

Note: X axis: 1 to 10 marked in Chapter-wise analysis refers to years starting from 2010 ranging till 2019 where 1 stands for 2010, 2 stands for 2011 ... and 10 stands for 2019. Y axis: No. of Questions

Physics

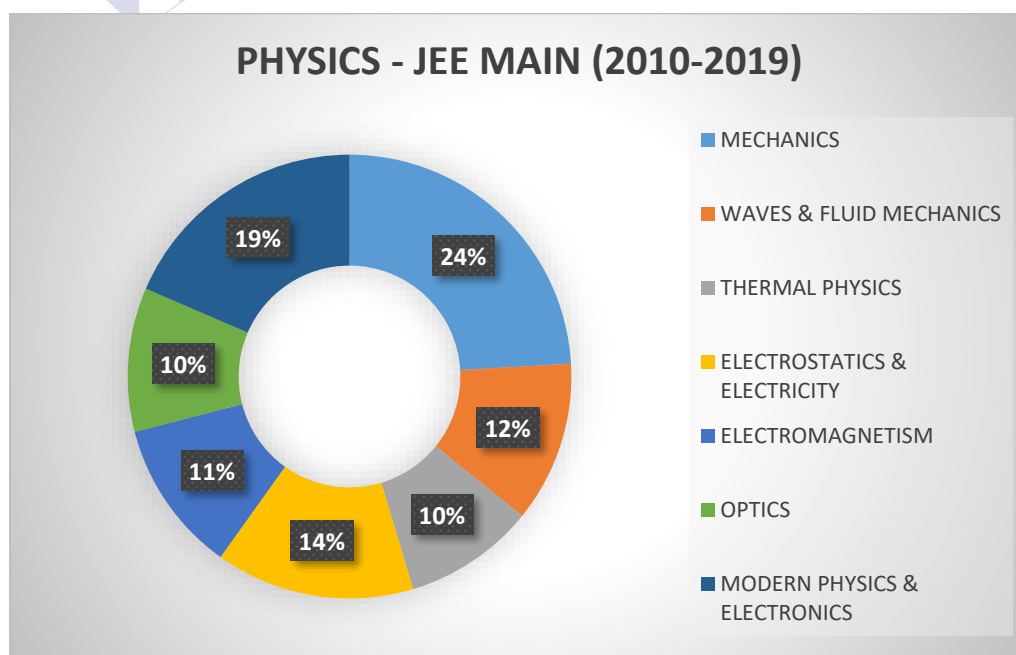
Physics is a subject largely dominated by concepts & problem solving coupled together to produce interesting problems. Safe enough to say, one needs to be extremely well versed with the derivation of formulas to be able to solve problems that are not conventional. However, from a statistical point of view, Mechanics covers $\frac{1}{4}$ th of the weightage by marks. It is followed up by Modern Physics & Electronics which covers as much as 19% even for the few chapters that lies under it. The rest 57% is shared more or less equally by the other units each accounting from 10% to 14% each.

Some of the most important chapters that more or less appear every year in Physics are: Errors in Measurement, Center of Mass, Work, Power & Energy, Rotational Motion, Simple Harmonic Motion, Fluid Mechanics, KTG & Thermodynamics, Electrostatics, Current Electricity, Capacitance, Electromagnetic Field & Induction, Optics (Ray & Wave), Atomic Physics, Semi-conductor and Electromagnetic Waves & Communication. The exact distribution can be seen in the graph present below.

The 7 units of Physics are:

1. Mechanics
2. Waves & Fluid Mechanics
3. Thermal Physics
4. Electrostatics & Electricity
5. Electromagnetism
6. Optics & Wave Optics
7. Modern Physics & Electronics

The graph below shows the mark distribution of the subjects:



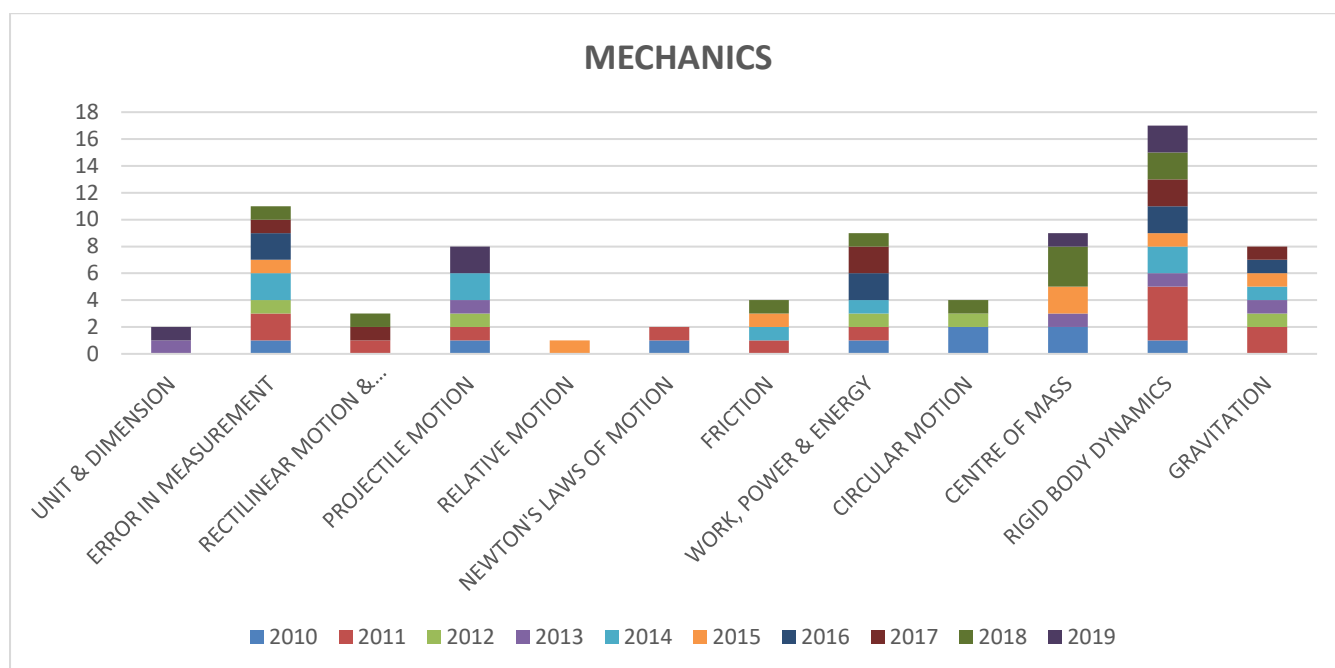
The chart below shows the mark distribution of the subjects across the years:

	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	Total
	30	60	30	30	30	30	30	30	30	24	33	357
MECHANICS												90
UNIT & DIMENSION	0	0	0	1	0	0	0	0	0	1	0	2
ERROR IN MEASUREMENT	1	2	1	0	2	1	2	1	1	0	1	12
RECTILINEAR MOTION & VECTORS	0	1	0	0	0	0	0	1	1	0	0	3
PROJECTILE MOTION	1	1	1	1	2	0	0	0	0	2	2	10
RELATIVE MOTION	0	0	0	0	0	1	0	0	0	0	0	1
NEWTON'S LAWS OF MOTION	1	1	0	0	0	0	0	0	0	0	2	4
FRICTION	0	1	0	0	1	1	0	0	1	0	0	4
WORK, POWER & ENERGY	1	1	1	0	1	0	2	2	1	0	2	11
CIRCULAR MOTION	2	0	1	0	0	0	0	0	1	0	1	5
CENTRE OF MASS	2	0	0	1	0	2	0	0	3	1	2	11
RIGID BODY DYNAMICS	1	4	0	1	2	1	2	2	2	2	2	19
GRAVITATION	0	2	1	1	1	1	1	1	0	0	0	8
WAVES & FLUID MECHANICS												40
SIMPLE HARMONIC MOTION	0	3	2	2	1	1	1	1	1	0	1	13
WAVE ON A STRING	1	0	1	1	0	0	1	0	1	1	0	6
SOUND WAVES	0	3	0	0	1	1	1	0	1	1	1	9
FLUID MECHANICS & PROPERTIES OF MATTER	1	4	1	2	2	1	0	1	0	0	0	12
THERMAL PHYSICS												34
CALORIMETRY & THERMAL EXPANSION	1	3	1	0	0	0	0	2	0	1	1	9

KTG & THERMODYNAMICS	0	3	2	1	2	3	3	2	1	1	2	20
HEAT TRANSFER	0	2	1	1	1	0	0	0	0	0	0	5
ELECTROSTATICS & ELECTRICITY												52
ELECTROSTATICS	3	3	2	2	1	2	1	1	1	1	1	18
CURRENT ELECTRICITY	1	2	1	2	1	2	1	3	3	2	3	21
CAPACITANCE	1	2	1	1	1	1	1	2	1	1	1	13
ELECTROMAGNETISM												40
ELECTRO MAGNETIC FIELD	1	3	2	1	2	3	2	1	2	1	2	20
ELECTRO MAGNETIC INDUCTION	2	3	1	3	1	2	0	1	0	1	0	14
ALTERNATING CURRENT	1	0	0	0	0	0	1	0	2	0	2	6
OPTICS												36
GEOMETRICAL OPTICS	3	4	2	2	2	1	2	1	0	1	0	18
WAVE OPTICS	0	3	1	2	1	2	1	2	2	2	2	18
MODERN PHYSICS & ELECTRONICS												65
ATOMIC PHYSICS	5	5	4	2	2	2	2	4	2	2	2	32
SEMICONDUCTORS	1	1	1	1	1	0	4	1	1	2	1	14
ELECTROMAGNETIC WAVES & COMMUNICATION	0	3	2	2	2	2	2	1	2	1	2	19

UNIT 1 - MECHANICS

Mechanics is the unit with the highest weightage among all of physics and this is also because of the vast number of chapters that reside within. However, the most important chapter among all of mechanics is Rigid Body Dynamics, also known as Rotational Motion. Errors in Measurement, Work, Power & Energy and Centre of Mass have a fair share as well. The interesting aspect of mechanics is you can't suddenly jump into a new chapter and learn it. The concepts of one chapter serve as the fundamentals of another. So, in a way, all the chapters work together. A total of 78 questions have been asked in the previous 10 years. Although vast in its syllabus, this is extremely important to strengthen the fundamentals of physics and can't be ignored.



Y axis: Number of Questions

SYLLABUS

PART 1: PHYSICS AND MEASUREMENT

- Physics, technology and society, S I Units, fundamental and derived units, least count
- Accuracy and precision of measuring instruments, Errors in measurement
- Dimensions of Physics quantities, dimensional analysis and its applications.

PART 2: KINEMATICS

- The frame of reference, motion in a straight line, Position- time graph, speed and velocity; Uniform and non-uniform motion, average speed and instantaneous velocity, uniformly accelerated motion, velocity-time, position-time graph, relations for uniformly accelerated motion
- Scalars and Vectors, Vector. Addition and subtraction, zero vector, scalar and vector products, Unit Vector, Resolution of a Vector.
- Relative Velocity, Motion in a plane
- Projectile Motion
- Uniform Circular Motion.

PART 3: LAWS OF MOTION

- Force and inertia, Newton's First law of motion, Momentum, Newton's Second Law of motion, Impulses; Newton's Third Law of motion.
- Law of conservation of linear momentum and its applications.
- Equilibrium of concurrent forces.
- Static and Kinetic friction, laws of friction, rolling friction.
- Dynamics of uniform circular motion, centripetal force and its applications.

PART 4: WORK, ENERGY AND POWER

- Work done by a constant force and a variable force;

- Kinetic and potential energies
- Work-energy theorem
- Power
- The potential energy of spring
- Conservation of mechanical energy, conservative and nonconservative forces;
- Elastic and inelastic collisions in one and two dimensions.

