OBJECTIVES:

To understand numerous types of map and its preparation with scale. Introduction to land surveying.

COURSE CONTENT / SYLLABUS

UNIT - 1. INTRODUCTION
Definition of Surveying, Purpose of Engineering survey, Principles of surveying. 1 hrs.

UNIT - 2. SCALES
Representative Fraction (R.F), Plain scale, Diagonal scale, Vernier scale, Construction of scales. 7 hrs.

UNIT - 3. CHAIN & TAPE SURVEY:
Types of chains and Tapes, Ranging Methods, Direct Ranging, Indirect Ranging (Reciprocal Ranging), Chaining on plane and sloping ground, Obstacles in Chaining, Offsetting, Types of offsets, Instruments used to take offsets such as optical square, Cross Staff, etc, Recording a field book, Tie line, Check line, Base line. 13 hrs.

UNIT - 4. COMPASS SURVEY
Prismatic Compass, Component Parts, Temporary Adjustments, Meridian, Magnetic Meridian, True Meridian, Bearing, True Bearing, Magnetic Bearing, Fore Bearing and Back Bearing, Local attraction and Examples base on local attraction, Computation of included angles, Compass Traverse Survey, Close and Open Traverse Survey, Establishment of survey stations, Procedure of Traverse Survey, Recording a field book, Closing error and Method of Adjusting Traverse 13 hrs.

UNIT - 5. LEVELING AND CONTOURING:
Terms used in Leveling, Types of Leveling Instruments, Dumpy Level, Tilting Level, Quick Set Level, Auto Set Level, Digital Level, Temporary Adjustments of Level, Recording Level Book, Computation of Reduced Levels, H.I. Method, Rise and Fall Method, Comparison between H.I. Method and Rise & Fall Method, Methods of Leveling, Fly Leveling, Reciprocal Leveling, Barometric Leveling, Hypsometry, Profile Leveling, Check Leveling, Differential Leveling Errors and Precautions in Leveling, Effects of Curvature and Refraction, Permanent Adjustments of Dumpy Level, Contouring, Definitions and Characteristics, Direct and Indirect Methods of Contour Survey, Methods of Interpolation of Contours, Uses of Contour Maps. 26 hrs.

PROJECTS AND FIELD WORK

(A) FIELD SURVEY PRACTICES AND PROJECT

1) Introduction to use of survey instruments on field
2) Ranging and Chaining of a survey lines.
3) Prismatic Compass: Component parts, Temporary Adjustment, Reading Bearings and Computation of included angles, local attraction and correction of Bearings.
4) Chain and Compass Survey Project.
5) Planimeter: Names, Function of different parts, Computation of areas of irregular figure with anchor point inside and outside.

7) Road Survey Project.

<table>
<thead>
<tr>
<th>Term work</th>
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</thead>
<tbody>
<tr>
<td>Sheet No 1: - Conventional Signs and Symbols, Scales, Plain Scale, Diagonal Scale, Vernier Scale.</td>
</tr>
<tr>
<td>Sheet No 2: - Chain and Compass Survey Project.</td>
</tr>
<tr>
<td>Sheet No 3: - Road Survey Project</td>
</tr>
</tbody>
</table>

**REFERENCES**

1) Surveying and Leveling by T.P.Kanitker, S.V.Kulkarni
2) Surveying and Leveling by N.N. Basak.
3) Textbook of Surveying by S.K. HUSAIN, M.S.NAGARAJ
4) Surveying (Volume-I) by Dr.K.R.ARORA
5) Plane and Geodetic Survey (Volume-I) by David Clark.
<table>
<thead>
<tr>
<th>UNIT - I</th>
<th>Heat and Thermodynamics</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Temperature and zeroth law of thermodynamics, heat and work, specific heat capacity and latent heat, first and second laws of thermodynamics, heat engine and its efficiency, entropy and its non-conservation</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>UNIT - II</th>
<th>Properties of Matter</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Surface tension, molecular force, cohesive and adhesive force, molecular range, definition of surface tension, angle of contact, surface tension through capillary rise method, Viscosity; Fluid friction, viscous force, definition of viscosity, coefficient of viscosity, stokes' law, Fluid flow, equation of continuity, Bernoulli's theorem and its applications</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>UNIT - III</th>
<th>Optics</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Light as a wave and its characteristics, equation of a plane progressive wave, Interference of light, principle of superposition, young’s double-slit experiment, constructive and destructive interference, diffraction of light, types of diffraction, diffraction through grating, polarization, types of polarization, Brewster’s law and Malus’ law, applications</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>UNIT - IV</th>
<th>Modern Physics</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Black-body radiation, Planck's constant, Photoelectric effect: Einstein’s equation, application of photoelectric effect, X-rays their production, properties and applications, LASERS:-properties and applications, types of LASER, Fibre optics and its applications, Superconductivity-idea of superconductors, Properties of superconductors, Meissner effect; perfect diamagnetism, critical temperature, high Tc superconductors and their applications</td>
</tr>
</tbody>
</table>
UNIT - V

