Shri Swami Vivekanand Shikshan Sanstha's
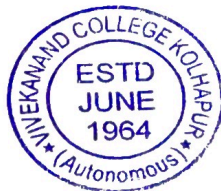# Vivekanand College, Kolhapur (Autonomous)

DEPARTMENT OF PHYSICS

B.Sc. Part - I
Semester-I & II

SYLLABUS

Under Choice Based Credit System

to be implemented from Academic Year 2021-22

B. Sc. Part – I CBCS
Semester - I Paper- I
MECHANICS (DSC -1001 A)

Theory: 60 Hours (75 lectures of 48 minutes)   **Credits -4**

Course Outcomes: After the completion of the course the student will be able to -

CO_1: Demonstrate and understand the basic primary knowledge of Mechanics theories in Physics and develop the critical skill in students to understand mechanics.
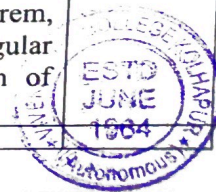
CO_2 demonstrate a proficiency in solving problems in Vectors, Ordinary Differential Equations, basic concepts of dot product, cross product, Ordinary Differential Equations, laws of motion, rotational motion, momentum and energy etc.

CO_3 demonstrate a proficiency in solving problems in Elasticity, gravitation, oscillation, Differential equation of Simple harmonic motion, special theory of relativity etc.

CO_4: Understand the basic concepts of elastic constants, gravitation and Kepler's laws, Simple harmonic motion, etc.

Section-I: Mechanics I

| Unit	Syllabus	Lectures
Unit 1	**Vectors:** Vector algebra : Definition of vector, polar vectors and axial vectors, addition of vectors, rectangular resolution of vectors, unit vector (def), position vector of a point, product of two vector, scalar and vector products- scalar or dot products and its geometrical interpretation, work done as a scalar product, Vector or cross product and their useful results, area of parallelogram, moment of force, angular velocity, Scalar triple product, Vector triple product and its geometrical interpretation, problems, Derivative of a vector with respect to a parameter	4
Unit 2	**Ordinary Differential Equations:** Differential Equation: Ordinary and Partial differential Equations,1st order homogeneous differential equations,2nd order homogeneous differential equations with constants coefficients, examples	6
Unit 3	**1. Laws of motion:** Introduction, Definition of translational and rotational motion, force and torque, Frames of reference - Inertial and Non-inertial frame with examples, Coordinate system-concept of Cartesian, Polar, Cylindrical ,and Spherical . Newton laws of motion and their proof **2. Rotational motion:** Rotational variables- Angular position, Angular displacement, Angular velocity, Angular acceleration, System of particle- Centre of mass, Moment of inertia (In short), Torque	14
Unit 4	**Momentum and Energy:** Introduction to mechanics, Mechanics of particle - Conservation of linear and Angular momentum (Single particle), Work - Energy theorem, Mechanics of system of particles- Conservation of linear and angular momentum for a system of particle, Energy conservation, Motion of rockets	6

Section-II: Mechanics II

Unit	Syllabus	Lectures
Unit 1	**1. Gravitation:** Newton's Law of Gravitation, Motion of a particle in a central force field (motion in a plane, angular momentum is conserved, areal velocity is constant), Kepler's Laws (statement only), Satellite in circular orbit and applications, Geosynchronous orbits, Weightlessness, Basic idea of global positioning system (GPS). **2. Oscillations:** Simple harmonic motion, Differential equation of SHM and its solutions, Kinetic and Potential Energy, Total Energy and their time averages, Damped oscillations, Forced oscillations.	15
Unit 2	**1. Elasticity:** Bending of beam, Bending moment, Cantilever (without considering weight of cantilever), Beam supported at both the ends (without considering weight of beam). Torsional oscillation, Work done in twisting a wire, Twisting couple on a cylinder: Torsional pendulum-Determination of Rigidity modulus and moment of inertia , Determination of Y, η and σ by Searles method **2. Special theory of relativity:** Introduction - Michelson Morley Experiment, Postulates of theory of relativity - Galilean, Lorentz Transformation, Application of Lorentz transformation- Loss of simultansity, Length contraction, Time dilation, Relativistic addition of velocities	15

