area by chaining.
2. Familiarize to measure the area and distance between the points by compass.
3. Impart the knowledge to measure the elevation of points and importance of counteracting.
4. Study the different techniques of measurements of distances, directions and elevations.
5. Learn about the principles involved in the advanced surveying instrument i.e Total Station.

### Course Outcomes:

At the end of the course the student will be able to:

CO1: Carry out preliminary surveying in the field of civil engineering applications such as structural, highway engineering

CO2: Students are able to calculate angular measurements using compass.

CO3: Understand the basics and elements of levelling.

CO4: Perform theodolite and tachometric surveying for distance and height measurements.

CO5: Invoke advanced surveying techniques such as total station and photogrammetry over conventional methods in the field of civil engineering.

## SYLLABUS

### UNIT I

Definition of Surveying, Overview of plane surveying (chain and compass), Objectives, Principles and Classifications.

#### Chain surveying:

Instrumentation for chaining – Errors due to incorrect chain-Errors in chaining-Tape corrections – Problems:

### UNIT II

**Compass Survey:** Introduction to compass survey Definitions of Bearing. True bearing, True meridian, Magnetic Meridian, Magnetic bearing – Arbitrary Meridian, R.B & B.B of lines – Designation of bearing – W.C.B. & R.B. – Conversion of bearings – from one systems to the other Related problems – Calculation of angles for bearings, Calculation of bearings for angles, Related problems – Theory of Magnetic compass (i.e. Prismatic compass) – Magnetic dip Description of Prismatic compass. Temporary adjustments of compass-Magnetic Declination – Local attraction-Related problems –Errors in compass survey.

**Traverse Surveying:** Chain and compass traversing-Free or loose needle method – Fast needle method-Checks in closed and open traverse-Plotting methods of traverse Survey-Closing error-Balancing the traverse-Bowditch’s method-Transit method, gale’s Traverse table.

### **UNIT III**

**Levelling:** Definitions of terms-Methods of levelling-Uses and adjustments of dumpy level Temporary and permanent adjustments of dumpy level levelling staves-Differential levelling, Profile levelling-Cross sections-Reciprocal levelling. Precise levelling-Definition of BS, IS, FS, HI, TP-Booking and reduction of levels, H.I. methods-Rise and fall method-Checks-Related problems-Curvature and refraction Related Problems-Correction-Reciprocal levelling-Related problems-L.S & C.S Leveling-Problems in levelling-Errors in levelling.

**Contouring:** Definitions-Interval, Characteristics of contours-methods of locating contours Direct and indirect methods -Contour gradient-Uses of contour maps.

### **UNIT IV**

**Theodolite**-Types of theodolites – Temporary Adjustments, Measurements of horizontal angle – Method of repetition, Method of reiteration – Uses of theodolites – Errors in theodolite or Permanent adjustments of a theodolite – Identification – Rectifying the errors. Theodolite traversing

**Tacheometry** – Principle of tachometry – Stadia methods – Fixed hair method – Movable hair method – Tangential method, Triangulation – Classification-intervisibility of station- Signals and towers-base line measurements

### **UNIT V**

**Total Station Surveying:** Electronic Theodolite, Electronic Distance Measurements, Total Station, Errors in measurements, Advantages, Disadvantages, Applications; Contour mapping, determination of height of remote point, position of hidden point, free station, Area measurement, volume measurement.

### **PHOTOGRAMMETRY SURVEYING:**

Introduction, Basic concepts on maps and aerial photographs

### **TEXT BOOKS**

1. S K Duggal, “*Surveying*” (Vol - 1&2), 10th Edition, Tata McGraw Hill Publishing Co.Ltd. New Delhi, 2004.
2. B.C.Punmia, Ashok Kumar Jain, Arun Kumar Jain, “*Surveying*” (Vol - 1,2&3), 18th Edition, Laxmi Publications (P) Ltd., New Delhi, 2011.

### **REFERENCES:**

- 1.K R Arora ,“*Surveying*” (Vol - 1,2&3), 9th Edition, Standard Book House, New Delhi,2008.
2. C.Venkatramaiah,“*Surveying*”, 2nd edition, Universities Press (India) Private Ltd., 2011.
3. N N Basak, “*Surveying & Levelling*”, 16th Edition, McGraw Hill Education (India) Private Ltd., New Delhi, 2015.