Engineering Applications of Physical Science
Radioactivity:-Types of radioactivity, units of radioactivity, properties of α, β and γ radiations, Application of radioactivity; radioisotopes, energy generation and other applications Non-Destructive Testing; Ultrasonic Testing(UT), Radiography testing

REFERENCE


Laboratory exercises for first and second semester
1. Use of vernier calipers
2. Use of micrometer screw
3. Measurement of acceleration due to gravity using simple pendulum
4. Measurement of Viscosity by Stokes Law
5. Measurement of Velocity of Sound by Resonance tube
7. Experiment on Photoelectric effect
8. Ohm’s Law and Laws of series & parallel
9. Wheatstone bridge (Measurement of low resistance)
10. Variation of magnetic field of a coil
11. Tangent Galvanometer
12. Voltage current characteristics of a P-N Jn. diode
13. ‘F’ of Convex Lens by displacement method
14. ‘F’ of Concave mirror
15. Magnetic moment of a bar magnet
16. Determination of surface tension using capillary rise method
17. Determination of angle of prism using spectrometer
18. Newton’s Rings
19. Latent heat of Ice
20. Study of thermo emf
21. Demonstration of interference and diffraction using LASER
22. Measurement of Refractive index of prism using spectrometer
23. Determine the coefficient of static friction
24. Determination of force constant of a spring
25. Malus’ law of polarization
The Maharaja Sayajirao University of Baroda  
College of Polytechnic,  
Department of Civil Engineering,  
Nr. Shastri Bridge, P.O. Fatehgunj, Vadodara 390 002., 02652783915,  
head-polyced@msubaroda.ac.in

**DIPLOMA IN CIVIL ENGINEERING**: <<Regular>>

<table>
<thead>
<tr>
<th>YEAR</th>
<th>FY</th>
<th>PAPER (UA+IA)</th>
<th>T.W. INCL. VIVA</th>
<th>HOURS (LECT.)</th>
<th>HOURS (LAB)</th>
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</thead>
<tbody>
<tr>
<td>Semester</td>
<td>II</td>
<td>APM3204:ENGINEERING MECHANICS – II</td>
<td>100</td>
<td>25</td>
<td>3/WEEK</td>
</tr>
</tbody>
</table>

Objectives: To learn and apply Principles of Engineering Mechanics in the various field of Engineering

Employability/Entrepreneurship/Skill development Aspects: The course will create skill development in analysis of various engineering problems.

Course Outcome: At the end of the course, the learner will be able to apply Principles of Engineering Mechanics in the various field of Engineering

**COURSE CONTENT / SYLLABUS**

**Unit - 1.** INTRODUCTION  
Dynamics, Kinematics and kinetics. Types of plane motion and their inter-relations.  
01

**Unit - 2.** RECTILINEAR MOTION  
Concept of trajectory displacement, speed velocity and acceleration. Addition and subtraction of velocity as a vector, combined motion and resultant motion, velocity time diagram and its application, basic equation of motion and simple problems.  
06 hrs

**Unit - 3.** MOTION UNDER GRAVITY  
Along straight trajectory and parabolic path, projectile in motion, range, time flight etc., and simple problems.  
04 hrs

