Semester	Course Category	Code	Papers	Credits
First Semester	Major	MJ-1	Mechanics and Properties of Matter	4
	Associated Core/Associated Vocational	AC-1A	Select any one subject from the Associated Core Table with the guidance of the Class Teacher	4
	Multidisciplinary Course	MDC-1	**Choose any one of the following:** • Mathematical and Computational Thinking Analysis • Gender Studies • Goods and Services Tax (GST) • Pollution Control and Waste Management	3
	Ability Enhancement Course	AEC-1	Hindi (Compulsory)	2
	Skills Enhancement Course	SEC-1	Introduction to Computer and IT (Compulsory)	2
	Value Added Course	VAC-1	Understanding India (Compulsory)	3
	Indian Knowledge System	IKS-I	Indian Knowledge System (Compulsory)	2

Compulsory Summer Internship:

1. ***If a student exits after Semester II, IV, or VI:***

To receive a Certificate/Diploma/Bachelor's Degree, students must complete a summer internship/project/dissertation worth 4 credits. This should be done during the summer break of any semester within the first three years.

Note: The Certificate/Diploma/Bachelor's Degree will not be awarded without completing this internship.

2. ***If a student exits after Semester VIII:***

Under the National Education Policy (NEP), all students must complete a 4-credit summer internship to get a Bachelor's Hons/Hons with Research/P.G. Diploma Degree.

There are two ways to complete this requirement:

a. Two internships of 4 weeks each (2 credits each), or

b. One internship of 8 weeks (4 credits total)

The college will help arrange the internship, and students can complete it any time between Semester 1 and Semester 6 Summer Vacation.

Note: The Bachelor (Hons)/Hons with Research, or P.G. Diploma will not be awarded without completing the internship.

INSTRUCTIONS FOR QUESTION SETTER

1. Semester Internal Examination Question Pattern (15 Marks)

The **Semester Internal Examination (SIE)** will carry a total of **15 marks**, which includes **10 marks for the internal test** and **5 marks for class attendance**. The question paper will have **two groups**.

Group A will have: **Question 1:** Five very short answer questions (1 mark each, total 5 marks)

Group B will have: Two descriptive-type questions of 5 marks each, out of which students must answer **any one** (total 5 marks) the remaining **5 marks** will be based on **class attendance**, as per the following:

- Up to 45% attendance: 1 mark
- 46% to 54%: 2 marks
- 55% to 64%: 3 marks
- 65% to 74%: 4 marks
- 75% and above: 5 marks

2. End Semester University External Examination Question Pattern(60 Marks)

The **End Semester Examination (ESE)** will be of **60 marks** and will also have **two groups**.

Group A (Compulsory) will include: **Question 1:** Five very short answer questions (1 mark each, total 5 marks)

Questions 2 and 3: Two short answer questions (5 marks each, total 10 marks) **Group B** will contain **five descriptive-type questions** of **15 marks each**, out of which students must answer **any three** (total 45 marks)

Note: Questions may have sub-parts if needed in the theory examination.

3. End Semester University Practical Examination Question Pattern (25 Marks)

The **End Semester Practical Examination (ESE)** will be of **6 hours duration**. The total marks and evaluation should be done as per the following guidelines:

- **Experiment/Activity performed during the exam** – 15 marks
- **Practical record notebook** – 5 marks
- **Viva-voce (oral questions)** – 5 marks

Students must score **at least 10 marks** to pass the practical examination.

PROMOTION CRITERIA

- All students will be promoted in odd Semesters (I, III, V & VII).
- To get a promotion from Semester II to Semester III, from Semester IV to Semester V, and from Semester VI to Semester VII a student has to procure a minimum of 4 CGPA.
- However, it will be necessary to obtain a minimum credit (4) to pass in each of the subjects individually before completion of the course.

CALCULATION OF MARKS FOR THE PURPOSE OF RESULT

The passing in a subject will be based on the combined marks obtained in both the internal and external examinations of the semester. However, the student must pass the theory and practical examinations separately.

Internal Semester Examination: 10 Marks

F.M.=10	**Subject/Code** **Time= 1 Hrs.**	**Exam Year**

i. **Group A** carries very short answer type **compulsory** questions.
ii. **Answer 1 out of 2** subjective/ descriptive questions given in **Group B**.
iii. Answer in your own words as far as practicable.
iv. Answer all sub parts of a question at one place.
v. Numbers in right indicate full marks of the question.

Group A [5x1=5]

1.
i. .....
ii. .....
iii. .....
iv. .....
v. .....

Group B

2. ..... [5]
3. ..... [5]

Note: There may be subdivisions in each question asked in Theory Examination.

End Semester Examination: 60 Marks

F.M.=60	**Subject/Code** **Time= 3 Hrs.**	**Exam Year**

vi. **Group A** carries very short answer type **compulsory** questions.
vii. **Answer 3 out of 5** subjective/ descriptive questions given in **Group B**.
viii. Answer in your own words as far as practicable.
ix. Answer all sub parts of a question at one place.
x. Numbers in right indicate full marks of the question.