PART 5: ROTATIONAL MOTION

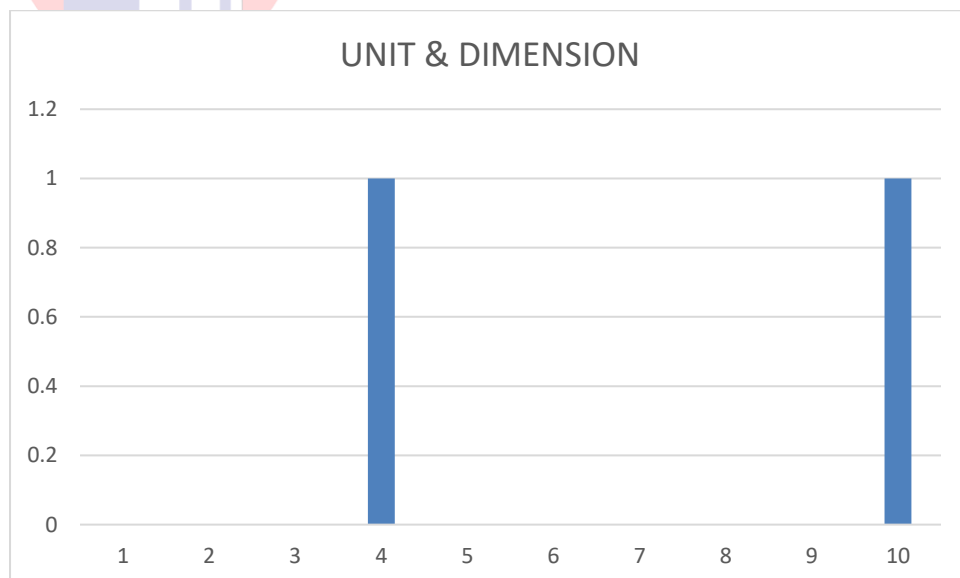
- Centre of the mass of a two-particle system, Centre of the mass of a rigid body;
- Basic concepts of rotational motion; a moment of a force; torque, angular momentum, conservation of angular momentum and its applications; the moment of inertia, the radius of gyration.
- Values of moments of inertia for simple geometrical objects, parallel and perpendicular axes theorems and their applications.
- Rigid body rotation equations of rotational motion.

PART 6: GRAVITATION

- The universal law of gravitation.
- Acceleration due to gravity and its variation with altitude and depth.
- Kepler's law of planetary motion.
- Gravitational potential energy; gravitational potential.
- Escape velocity, Orbital velocity of a satellite.
- Geostationary satellites.

CHAPTERWISE ANALYSIS

1. Units and dimensions



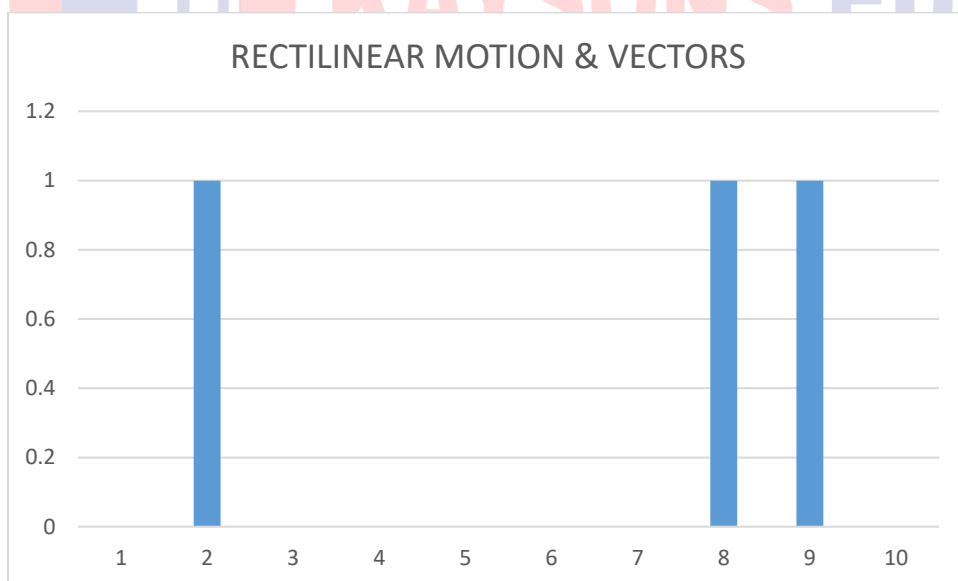
Questions are rarely asked from this chapter. Over the past 10 years, only two questions have been asked. However, dimension analysis is a useful tool to remove options by the process of elimination. It is a fairly simple chapter and thus should be undertaken by every aspirant.

2. Errors in Measurement



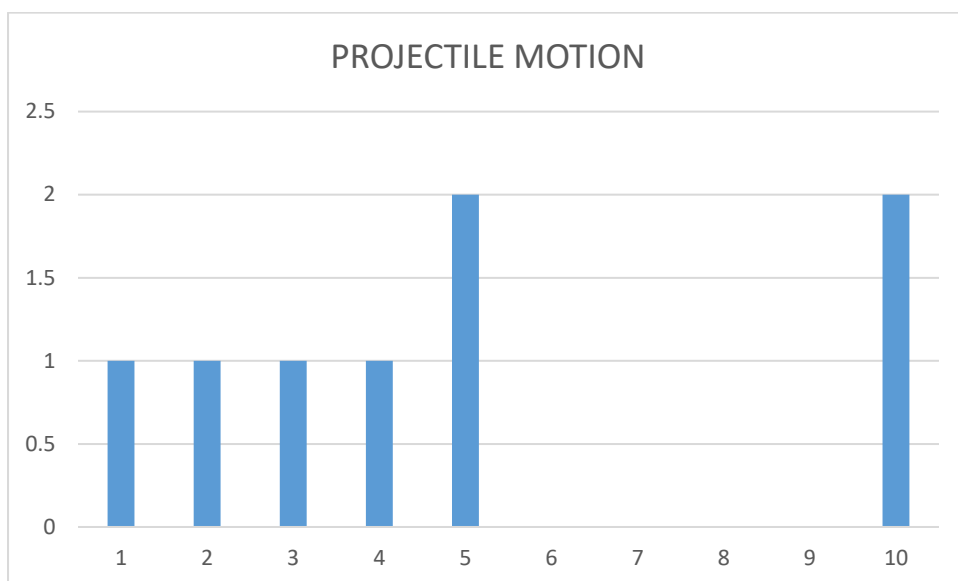
This chapter receives questions almost every year. A total of 11 questions have been asked in 10 years. Understanding errors and approximations lies at the heart of doing any sort of calculations and thus is a must complete chapter. The usefulness of the chapter extends over to all branches of science.

3. One dimensional motion (1-D Motion) & Vectors



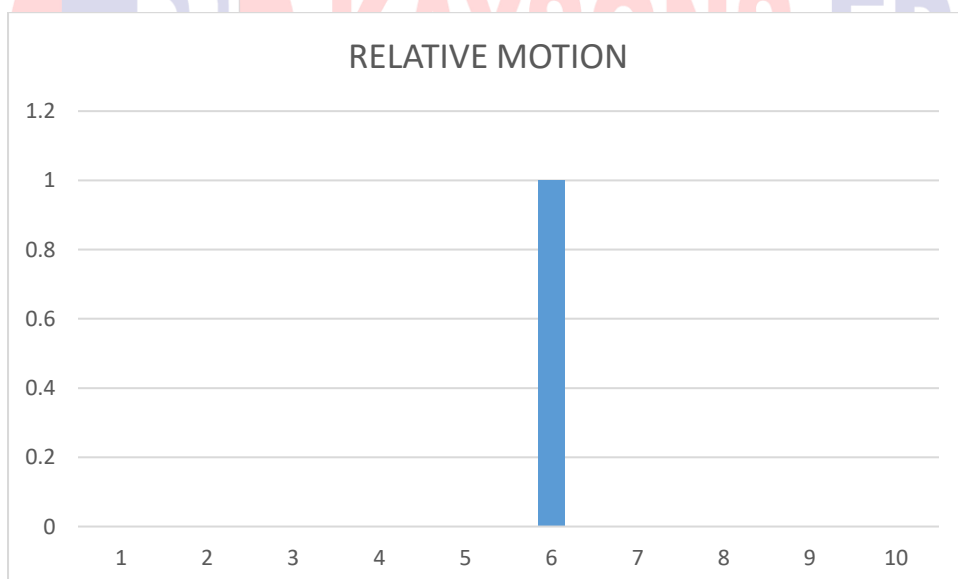
Vectors add a new dimension to the kit of the students. This chapter introduced basic formulas and equations. While questions directly do not appear from the chapter as only 3 questions have been asked in the past 10 years. Understand the intuition behind the simple equations and it will be useful in all the upcoming chapters. A simple understanding of various graphs is useful as well.

4. Projectile motion (2-D motion)



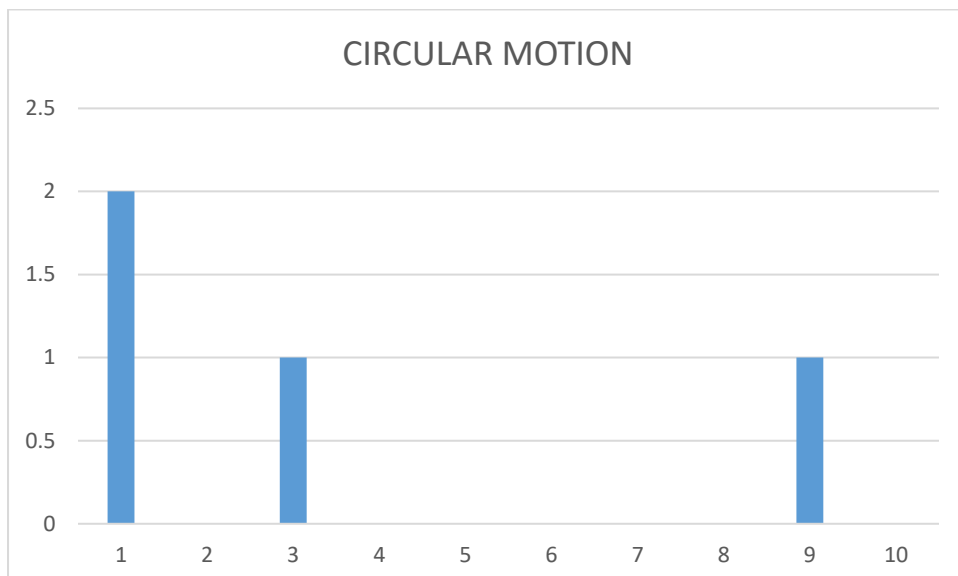
With a total of 8 questions asked, however, this chapter has not seen many direct questions in the recent years. It is an interesting chapter as the students can figure out how to decompose 2D motions into respective axes. The basics should be covered for sure alongside the fundamental equations.

5. Relative motion



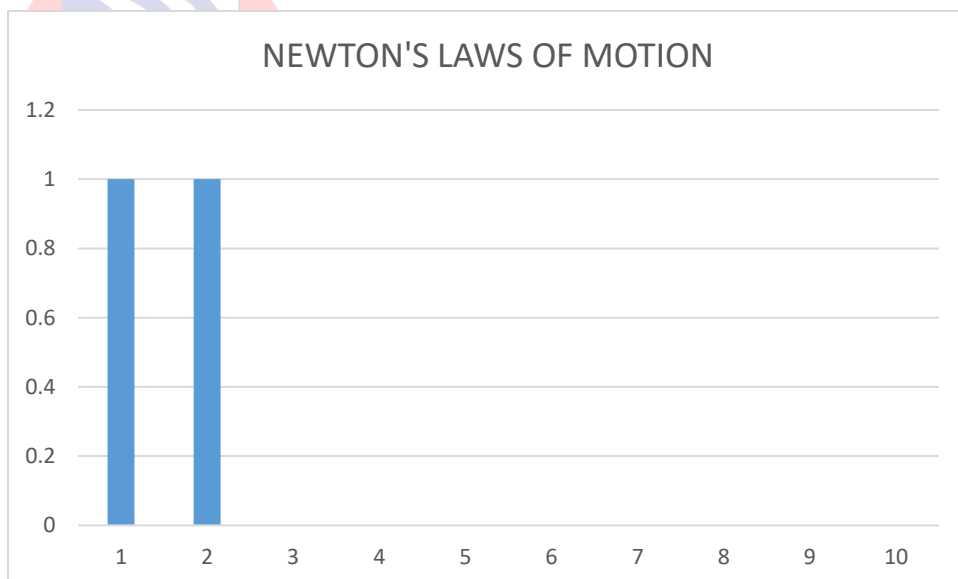
As much as the 1 question might make it look like a not-important chapter, this is far from truth. Despite of the lack of direct questions, it is heavily used in Rotational Motion which is the favourite chapter of the question setters. This is a must complete chapter.