**Unit - 4.** ROTATION MOTION  
04 hrs
<table>
<thead>
<tr>
<th>Unit</th>
<th>Topic</th>
<th>Description</th>
<th>Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>Angular motion</td>
<td>Angular motion, angular displacement, angular velocity, relation between angular motion and rectilinear motion, radial and tangential acceleration and their relations.</td>
<td>06 hrs</td>
</tr>
<tr>
<td>6</td>
<td>KINETICS</td>
<td>Basic laws of motion, relation between force, mass and acceleration. Motion along rough planes. Tension in ropes and string. Momentum and conservation of momentum.</td>
<td>06 hrs</td>
</tr>
<tr>
<td>7</td>
<td>CIRCULAR MOTION</td>
<td>Centripetal acceleration, centripetal and centrifugal force, super elevation condition for overturning and skidding.</td>
<td>06 hrs</td>
</tr>
<tr>
<td>7</td>
<td>WORK POWER AND ENERGY</td>
<td>Concept of work due to a tangential force and an inclined force, graphical representation of work and indicator diagram, constant force and varying force, units of work. Power and its units, I.H.P., B.H.P., Energy, Potential energy, Kinetic energy, Conservation of energy.</td>
<td>04 hrs</td>
</tr>
<tr>
<td>8</td>
<td>POWER TRANSMISSION AND MODES OF TRANSMISSION</td>
<td>Individual drive and group drive, transmission number and speed ratio, belt and pulley drive, driver, follower and idler, cross and open belt transmission, length of belt, belt slips and its consideration, centrifugal tension, gear transmission, various types of gears used, gear train, addendum and addendum circles, spur gear design.</td>
<td>06 hrs</td>
</tr>
<tr>
<td>9</td>
<td>LIFTING MACHINES</td>
<td>Machine, mechanism, mechanical advantage, velocity, rotation and mechanical efficiency of a machine, frictional losses, condition for irreversibility, law of machine, maximum mechanical advantage and maximum efficiency, various types of lifting machines and their velocity ratio.</td>
<td>08 hrs</td>
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<td>TERM WORK</td>
<td>Students will be required to submit term work based on the course content of the subject.</td>
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<td>REFERENCES</td>
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<tr>
<td>1</td>
<td>Applied Mechanics by Dhadhe Jamdar and Waghmare</td>
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<tr>
<td>2</td>
<td>Applied Mechanics by S. B. Junnarkar</td>
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</tbody>
</table>
## OBJECTIVES:
- To create a firm foundation in the fundamentals and applications of scientific theories.
- To develop basic knowledge of Organic Chemistry.
- To help students in understanding engineering subjects.

## COURSE CONTENT / SYLLABUS

<table>
<thead>
<tr>
<th>UNIT</th>
<th>COURSE CONTENT</th>
<th>HOURS</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>UNIT-II</strong></td>
<td><strong>Plastic and Rubber:</strong> Monomer, Polymer, Polymerisation, Formation of plastics, Thermosetting, And thermoplastic, Polystyrene, Nylon, Synthetic rubbers, Vulcanization Properties and use of plastics.</td>
<td>4 hrs.</td>
</tr>
<tr>
<td><strong>UNIT-III</strong></td>
<td><strong>Fuel</strong> Fuel, Essential properties of fuels, Classification of fuels, Natural and prepared fuels, Types of coal, Coke, Petroleum, Producer gas, water gas, Coal gas, oil gas.</td>
<td>4 hrs.</td>
</tr>
<tr>
<td><strong>UNIT-IV</strong></td>
<td><strong>Corrosion and Protection of Metals:</strong> Corrosion, Mechanism of corrosion, Direct chemical process, Electrochemical Process, Galvanic cell, and concentration cell action, pitting corrosion, Corrosion of iron and aluminium protection from corrosion.</td>
<td>4 hrs.</td>
</tr>
<tr>
<td><strong>UNIT-V</strong></td>
<td><strong>Paints and Varnishes:</strong> Paints, Constituents of paints and their functions, Drying oils Pigments, Extenders, Thinners, Plasticizer, Varnishes, Enamel lacquers, Distempers, Defects in paint films</td>
<td>4 Hrs</td>
</tr>
<tr>
<td><strong>UNIT-VI</strong></td>
<td><strong>Lubricants:</strong> Frictional resistance, Lubricants, Properties of lubricants, Classification of lubricants, Lubricating oils, Additives, Synthetic lubricants, Semi-solid lubricants (Greases) solid lubricants, Cutting Oils.</td>
<td>4 Hrs</td>
</tr>
<tr>
<td><strong>UNIT-VII</strong></td>
<td><strong>Catalysis:</strong> Catalyst, catalysis, Types of catalysis, Characteristics of catalytic action, Theories of catalysis, industrial applications</td>
<td>4 Hrs</td>
</tr>
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<td>REFERENCES</td>
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</tr>
<tr>
<td>1. Polytechnic Chemistry by V.P.Mehta</td>
<td></td>
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<tr>
<td>3. Inorganic Chemistry by P.L.Soni</td>
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</tbody>
</table>
## SECOND SEMESTER OF F.Y. D. CIVIL: DIPLOMA