Reference Books:
1. University Physics. FW Sears, MW Zemansky and HD Young13/e, 1986. Addison- Wesley
2. Mechanics Berkeley Physics course,v.1: Charles Kittel, et. Al. 2007, Tata McGraw- Hill.
3. Physics – Resnick, Halliday & Walker 9/e, 2010, Wiley eastern Ltd, New Delhi.
4. Engineering Mechanics, Basudeb Bhattacharya, 2nd edn., 2015, Oxford University Press
5. University Physics, Ronald Lane Reese, 2003, Thomson Brooks/Cole.
6. Physics – S.G. Starling and Woodal Longmams and Green Co. Ltd.
7. Elements of properties of matter – D.S. Mathur, Shamlal Charitable trust New Delhi.
8. A text Book of properties of matter–N.S. Khare and S. Kumar. Atmaram and sons New Delhi.
9. Concepts of Physics –Vol.1 H.C. Verma -Bharati Bhavan Publishers.

VIVEKANAND COLLEGE KOLHAPUR
ESTD JUNE 1964
(Autonomous)
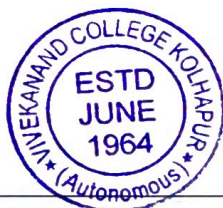
B. Sc. Part – I CBCS

Semester - II Paper- II

Electricity, Magnetism and Electromagnetic Theory (DSC -1001 B)

Theory: 60 Hours (75 lectures of 48 minutes)   **Credits -4**

Course Outcomes: After the completion of the course the student will be able to -

CO_1: Demonstrate and understand the basic primary knowledge of Electricity, Magnetism and Electromagnetic Theory and will demonstrate a proficiency in solving problems in Thevenin's theorem, and Norton's theorem, magnetism, electrostatics etc.
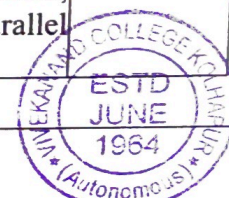
CO_2: Understand the basic concepts of Ballistic galvanometer, networks theorem, magnetostatics and electrostatics, electricity, and magnetism etc.

CO_3: get proficiency in solving problems in gradient, divergence, Curl and their significance, Vector Integration, Line, surface and volume integrals of Vector fields, Maxwell's equations, and Electromagnetic wave propagation.

CO_4: Understand the basic concepts of gradient, divergence, Curl and their significance, Gauss-divergence theorem and Stoke's theorem of vectors, Electromagnetic Induction, Maxwell's equations, and Electromagnetic wave propagation etc.

Section-I: Electricity, Magnetism and Electromagnetic Theory I

Unit	Syllabus	Lectures
Unit 1	**Electricity:** Direct current : Theory Of Ballistic Galvanometer (B.G.) and constants of B.G., Varying currents,(LR.RC.LC circuit) Growth and decay of currents, Importance of time constants T	5
Unit 2	**Network Theorems:** Source representation, Ohm's law, KVL, KCL, Thevenin's theorem, and Nortan's theorem **A.C. Circuits:** Complex numbers and their application in solving a. c. series LCR circuit, complex impedance, Reactance, Admittance, and Susceptance, Resonance in LCR series circuit, Sharpness of resonance (qualitative treatment only), Q-factor (definition only) A.C. Bridge - Owen's Bridge	6
Unit 3	**Magnetism:** Magnetostatics: Biot-Savart's law & its applications- straight conductor, circular coil, solenoid carrying current, Divergence and curl of magnetic field, Magnetic vector potential, Ampere's circuital law, Magnetic properties of materials: Magnetic intensity, magnetic induction, permeability, magnetic susceptibility, Brief introduction of dia-, para- and ferro-magnetic materials.	6
Unit 4	**Electrostatics:** Electrostatic Field, electric flux, Gauss's theorem of electrostatics, Electric potential as line integral of electric field, potential due to a point charge, electric dipole, uniformly charged spherical shell and solid sphere, Calculation of electric field from potential, Capacitance of an isolated spherical conductor, parallel plate, spherical and cylindrical condenser, Energy per unit volume in electrostatic field, Dielectric medium, Polarization, Displacement vector, Gauss's theorem in dielectrics, Parallel plate capacitor completely filled with dielectric.	13