6. Circular motion



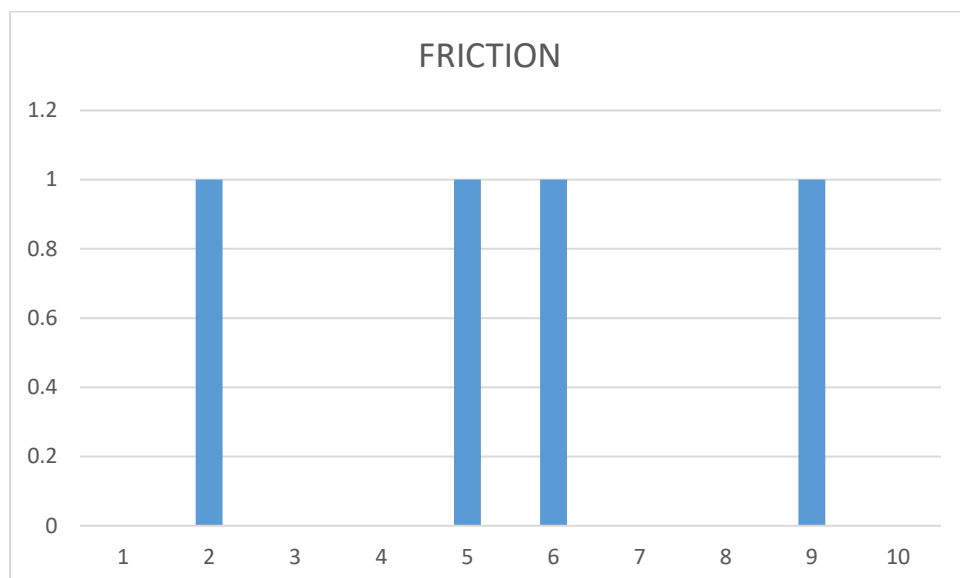
With just 4 direct questions, it doesn't attract a lot of questions. However, like with all of physics, this goes on to serve as the fundamental of all motions that has a circular pattern. It is very important to know the basics equations and the fundamentals.

7. Laws of motion



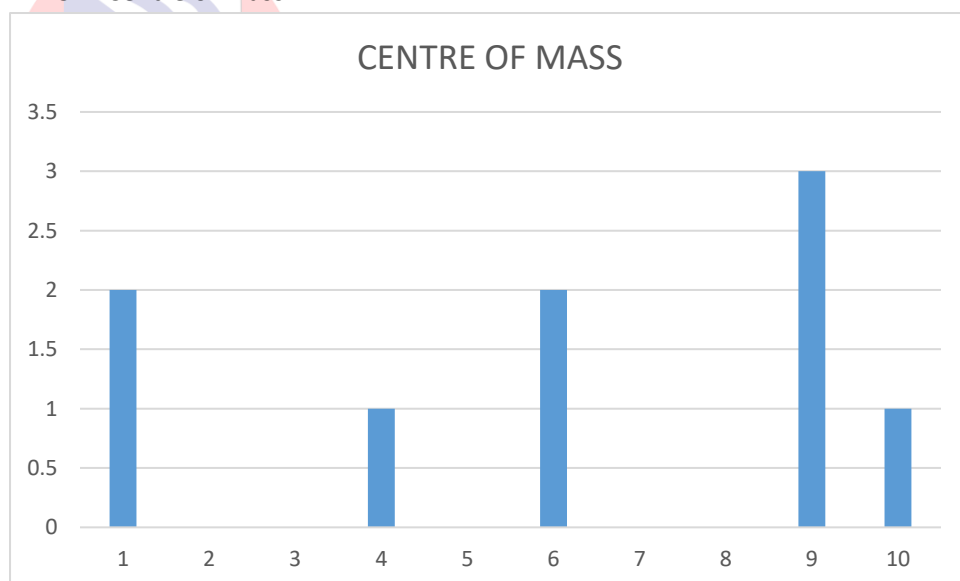
Do not get disillusioned with the 2 questions asked over the years. This is one of the most important section and should be treated likewise. Free Body Diagrams are introduced at this stage which are among the fundamentals that support a lot of Physics Problems. Momentum and Impulse problems are common.

8. Friction



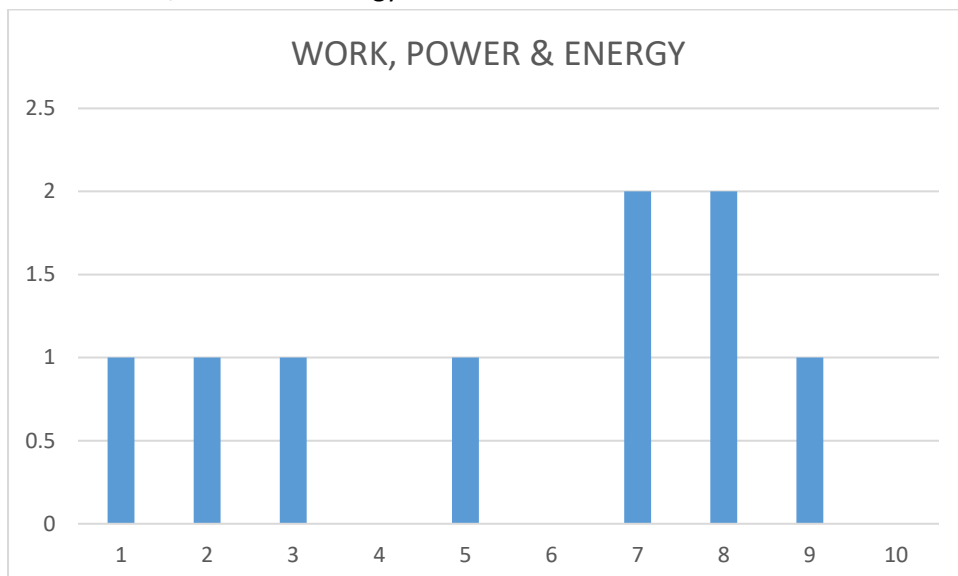
With a total of 4 questions, it sees direct questions now and then. It is possible to ignore completing the chapter in its entirety. However, a basic lookup of the chapter is essential to know friction in various inclinations and while rolling. Essentially, free body diagram is employed.

9. Centre of mass



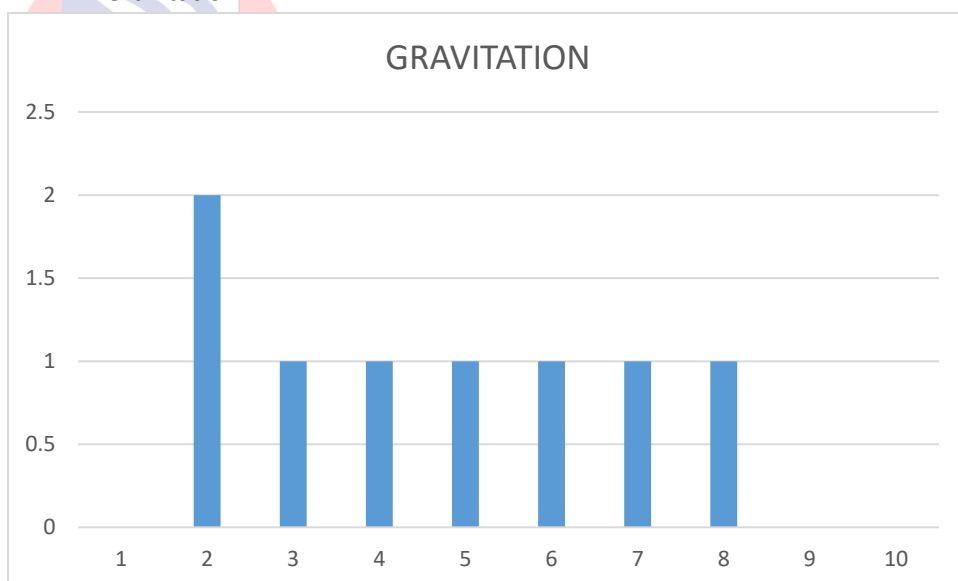
With 9 questions asked in the previous years, it is a chapter that doesn't witness questions consistently over the years but in years that it does, a good amount of questions appear. It serves as the fundamental of rotational motion since torque requires centre of mass and anyone wishing to complete mechanics properly shouldn't ignore it at all.

10. Work, Power and Energy



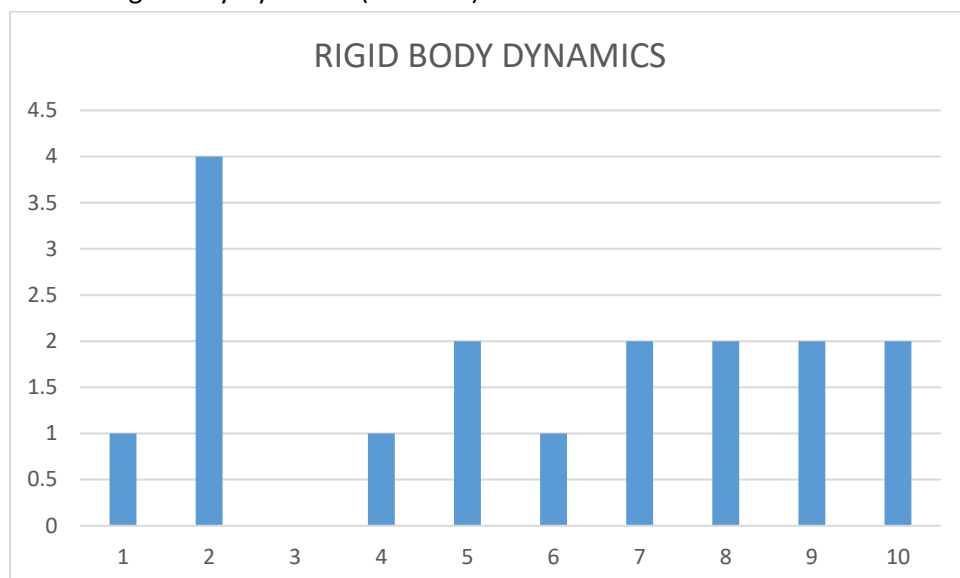
Energy Conservation Theorem can solve a lot of questions single-handedly and this fact alone can settle the equation in favour of the chapter. Working closely with all the chapters of mechanics, it will be an understatement to say that it is one of the most important chapter in physics itself. 9 questions in the past 10 years add further to its reputation.

11. Gravitation



With over 9 questions in the past years, gravitation constantly sees a question every year. With the possible exceptions of the few years, it constantly sees 1 questions. It is also an important chapter from the perspective of Electrostatics as there are a lot of similarities in both the chapters and the basic rules that governs the formulas. The various of acceleration with altitude, gravitational potential energy and geo stationary satellites form questions.