### APPLIED MATHEMATICS - II

<table>
<thead>
<tr>
<th>Scheme</th>
<th>4 Hrs/Week</th>
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</thead>
<tbody>
<tr>
<td>Tutorial</td>
<td>1 Hrs/Week</td>
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</tbody>
</table>

### SYLLABUS

#### UNIT-I
**Determinants**
- Equation of second and third order determinants, Properties, Minor and cofactors, solution of simultaneous linear equations in two and three unknowns, Consistency condition

**Matrices**
- Definition and operation, Transpose, adjoint and Inverse of a matrix, solution of simultaneous linear equations in two and three unknowns.

**Vector Algebra**

**UNIT-II**
**Indefinite Integrals**
- Standard formulae, Integration by substitution, Integration by Algebraic functions, Integration by parts, Trigonometric substitutions, Integration by the method of partial fractions

**UNIT-III**
**Definite Integration**
- Definite Integrals : Definition, Definite Integrals as the limit of a sum, fundamental theorem of integral calculus, properties of definite integrals

**UNIT-IV**
**Application of Integration:**
- Area under the curve, Volume of revolution, Approximate integrations (Simpson’s rule, Trapezoidal rule), Center of gravity of plane regions, Length of Arc (Length of a Plane curve), The area of a surface of revolution.

### UNIT-V
**Statistics:**
- Grouped and Ungrouped Data, Frequency Distribution table, Measure of Central tendency: Mean, Median and Mode, Measure of Dispersion : Mean deviation, standard deviation and variance. Correlation, Linear regression.

### UNIT-VI
**Probability:**

### REFERENCES

1. Applied Mathematics Semester III (Common to all branches) by G.V. Kumbhojkar, Mrs. R.P. Kumbhojkar, Phadke Prakashan, Kolhapur. (14th Edition)
2. Engineering Mathematics Semester II (Civil, Mechanical, Chemical, Electrical and Electronics Group) by G.V. Kumbhojkar, Mrs. R.P. Kumbhojkar, Phadke Prakashan, Kolhapur. (1st Edition)
4. Mathematics for Polytechnic students, Semester 3, by S. P. Deshpande, Pune Vidyarthi Gruha Prakashan. (For Diploma Students).
OBJECTIVES: English language has become a dire need to deal successfully in the globalized and competitive market and hence this course aims at developing the functional and communicative abilities of the students in English. Proficiency in English is one of the basic needs of technical students. A technician has to communicate all the time with peers, superiors, subordinates and clients in his professional life. Hence this course aims at developing and enhancing speaking, reading and writing skills of the students, in English with the ultimate goal of enabling them to perform adequately and usefully in real life situations.

COURSE CONTENT / SYLLABUS

UNIT-I
STRENGTHENING GRAMMAR AND ENHANCING VOCABULARY
Voice, Framing Questions, Negatives, Degrees of Comparison, Confusing pair of words, Error analysis

UNIT-II
DEVELOPING READING SKILLS
Note making
Identifying important information in written texts
Making notes in point format

UNIT-III
DEVELOPING WRITING SKILLS
Information transfer and interpretation of Visual or verbal information
Investigative report
Writing Job Application and Resume
Formal Letters and E-Mails
Letter Placing Order- Placing order for product with particular specifications
Letter of Complaint- Complaining about product or services

UNIT-IV
CONSOLIDATING SPEAKING SKILLS
Oral Presentation
Interview Techniques and Group Discussion
<table>
<thead>
<tr>
<th></th>
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