Section-II: Electricity, Magnetism and Electromagnetic Theory II

Unit	Syllabus	Lectures
Unit 1	**Vector Analysis:** Scalar and Vector product, gradient, divergence, Curl and their significance, Vector Integration, Line, surface and volume integrals of Vector fields, Gauss-divergence theorem and Stoke's theorem of vectors (statement only).	15
Unit 2	**1. Electromagnetic Induction:** Faraday's laws of electromagnetic induction, Lenz's law, self and mutual inductance, L of single coil, M of two coils, Energy stored in magnetic field. **2. Maxwell's equations and Electromagnetic wave propagation:** Equation of continuity of current, Displacement current, Maxwell's equations, Poynting vector, energy density in electromagnetic field, electromagnetic wave propagation through vacuum and isotropic dielectric medium, transverse nature of EM waves, polarization.	15

Reference Books:

1. Electricity and Magnetism, Edward M. Purcell, 1986, McGraw-Hill Education.

2. Electricity and Magnetism, J.H. Fewkes & J. Yarwood. Vol. I, 1991, Oxford Univ. Press.

3. Electricity and Magnetism, D C Tayal, 1988, Himalaya Publishing House.

4. University Physics, Ronald Isane Reese, 2003, Thomson Brooks/Cole.

5. D.J. Griffiths, Introduction to Electrodynamics, 3rd Edn, 1998, Benjamin Cummings.

6. Electricity and Magnetism – Khare and Shrivastav.

7. Foundations of Electromagnetic Theory – Rritz and Milford.

8. University Physics 9th edition – Young and Freedman.

9. Concepts of Physics Vol-2 H. C. Verma

PHYSICS LAB(I) : DSC -1001A(pr)
Semester: I
MECHANICS
60 Hours - Credits -2

1. Measurements of length (or diameter) using Vernier calliper, screw gauge Spherometer and travelling microscope.
2. To determine the Moment of Inertia of a Flywheel.
3. To determine the Moment of inertia of a disc using auxiliary annular ring.
4. Young's modulus of material of Bar by vibration.
5. Modulus of rigidity of material of wire by torsional oscillations
6. Y/η of Wire by Searle's method.
7. To determine g by Bar Pendulum.
8. To determine g by Kater's Pendulum.
9. Poission ratio for rubber using rubber tube.
10. To study the Motion of a Spring and calculate (a) Spring Constant (b) Value of g.
11. Amplitude Decay

PHYSICS LAB(II) : DSC -1001B (pr)
Semester: II
ELECTRICITY ,MAGNETISM AND ELECTROMAGNETIC THEORY
60 Hours- Credits -2

1. To use a Multimeter for measuring (a) Resistances, (b) AC and DC Voltages, (c) Checking electrical fuses and Contnuity..
2. Measurement of constants of B. G.
3. Determine a high resistance by Leakage Method.
4. To compare capacitances using De'Sauty's bridge.
5. Measurement of field strength B and its variation in a Solenoid (Determine dB/dx).
6. Impedance of series LCR circuit.
7. To study the a series LCR circuit and determine its (a) Resonant Frequency, (b) Quality Factor.
8. 7. To study a parallel LCR circuit and determine its (a) Anti-resonant frequency and (b) Quality factor Q.
9. Frequency of A. C. mains by sonometer.
10. To verify the Thevenin / Norton theorem.

Reference Books

1. Advanced Practical Physics for students, B.L.Flint & H.T.Worsnop, 1971, Asia Publishing House.
2. A Text Book of Practical Physics, Indu Prakash and Ramakrishna, 11th Edition, 2011, Kitab Mahal, New Delhi.
3. Advanced level Physics Practicals, Michael Nelson and Jon M. Ogborn, 4th Edition, reprinted 1985, Heinemann Educational Publishers
4. College Practical Physics – Khanna and Gulati (S. Chand and Co. Ltd, Delhi).
5. Practical Physics – Gupta and Kumar (Pragati Prakation Meerat)
6. Advanced Level Practical Physics – J.M. Nelcon, J.M. Ogloom (EIBS).
7. A Text Book of Practical Physics - Shrinivasan and Balasubramanyam.
8. Engineering Practical Physics- S.Panigrahi & B.Mallick,2015, Cengage Learning India Pvt. Ltd.