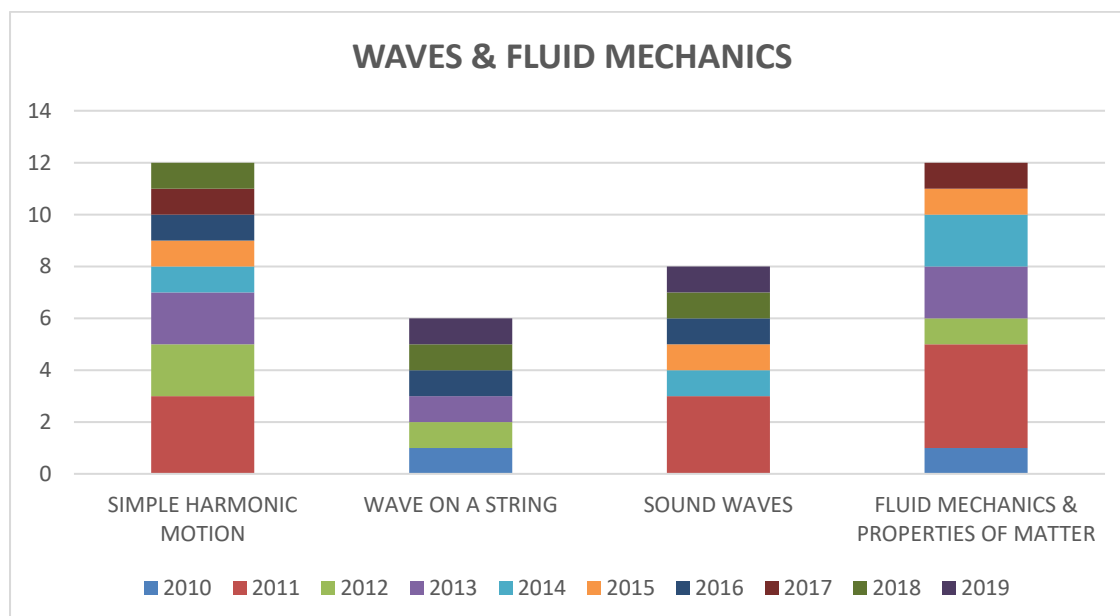
12. Rigid Body Dynamics (Rotation)



The most weighted chapter of mechanics and hands down a chapter that is a mine of questions. With a staggering 17 questions, it stands well above and ahead of all the other chapters in terms of direct questions. However, it is to be understood that the chapter isn't simple and requires other chapters before it as pre-requisites. This completes one big aspect of mechanics. Angular momentum and moment of inertia are important concepts.

UNIT 2 - WAVES & FLUID MECHANICS

The unit includes 3 to 4 questions every year and are comparatively stand-alone chapters. At the dearth of time, these chapters can be prepared separately. However, forming a 12% of physics, the most important aspects of the unit are Simple Harmonic Motion, Fluid Mechanics & Properties of matter. Periodic Motion is at the heart of this unit. It is possible to understand the formulas and score easy marks from this unit if a certain amount of time is put into it. But it is safe to say this is not a very important unit in physics.



SYLLABUS**PART 1: OSCILLATIONS AND WAVES**

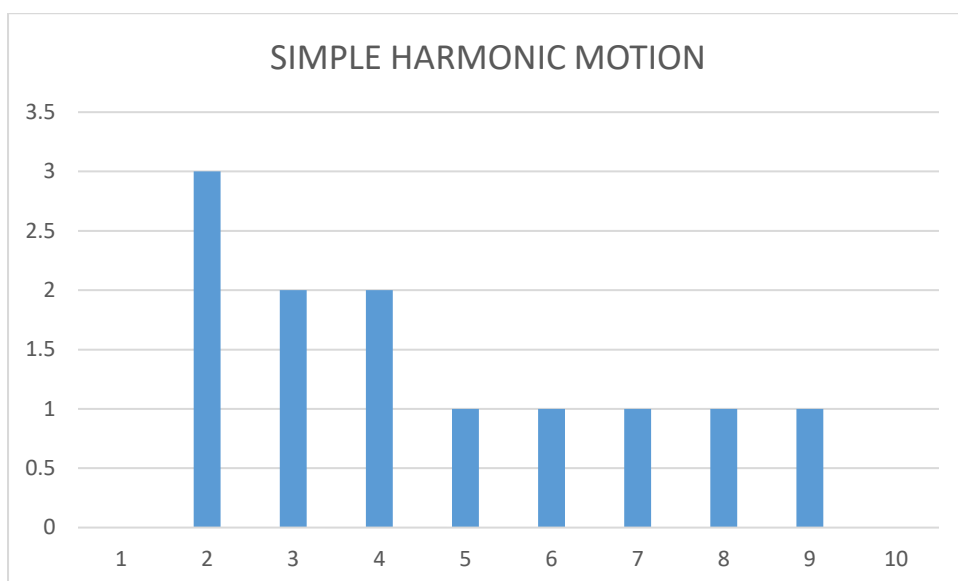
- Periodic motion - period, frequency, displacement as a function of time.
- Periodic functions.
- Simple harmonic motion (S.H.M.) and its equation; phase: oscillations of a spring -restoring force and force constant: energy in S.H.M. - Kinetic and potential energies
- Simple pendulum - derivation of expression for its time period: Free, forced and damped oscillations, resonance.
- Wave motion.
- Longitudinal and transverse waves, speed of a wave.
- Displacement relation for a progressive wave.
- Principle of superposition of waves, a reflection of waves.
- Standing waves in strings and organ pipes, fundamental mode and harmonics.
- Beats.
- Doppler Effect in sound

PART 2: PROPERTIES OF SOLIDS AND LIQUIDS

- Elastic behaviour, Stress-strain relationship, Hooke's Law.
- Young's modulus, bulk modulus, modulus of rigidity.
- Pressure due to a fluid column; Pascal's law and its applications.
- Viscosity.
- Stokes' law.
- Terminal velocity, streamline and turbulent flow.
- Reynolds number.
- Bernoulli's principle and its applications.
- Surface energy and surface tension, angle of contact, application of surface tension -drops, bubbles and capillary rise.
- Heat, temperature, thermal expansion; specific heat capacity, calorimetry; change of state, latent heat.
- Heat transfer-conduction, convection and radiation.
- Newton's law of cooling.

CHAPTERWISE ANALYSIS

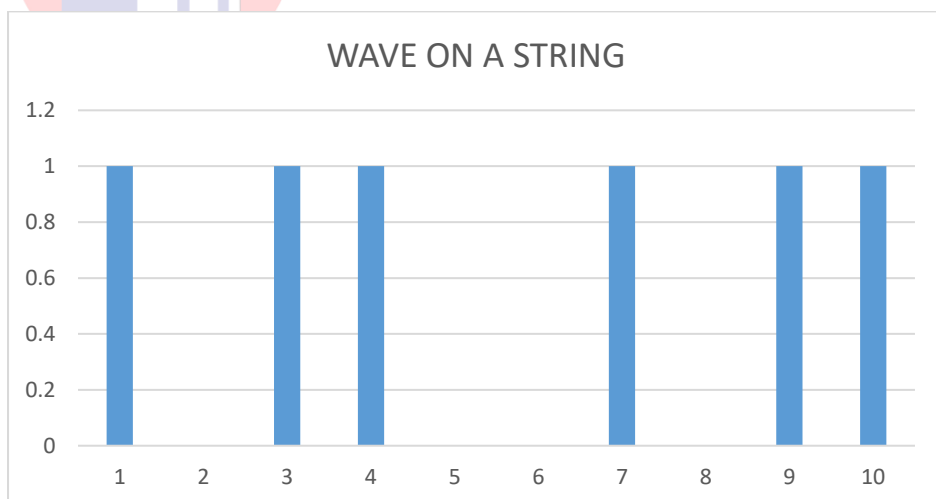
1. Simple Harmonic Motion



With 12 questions in the past 10 years, SHM sees 1 question every year and should be prepared keeping that in mind. SHM alongside fluid mechanics and properties of matters, form a major portion of questions from this unit.

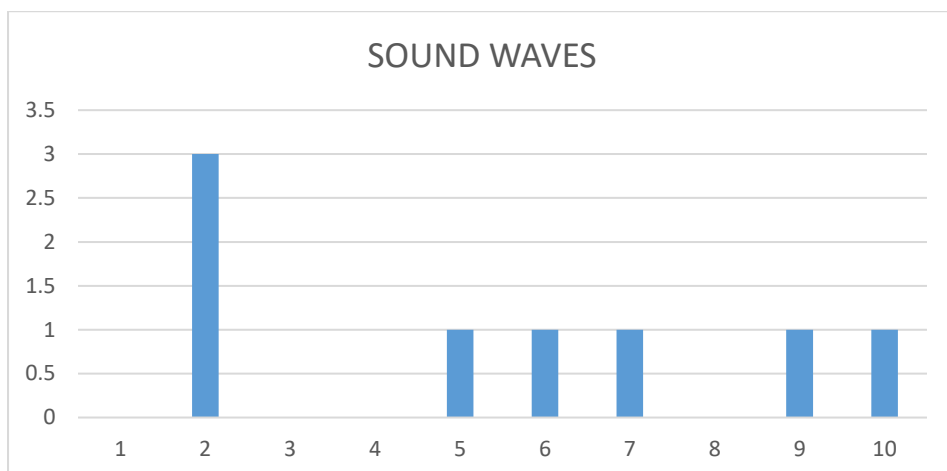


2. Waves on a String (Progressive Waves, Speed of Mechanical Waves, Stationary Waves)



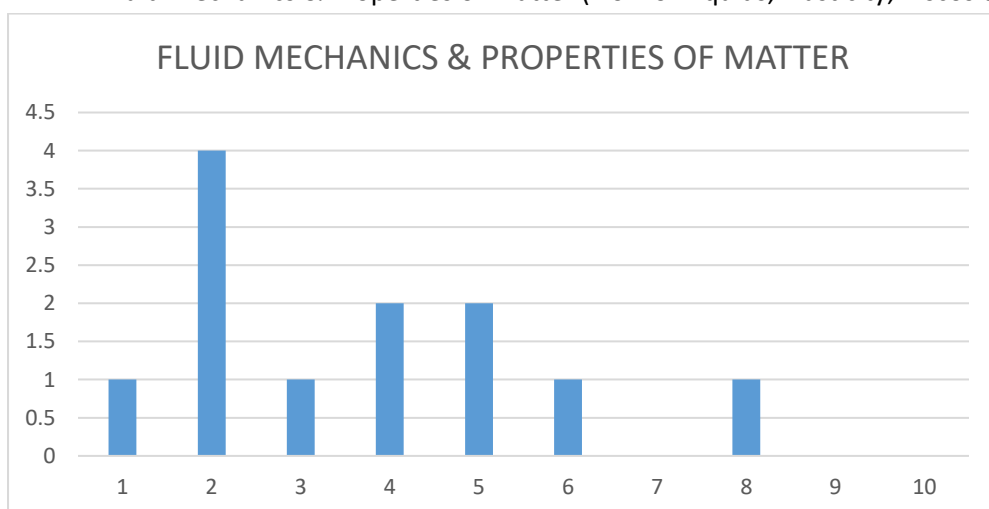
With 6 questions in the past years, and one question here and there, the preparation is to be done in the similar intensity of SHM. Also, the chapters go together.

3. Sound Waves (Doppler's effect, Beat, Interference, Organ Pipe)



Much like the waves on a string, it has 8 questions in the past years and can be prepared together. However, it is important to prioritize other chapters before coming to this.