Group A [5x1=5]

1.
i. .....
ii. .....
iii. .....
iv. .....
v. ..... [5]
2. ..... [5]
3. .....

Group B

4. ..... [15]
5. ..... [15]
6. ..... [15]
7. ..... [15]
8. ..... [15]

Note: There may be subdivisions in each question asked in Theory Examination.

SEMESTER - I

COURSE: MAJOR – 1(MJ-1) **TOTAL CREDITS:** THEORY-03, PRACTICAL-01
PAPER NAME: MECHANICS AND PROPERTIES OF MATTER **TEACHING HOURS:** THEORY-45, PRACTICAL-30

EVALUATION			
	External Exam	**Internal Exam**	**Practical**
Full Marks	**60**	15 (10 Written + 5 Attendance/Overall Class Performance)	**25**
Duration of Exam	3 Hours	1 Hour	6 Hours
Pass Marks	30 Marks		10 marks

COURSE OBJECTIVES:

This course aims to enable the students to acquire the key concepts of the general properties of matter, the motion of a particle under central force field, oscillations and special theory of relativity.

COURSE OUTCOMES:

1. Learn about the behavior of physical bodies around us in daily life.
2. Understand the dynamics of planetary motion.
3. Build a foundation of various applied field in science and technology.
4. Develop the analytical thinking on Mechanics in order to understand the response of the classical systems to external forces.

PART 'A'

THEORY COURSE CONTENTS:

UNIT-I:

General Properties of Matter (15 Lectures): Hooke's law. Stress-strain diagram, Elastic moduli, Poisson's Ratio: Expression for Poisson's ratio in terms of elastic constants. Relation between Elastic constants. Kinematics of Moving Fluids: Viscous fluid, Poiseuille's Equation for Flow of a Liquid through a Capillary Tube with correction, Flow of compressible fluid through a capillary tube, Rankine's methods for measurement of viscosity of gas. Surface tension and surface energy, angle of contact, Expression for excess pressure, Principle of virtual work, Ripples and Gravity waves.

UNIT-II:

Central Force Motion and Oscillation (15 Lectures): Motion of a particle under a central force field. Conservation of angular momentum. Kepler's Laws of planetary motion and their derivations. Satellite in circular orbit and applications, Centrifugal force. Simple Harmonic Oscillations (SHM).Differential equation of SHM and its solution. Kinetic energy, potential energy, total energy and their time-average values. Examples of Physical Systems Executing SHM: Simple Pendulum, Compound Pendulum, Torsional Pendulum, LC-Circuit. Damped oscillation. Forced oscillations: Resonance, sharpness of resonance, power dissipation and Quality Factor.

UNIT-III:

Special Theory of Relativity (15 Lectures): Inertial and Non-inertial frames. Michelson-Morley Experiment and its outcome. Postulates of Special Theory of Relativity. Lorentz Transformations. Lorentz contraction. Time dilation. Simultaneity and order of events. Relativistic addition of velocities. Variation of mass with velocity. Massless Particles. Mass-energy Equivalence. Relativistic Doppler Effect.

SUGGESTED READINGS:

1. An introduction to mechanics, D. Kleppner, R.J. Kolenkow, 1973, McGraw-Hill.
2. Mechanics by D. S. Mathur, S. Chand.
3. Physics, Resnick, Halliday and Walker, 2008, Wiley.
4. Feynman Lectures, Vol. I, R.P. Feynman, R.B. Leighton, M. Sands, 2008, Pearson Education
5. Introduction to Special Relativity, R. Resnick, 2005, John Wiley and Sons.
6. University Physics, Ronald Lane Reese, 2003, Thomson Brooks/Cole.

PART 'B'

PRACTICAL COURSE CONTENTS:

List of Practical:

1. To determine the value of g using simple Pendulum
2. To determine the value of g using Bar Pendulum.
3. To determine the value of g using Kater's Pendulum.
4. To study the Motion of Spring and calculate (a) Spring constant, (b) g and (c) Modulus of rigidity.
5. To determine the elastic Constants of a wire by Searle's method.
6. To determine the Modulus of Rigidity of a Wire by Maxwell's needle.

SUGGESTED READINGS:

1. Advanced Practical Physics for students, B.L. Flint and H.T. Worsnop, 1971, Asia Publishing House
2. A Text Book of Practical Physics, I. Prakash& Ramakrishna, 11th Ed., 2011, Kitab Mahal
3. Advanced level Physics Practicals, Michael Nelson and Jon M. Ogborn, 4th Edition, reprinted 1985, Heinemann Educational Publishers.
4. A Laboratory Manual of Physics for undergraduate classes, D.P. Khandelwal, 1985, Vani Pub.

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