New course structure to be implemented after sanction(Draft)
For B.Sc./BCA/B.Sc.Computer science (Entire)

| Sr. No. | Internal Examination DSC Course | | | | Total (a+b+c+d) | Conversion of 80 marks in Total (I) (e) | SEE (Semester End Examination) DSC Course | | Total (II) (f+g) = h | Total (I and II) (e+h) = i |
	Part -I (Two tests each of 10 marks (a))	Part - II (Two tests each of 10 marks) (b)	Home assignment Part-I (c)	Home assignment Part-II(d)			Part -I (f)	Part -II (g)		
1	20	20	20	20	80	20	40	40	80	100
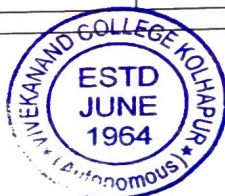
## Nature of Internal and SEE(Semester End Examination)Examination

1. For internal examination, there shall be two tests (online/offline) of ten marks andone home assignment of 20 marks for each part per semester.

2. For internal examination there shall be conversion of 80 marks in 20 marks and forpassing **7** marks is required out of **20**.

3. For SEE (Semester End Examination), there shall be two parts (Part I and Part II) ofeach DSC course per semester, each of 40 marks.

4. There shall be combined passing for SEE (Semester End Examination) of Part I andPart II i.e. **20** marks is required out of **80**.

5. There shall be separate passing is mandatory for both internal and SEE (SemesterEnd Examination).

Practical Examination B.Sc.I (as per BoS guidelines)

Sr.No.	Lab work	Journal (Punctuality, Neatness)	Attendance, and participation in the practical's, motivation	Total
1	40	5	5	50

EVALUATION PATTERN
Scheme of Marking (Theory)

Sem.	DSC	Marks	Evaluation	Sections	Answer Books	Standard of passing
I	DSC1001A	80	Semester wise	Two sections each of 40 marks	As per Instruction	35% (28 marks).
II	DSC1001 B	80	Semester wise	Two sections each of 40 marks	As per Instruction	35% (28marks)
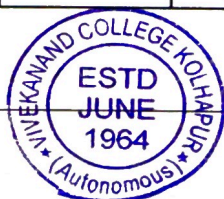
SCHEME OF MARKING (CIE) Continuous Internal Evaluation

Sem.	DSC	Marks	Evaluation	Sections	Answer Books	Standard of passing
I	DSC1001 A	20	Concurrent	-	As per Instruction	35% (7 marks)
II	DSC1001 B	20	Concurrent	-	As per Instruction	35% (7 marks)

SCHEME OF MARKING (PRACTICAL)

Sem.	DSC	Marks	Evaluation	Sections	Standard of passing
I AND II	DSC1001 A(pr)	50	Annual	As per Instruction	35% (18 marks)
	DSC1001 B(pr)				

Nature of Question Paper

Instructions: *1) All the questions are **compulsory**.*
*2) Answers to the two sections should be written in **same** answer book.*
*3) Figures to the right indicate **full** marks.*
*4) Draw neat labeled diagrams **wherever** necessary.*
5) Use of log table/calculator is allowed.

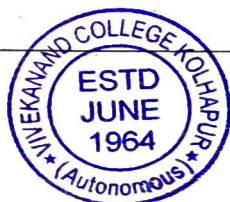**Time : 3 hours**   **Total Marks: 80**

SECTION-I

Q.1. Choose correct alternative.   8

   i)

   A)   B)   C)   D)
   ii)

   A)   B)   C)   D)
   iii)

   A)   B)   C)   D)
   iv)

   A)   B)   C)   D)
   v)

   A)   B)   C)   D)
   vi)

   A)   B)   C)   D)
   vii)

A)   B)   C)   D)

viii)

A)   B)   C)   D)

Q.2. Attempt any two.   16

    A)
    B)
    C)

Q.3. Attempt any four.   16

    a)
    b)
    c)
    d)
    e)

SECTION-II

Q.1 Choose correct alternative.   8

    i)

    A)   B)   C)   D)

    ii)

    A)   B)   C)   D)

    iii)

    A)   B)   C)   D)

    iv)

    A)   B)   C)   D)

    v)

    A)   B)   C)   D)

    vi)

    A)   B)   C)   D)

    vii)

    A)   B)   C)   D)

    viii)

    A)   B)   C)   D)

Q.2. Attempt any two.   16
      A)
      B)
      C)

Q.3. Attempt any four.   16
      a)
      b)
      c)
      d)
      e)
      f)