4. Fluid Mechanics & Properties of Matter (Flow of Liquids, Elasticity, Viscosity, Surface Tension)

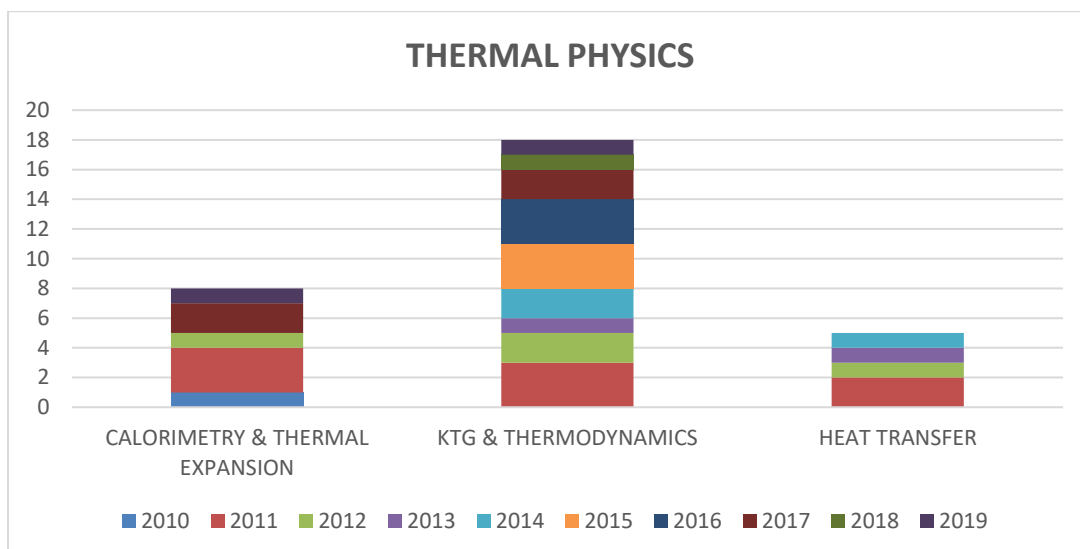


With 12 questions in the past years, it sees 1 or 2 questions at times. This is a relatively easy chapter and marks can be fetched by covering the basics and formulas associated with it. Different modulus, stoke's law, Reynold number, surface tension etc. are important concepts

UNIT 3 - THERMAL PHYSICS

Forming a total of 10% of the entire Physics, this unit has some very important chapters. 3 questions appear every year from this unit but it has a distinct distribution when it comes to individual chapters. KTG & Thermodynamics is the bread and butter of the unit and must not be ignored at any cost while the other two are optional.

Thermodynamics is also essential in the subject of chemistry.



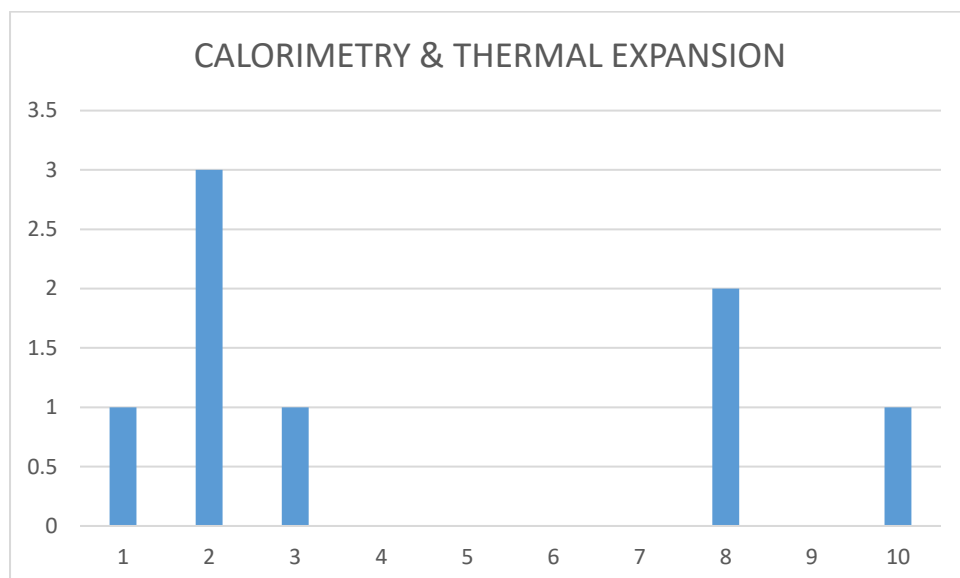
SYLLABUS

PART 1: THERMODYNAMICS

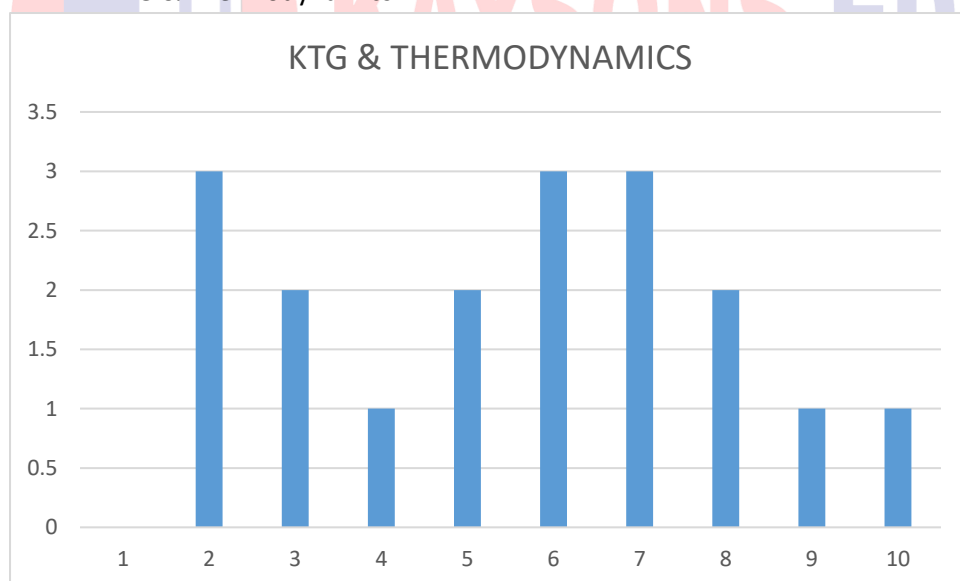
- Thermal equilibrium, zeroth law of thermodynamics, the concept of temperature.
- Heat, work and internal energy.
- The first law of thermodynamics.
- The second law of thermodynamics: reversible and irreversible processes.
- Carnot engine and its efficiency.

PART 2: KINETIC THEORY OF GASES

- Equation of state of a perfect gas, work done on compressing a gas
- Kinetic theory of gases - assumptions, the concept of pressure.
- Kinetic energy and temperature: RMS speed of gas molecules: Degrees of freedom.
- Law of equipartition of energy, applications to specific heat capacities of gases; Mean free path.
- Avogadro's number.

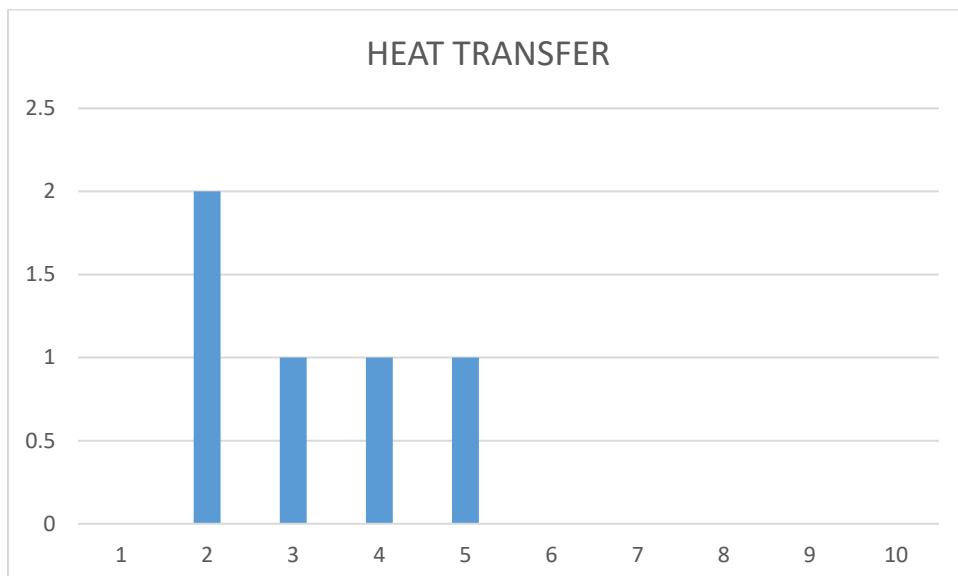
CHAPTERWISE ANALYSIS**1. Calorimetry & Thermal Expansion - Thermometry**

With 8 questions in the past 10 years and only 3 in the past 7 years, there is no certainty of this chapter being asked in the examination. It should be completed if there's ample time available only.

2. KTG & Thermodynamics

This is a chapter that should be rated as highly as the likes of Rotational Motion. Covering a huge 60% of the whole unit, as many as 18 questions have been asked in the previous 9 years. A minimum of one question has been asked since 2011 and 10 questions were asked just in the 4 years between 2014 and 2017. This is a must to be completed. Laws of thermodynamics, RMS speed, mean free path, degree of freedom form topics from which questions appear.

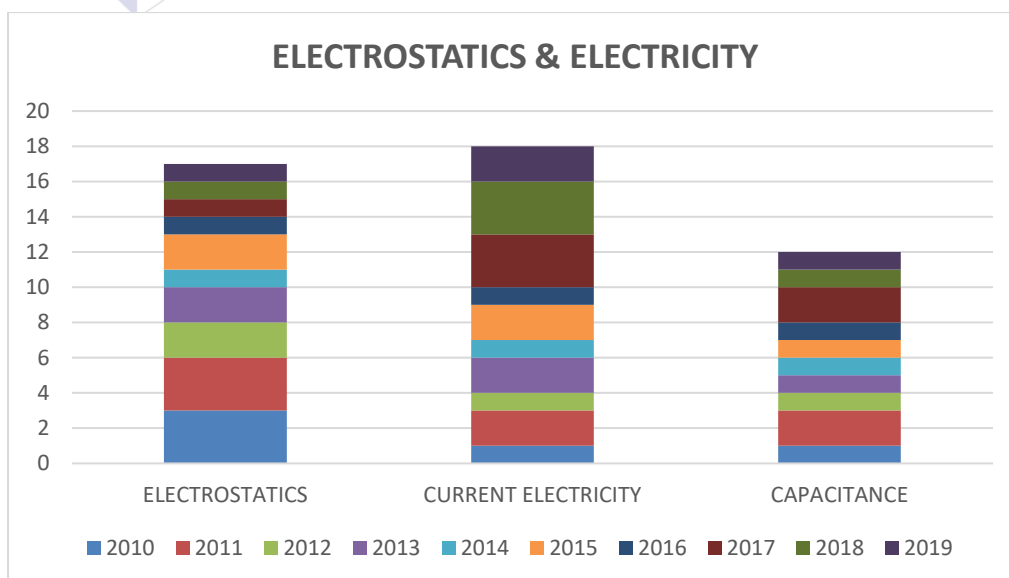
3. Heat Transfer - Conduction and Radiation



Much like Calorimetry, it is up to the student to prepare if there's time left for preparation. With no question in the past 5 years, it doesn't rate highly at all in terms of weightage.

UNIT 4 - ELECTROSTATICS & ELECTRICITY

While the unit contributes to 14% of the entire Physics, it doesn't tell the big story. This is a massively important unit because almost 5 questions appear every year and the chapters form the basics of Physics that are useful in other units as well. The chapter adds on to the concepts of Electromagnetism as well. All the 3 chapters i.e., Electrostatics, Current Electricity and Capacitance are important for the students to prepare and shouldn't be ignored. A total of 47 questions have been asked in the last 10 years.



SYLLABUS

PART 1: ELECTROSTATICS

- Electric charges: Conservation of charge.

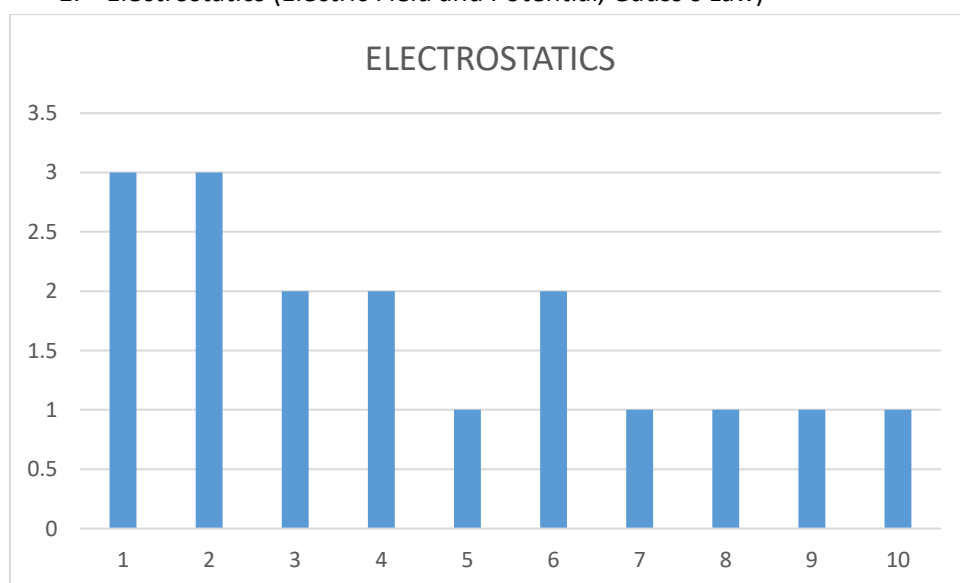
- Coulomb's law-forces between two point charges, forces between multiple charges: superposition principle and continuous charge distribution.
- Electric field: Electric field due to a point charge, Electric field lines.
- Electric dipole, Electric field due to a dipole.
- Torque on a dipole in a uniform electric field.
- Electric flux.
- Gauss's law and its applications to find field due to infinitely long uniformly charged straight wire, uniformly charged infinite plane sheet and uniformly charged thin spherical shell.
- Electric potential and its calculation for a point charge, electric dipole and system of charges
- Equipotential surfaces, Electrical potential energy of a system of two point charges in an electrostatic field.
- Conductors and insulators. Dielectrics and electric polarization, capacitor, the combination of capacitors in series and parallel, capacitance of a parallel plate capacitor with and without dielectric medium between the plates.
- Energy stored in a capacitor.

PART 2: CURRENT ELECTRICITY

- Electric current.
- Drift velocity.
- Ohm's law.
- Electrical resistance. Resistances of different materials.
- V-I characteristics of Ohmic and non-ohmic conductors.
- Electrical energy and power.
- Electrical resistivity. Colour code for resistors; Series and parallel combinations of resistors; Temperature dependence of resistance. Electric Cell and its Internal resistance
- Potential difference and emf of a cell, a combination of cells in series and parallel.
- Kirchhoff's laws and their applications.
- Wheatstone bridge. Metre Bridge.
- Potentiometer - principle and its applications.

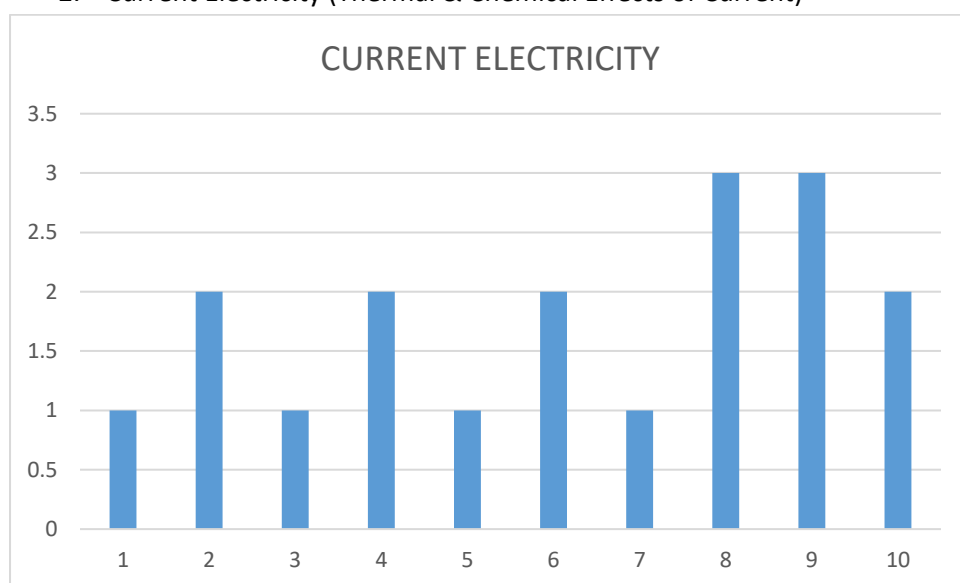
CHAPTERWISE ANALYSIS

1. Electrostatics (Electric Field and Potential, Gauss's Law)



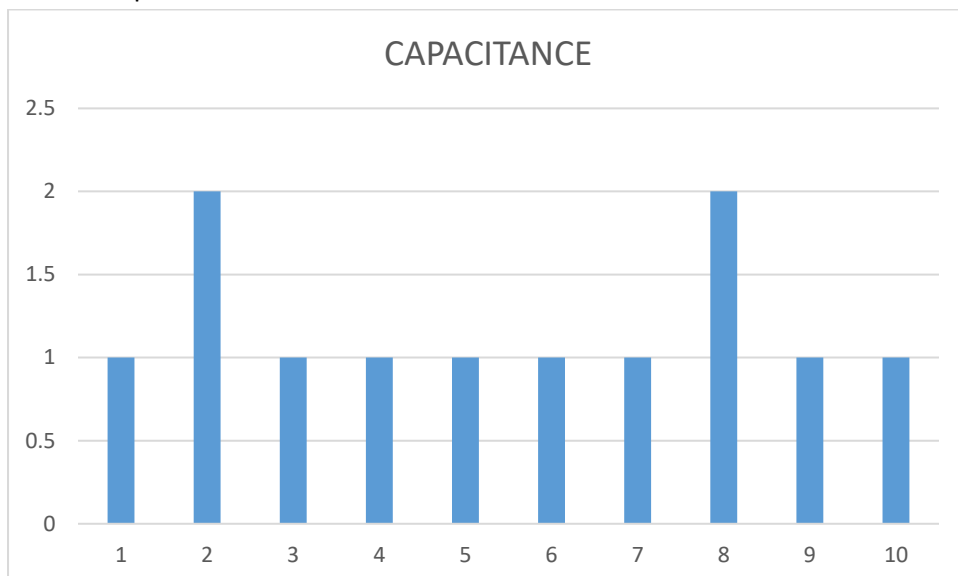
With at least 1 question every year and a total of 17 questions, there is no doubt about the importance of the chapter. A must complete chapter for any serious aspirant. Coulomb's law, Electric Field under conditions, Electric Flux, Gauss's law, and Electric potential are some important topics.

2. Current Electricity (Thermal & Chemical Effects of Current)



This chapter has seen a total of 18 questions in the past 10 years but has been seeing an average of as high as 2 questions every year in the past 7 years. The chapter includes interesting concepts coupled together with problem solving. It has certain resemblance with thermodynamics in terms of the resistivity section. Drift Velocity, Ohm's law, Resistance, electrical resistivity, kirchoff's law and wheatstone bridge are important concepts.

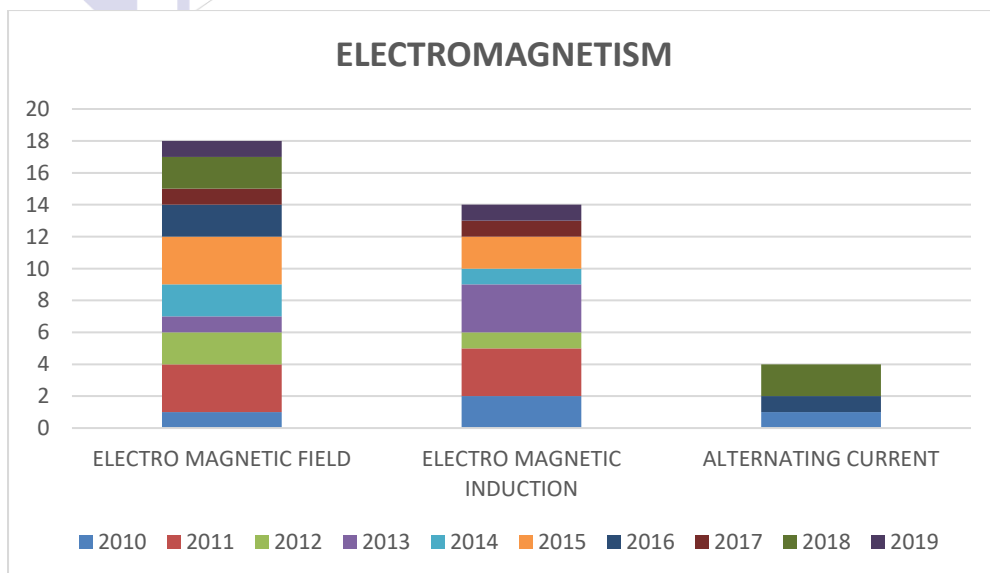
3. Capacitance



As important as any chapter gets, it is also consistent with at least 1 question every year. Capacitance with dielectric mediums in between makes for interesting problems.

UNIT 5 - ELECTROMAGNETISM

Much like the previous module of Electrostatics, there are fundamental derivations to be understood as concepts which are later coupled with problems to form interesting questions. With 3 to 4 questions appearing every year 2 chapters out of 3 in this unit are very important. Constituting 11% of Physics, 36 questions have been asked between 2010 and 2019. Electromagnetic Field and Electromagnetic Induction are the two important chapters from this module while Alternating Current is just an add on.



SYLLABUS

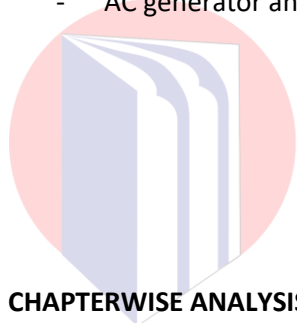
PART 1: MAGNETIC EFFECTS OF CURRENT AND MAGNETISM

- Biot - Savart law and its application to current carrying circular loop.
- Ampere's law and its applications to infinitely long current carrying straight wire and solenoid.

- Force on a moving charge in uniform magnetic and electric fields.
- Cyclotron.
- Force on a current-carrying conductor in a uniform magnetic field.
- The force between two parallel current carrying conductors
- Torque experienced by a current loop in a uniform magnetic field: Moving coil galvanometer, its current sensitivity and conversion to ammeter and voltmeter.
- Current loop as a magnetic dipole and its magnetic dipole moment.
- Bar magnet as an equivalent solenoid, magnetic field lines
- Earth's magnetic field and magnetic elements.
- Para-, dia- and ferromagnetic substances. Magnetic susceptibility and permeability.
- Hysteresis.
- Electromagnets and permanent magnets.

PART 2: ELECTROMAGNETIC INDUCTION AND ALTERNATING CURRENTS

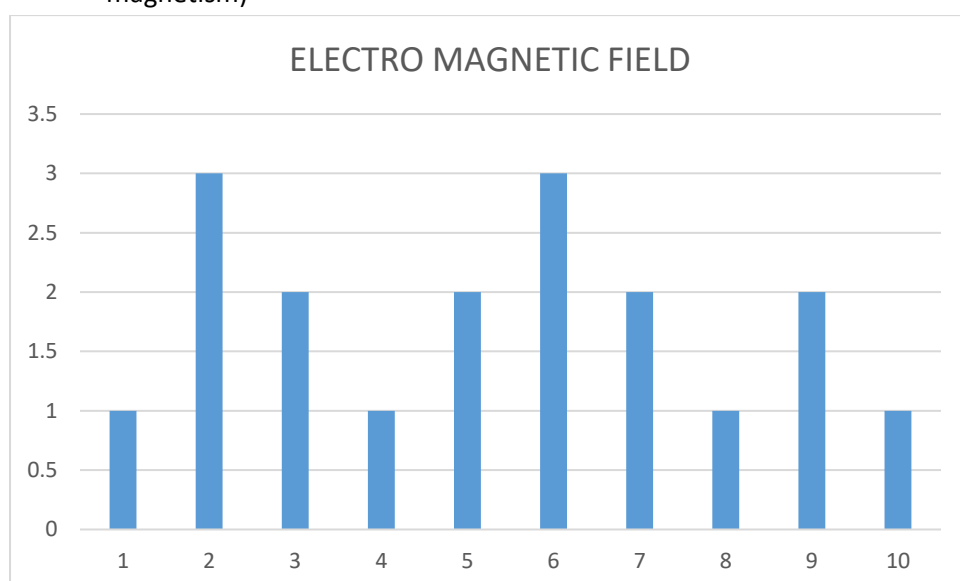
- Electromagnetic induction: Faraday's law.
- Induced emf and current: Lenz's Law
- Eddy currents. Self and mutual inductance.
- Alternating currents, peak and RMS value of alternating current/ voltage: reactance and impedance: LCR series circuit, resonance: Quality factor, power in AC circuits, wattless current.
- AC generator and transformer.



KAYSONS EDUCATION
ENLIGHTENING YOUR FUTURE

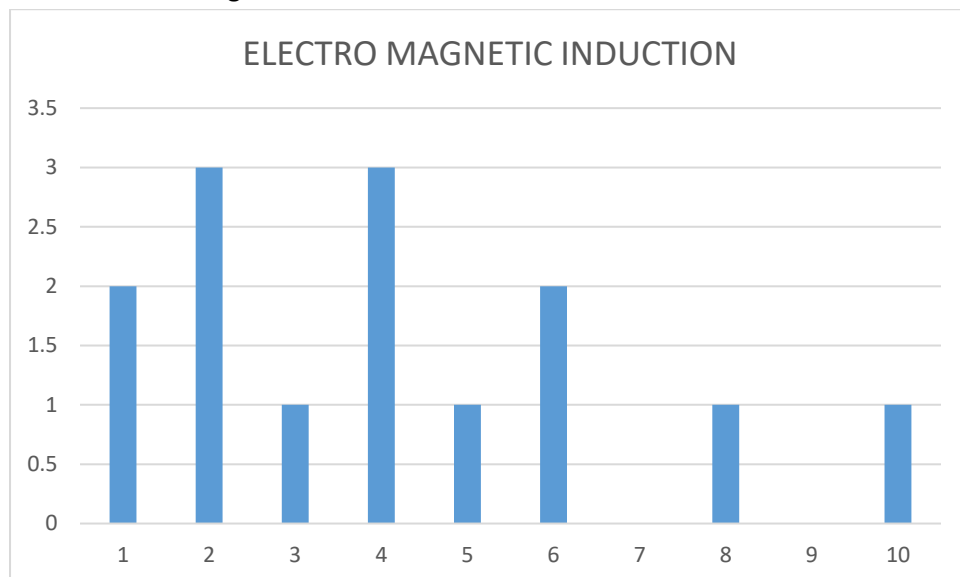
CHAPTERWISE ANALYSIS

1. Electromagnetic Field (Moving charge in magnetic field, Force and Torque in magnetic field, Earth's magnetism)



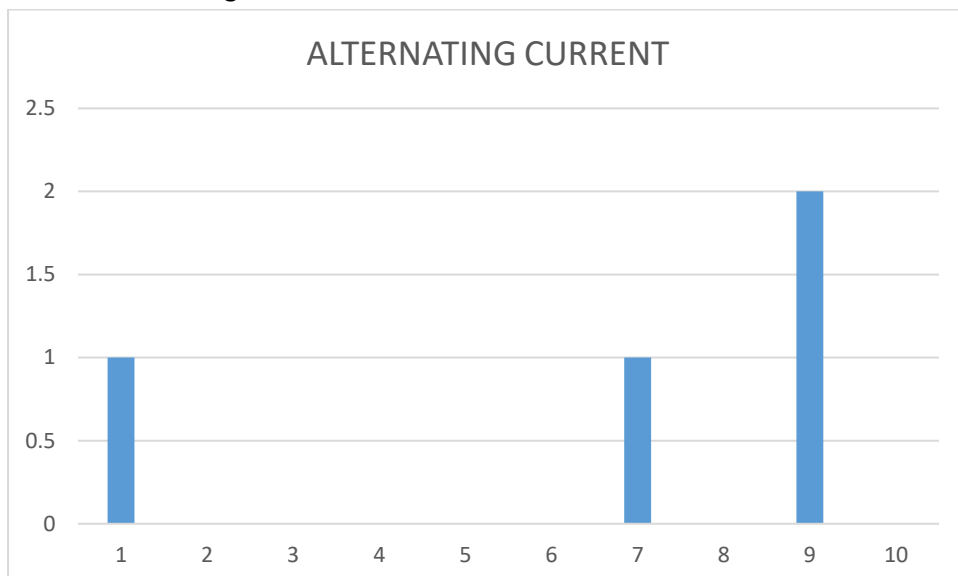
With as many as 18 questions in the previous 10 years, it is the most important chapter in the unit. One can safely expect 1 to 2 questions from this module in the upcoming years as well. The topic of force on a moving charge, and force by a current carrying conductor attracts questions.

2. Electromagnetic Induction



Encompassing important questions from various laws of Faraday, and Lenz, it shows interesting concepts for students who have an affinity towards physics. With 14 questions in between 2010 and 2019, this is a chapter that attracts a fair bit of questions. Despite of only 2 questions in the past 4 years, this chapter should not be ignored.

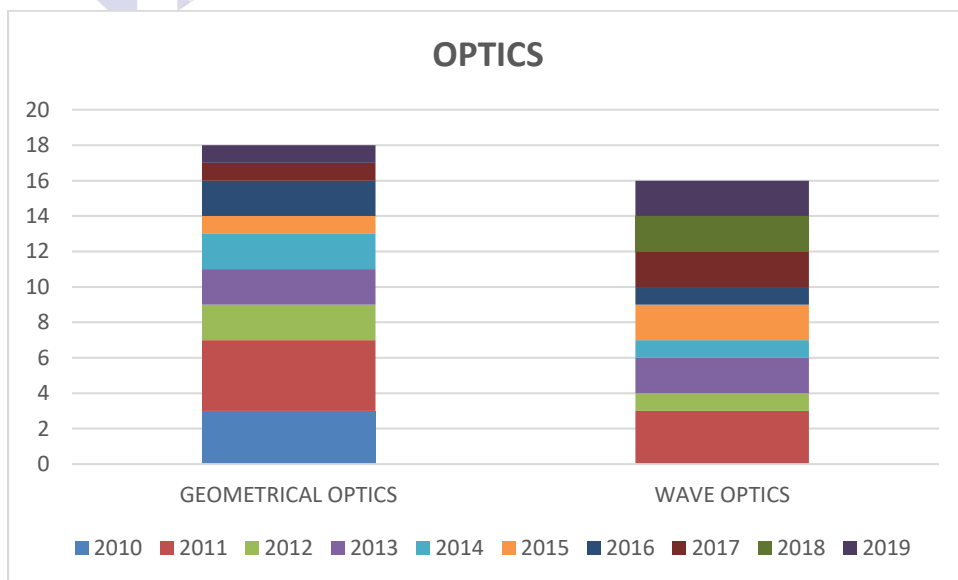
3. Alternating Current



With just 4 questions over the 10 years, this is an inconsistent chapter in terms of weightage towards number of questions. While AC concepts are very useful going ahead, it isn't at all very important from the JEE Main perspective. Covering the basics should be enough for this chapter such as RMS value, reactance, impedance, power etc.

UNIT 6 - OPTICS & WAVE OPTICS

Optics is a very important unit both in terms of weightage and concepts. It is very important to learn the various phenomena of light. In ray optics, conditions of mirrors and lens are important to know and in wave optics, it is interference, diffraction and polarization. With 34 questions between 2009 and 2019, you can expect 3 to 4 questions from this unit every year.



SYLLABUS

PART 1: RAY OPTICS

- Reflection and refraction of light at plane and spherical surfaces, mirror formula.

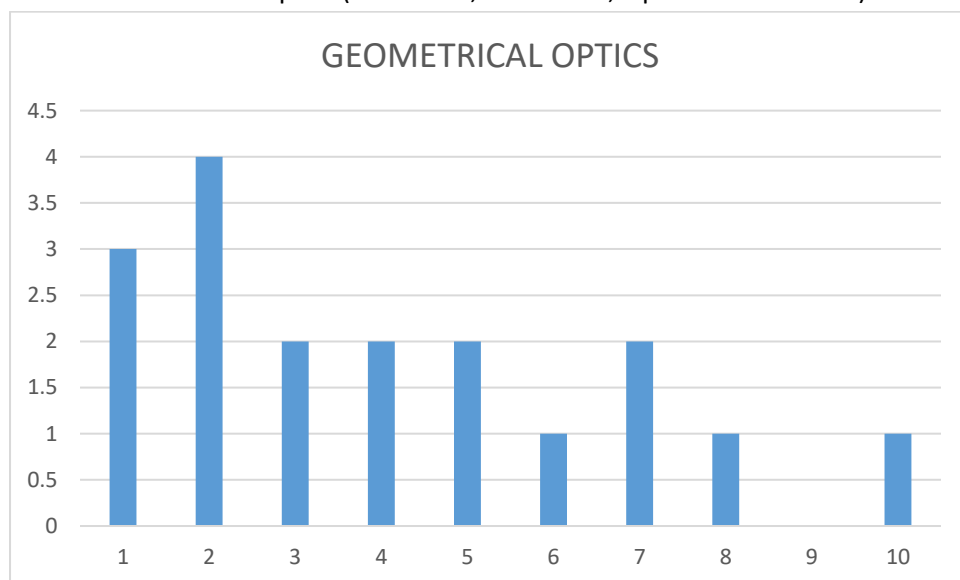
- Total internal reflection and its applications.
- Deviation and Dispersion of light by a prism; Lens Formula.
- Magnification. Power of a Lens.
- Combination of thin lenses in contact.
- Microscope and Astronomical Telescope (reflecting and refracting) and their magnifying powers.

PART 2: WAVE OPTICS

- Wave front and Huygens' Principle.
- Laws of reflection and refraction using Huygens principle.
- Interference
- Young's double-slit experiment and expression for fringe width, coherent sources and sustained interference of light.
- Diffraction due to a single slit, width of central maximum.
- Resolving power of microscopes and astronomical telescopes.
- Polarization, plane-polarized light: Brewster's law, uses of plane-polarized light and Polaroid.

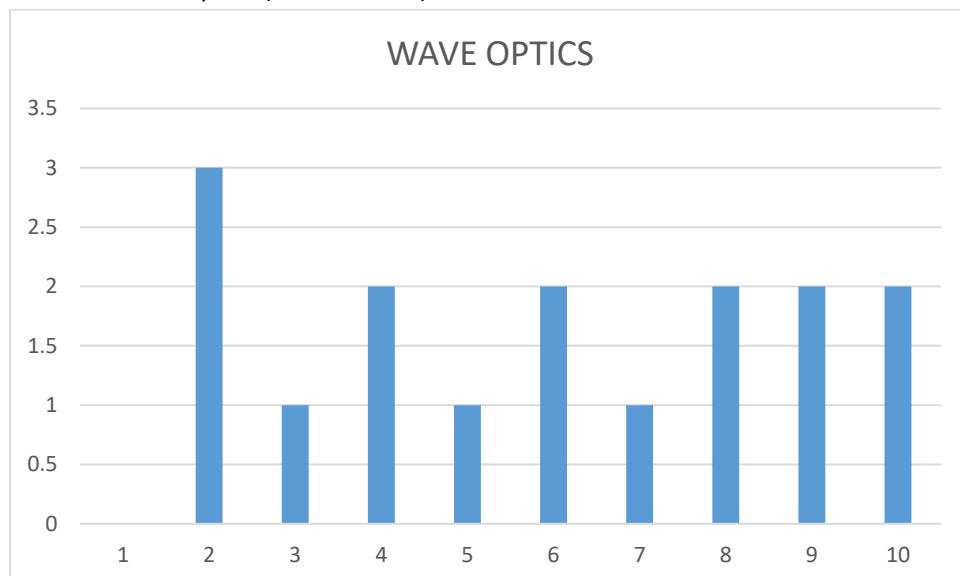
CHAPTERWISE ANALYSIS

1. Geometrical Optics (Reflection, Refraction, Optical Instruments)

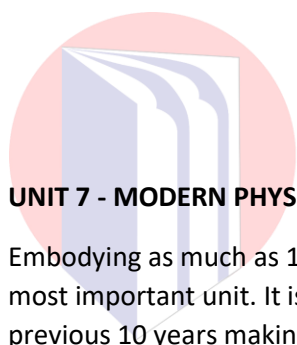


Witnessing at least one question every year, ray optics is an important chapter. It has seen as many as 18 questions in the last 10 years and should be a must know chapter. Combination of lenses form good questions.

2. Wave Optics (Interference)



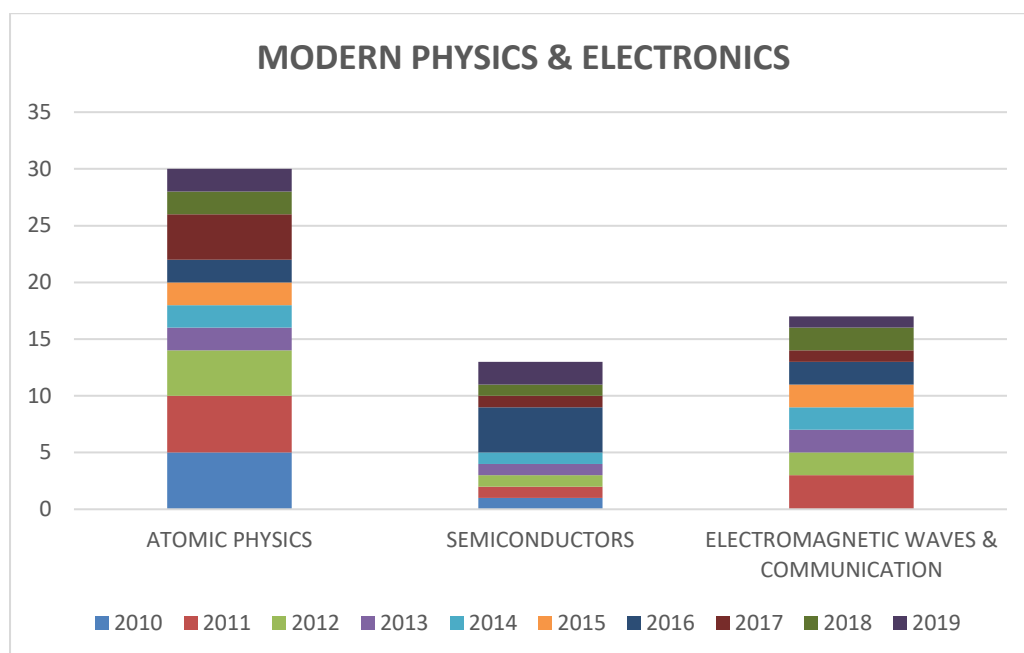
While 16 questions have been asked over the span of 9 years, recently it is seeing a regular of 2 questions. This chapter should not be ignored at any cost. Young's double slit experiment is an important topic.



KAYSONS EDUCATION

UNIT 7 - MODERN PHYSICS & ELECTRONICS

Embodying as much as 19% of the whole of Physics, it is safe to say that from the weightage point of view, this is the most important unit. It is only because of the chapter of Atomic Physics which alone has seen 30 questions in the previous 10 years making it the most important chapter of all time. It is followed by a very important EM Waves & Communication which has seen 17 questions. While semiconductor is the least weightage based among these 3, it is equally important with 13 questions. Make it a point to not ignore any concepts from this chapter. If at all being prepared at the end, semiconductors can be selectively prepared. Ignoring any other chapter can prove to be a serious mistake.



SYLLABUS

PART 1: DUAL NATURE OF MATTER AND RADIATION

- Dual nature of radiation.
- Photoelectric effect.
- Hertz and Lenard's observations; Einstein's photoelectric equation: particle nature of light.
- Matter waves-wave nature of particles, de Broglie relation.
- Davisson-Germer experiment.

PART 2: ATOMS AND NUCLEI

- Alpha-particle scattering experiment; Rutherford's model of atom; Bohr model, energy levels, hydrogen spectrum.
- Composition and size of nucleus, atomic masses, isotopes, isobars: isotones.
- Radioactivity- alpha. beta and gamma particles/rays and their properties; radioactive decay law.
- Mass-energy relation, mass defect; binding energy per nucleon and its variation with mass number, nuclear fission and fusion.

PART 3: ELECTRONIC DEVICES

- Semiconductors; semiconductor diode: I-V characteristics in forward and reverse bias; diode as a rectifier; I-V characteristics of LED.
- The photodiode, solar cell and Zener diode; Zener diode as a voltage regulator.
- Junction transistor, transistor action, characteristics of a transistor: transistor as an amplifier (common emitter configuration) and oscillator.
- Logic gates (OR. AND. NOT. NAND and NOR)
- Transistor as a switch.

PART 4: ELECTROMAGNETIC WAVES

- Electromagnetic waves and their characteristics
- Transverse nature of electromagnetic waves

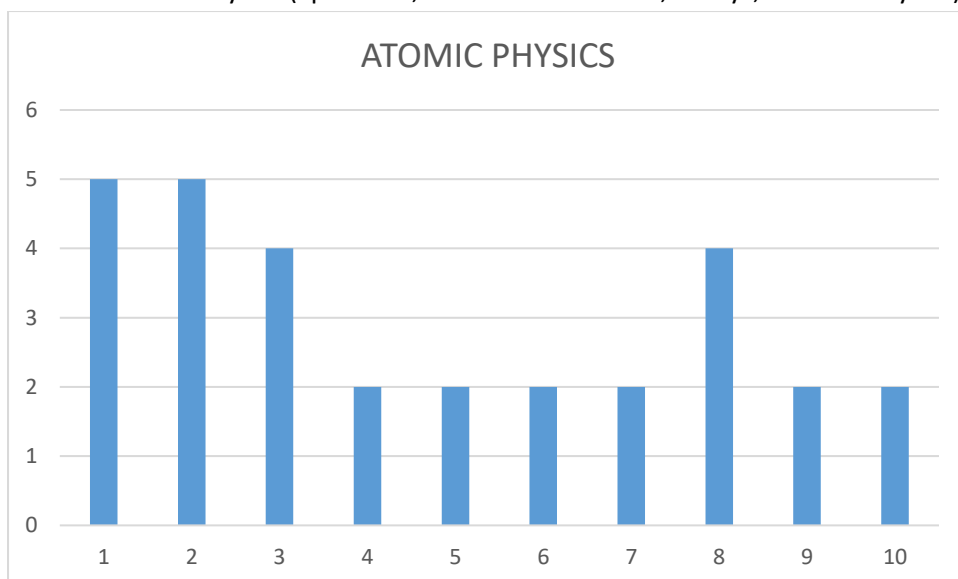
- Electromagnetic spectrum (radio waves, microwaves, infrared, visible, ultraviolet. X-rays. Gamma rays)
- Applications of e.m. waves

PART 5: COMMUNICATION SYSTEMS

- Propagation of electromagnetic waves in the atmosphere; Sky and space wave propagation.
- Need for modulation.
- Amplitude and Frequency Modulation, Bandwidth of signals.
- The bandwidth of Transmission medium, Basic Elements of a Communication System (Block Diagram only).

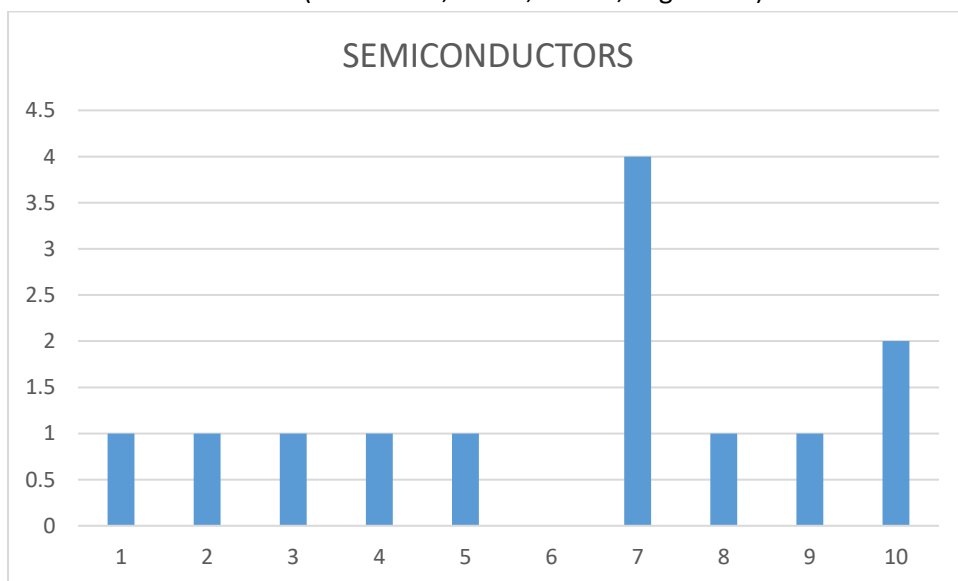
CHAPTERWISE ANALYSIS

1. Atomic Physics (Spectrum, Photoelectric Effect, X-Rays, Nuclear Physics)



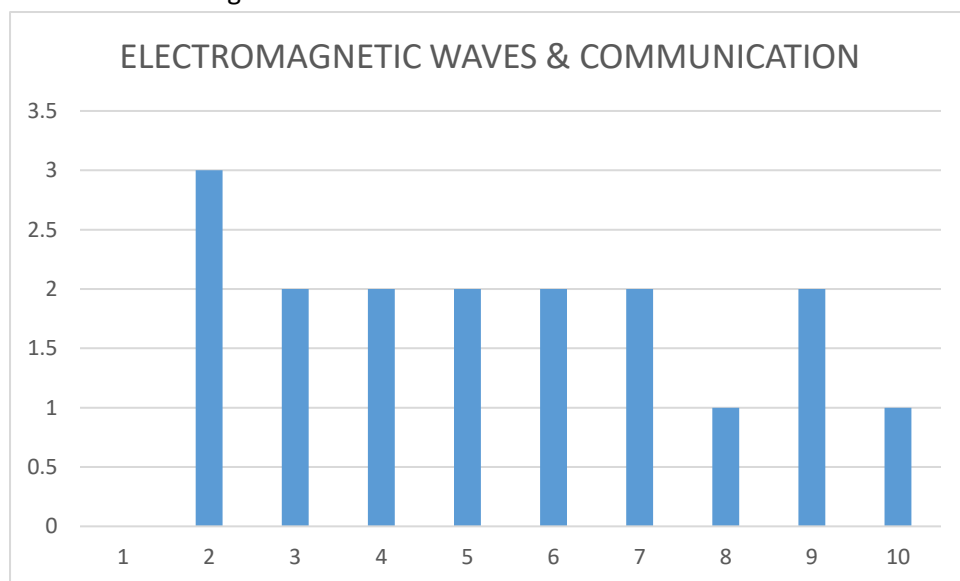
Averaging 3 questions per year, this chapter needs no introduction or discussion. It is alone 50% of the whole unit and all the concepts in it should be prepared without fail. All topics should be covered equally.

2. Semiconductors (Transistors, Diode, Triode, Logic Gate)



Seeing at least 1 question every year, it had a surprise amount of 4 questions in 2016. It is not a difficult chapter and should be generally completed as well. A total of 13 questions from 2010 to 2019. All topics should be covered.

3. Electromagnetic Waves & Communication



It is a good combination of theory and problems. With 2 questions asked almost every year, this is a very easy chapter and should be prepared to score the precious marks. Many students do the mistake of leaving out the chapter at the end to find no time for preparation. With 17 questions from 2012 to 2019, this chapter is well ahead in importance. Get comfortable with the spectrum. Communication system is a fairly simple chapter.

While preparing for the subject, students tend to spend a lot of time in the initial chapters of the subject which leaves out a very little time for the important ones at the end. Thus, it is very important to refer the weightage chart and adjust the preparation accordingly.