ASSESSMENT FRAMEWORK AND MODEL QUESTION PAPER

PHYSICS

Grade IX

NATIONAL CURRICULUM
2022-23

INCLUSIVE SCHEME OF STUDIES 2024



FEDERAL BOARD OF INTERMEDIATE AND SECONDARY EDUCATION, ISLAMABAD

WE WORK FOR EXCELLENCE

FEDERAL BOARD OF INTERMEDIATE AND SECONDARY EDUCATION

H-8/4, ISLAMABAD

ASSESSMENT FRAMEWORK

FOR PHYSICS GRADE-IX

CURRICULUM 2022-23

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ACKNOWLEDGEMENT

It is a great honour that we, at the Federal Board of Intermediate and Secondary Education, have developed the Assessment Framework (AF) for the subject of Physics for Grade-IX. The primary objective of the AF is to optimize the current curriculum 2022-23. This comprehensive framework has been crafted meticulously by subject matter and assessment experts who conducted an in-depth review of all learning outcomes for Grade-IX Physics curriculum. They evaluated these outcomes in terms of their scope, cognitive level, and progression across the grade.

This significant undertaking was the result of a series of extensive meetings and collaborative efforts of the subject and assessment experts. Their dedication and expertise have been instrumental in bringing this framework to fruition.

The Assessment Framework will serve as a guiding document for students, teachers and paper setters. Students will receive clear directions for preparing themselves for the annual examination. Similarly, teachers will use it as a guide to understand what to teach in class and to prepare students for the final examinations accordingly. Similarly paper setters will also seek guidance from this document.

Following subject as well as assessment experts/committee members remained constantly engaged in the development of the AF:

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The whole work was successfully accomplished under the able supervision and guidance of Syed Junaid Akhlaq, Chairman, FBISE and due to the hard work and dedication of the staff of Research Section of FBISE, in particular, Syed Zulfiqar Shah, Deputy Secretary, Research and Academics who played a pivotal and leading role in finalizing the AF.

MIRZA ALI
Director (Research & Academics)
FBISE, Islamabad

ASSESSMENT FRAMEWORK FOR PHYSICS GRADE-IX, CURRICULUM 2022-23

To ensure clarity and precision in assessment, the learning outcomes have been categorized into two distinct groups: formative and summative. This classification helps in effectively measuring student progress and understanding. Each Student learning outcome (SLO) has been carefully marked as either formative or summative within the newly developed Assessment Framework. SLOs of Summative Assessment Format will be part of the Final Examination while SLOs of Formative Assessment will although be part of the teaching-learning activity but they will **NOT** be part of Final Examinations. Estimated cognitive levels i.e Knowledge (K), Understanding (U) and Application (A) of all the SLOs have also been indicated. It may be noted that all the higher cognitive levels have been collectively accumulated in the cognitive level of 'Application'. In subjects involving Practicals (Lab work), it has been mentioned categorically whether an SLO is summative for theory or summative for Practical Based Assessment (PBA). If an SLO is summative for PBA, it means that Laboratory work is required in the teaching-learning activity and it will be part of the Practical Examination/ Practical Based Assessment.

The Assessment Framework will act as a comprehensive guide for students, teachers and paper setters. Students will have clear instructions on how to prepare for the annual examinations. Teachers will use the framework to understand the curriculum and effectively prepare their students for the final examination. Additionally, paper setters will refer to this document for guidance in setting examination papers.

A model question paper has also been developed to provide a clear structure and format for upcoming examinations. The model question paper ensures consistency and fairness, offering students a comprehensive understanding of what to expect in their examinations. By aligning the paper with the Student Learning Outcomes (SLOs) of the curriculum, we ensured that the questions accurately reflect the skills and knowledge that students are expected to acquire.

A detailed Table of Specifications (ToS) has been created to ensure equitable coverage of cognitive levels and content domains in order to generate a balanced question paper. The ToS serves as drawing scale and action plan for the question paper, ensuring that all important areas of the curriculum are adequately and proportionately assessed.

FORMATIVE ASSESSMENT: AN ESSENTIAL COMPONENT OF EFFECTIVE LEARNING

Formative assessment is a pivotal element in the educational process, distinguished by its role in providing ongoing feedback to both students and educators. Unlike summative assessments, which evaluate student learning at the end of an instructional period, formative assessments are integrated into the learning process to monitor student understanding and guide instructional decisions.

The primary objective of formative assessment is to identify learning gaps and misunderstandings as they occur, enabling timely interventions. This dynamic approach allows teachers to adjust their teaching strategies to better meet the needs of their students. For instance, if a teacher notices through a quick quiz or class discussion that a significant portion of the class struggles with a particular concept, they can revisit that topic, providing additional explanations or alternative methods of instruction. This adaptability is crucial for fostering a deeper understanding of the material.

Formative assessments come in various forms, ranging from informal methods like classroom discussions, observations, and questioning, to more structured approaches such as quizzes, peer assessments, and self-reflections. These methods are not limited to paper-and-pencil tasks but can include digital tools that provide instant feedback. The versatility of formative assessments allows educators to cater to diverse learning styles and preferences, ensuring that all students are engaged and supported in their learning journey.

Formative assessment plays a significant role in creating a supportive classroom environment. It shifts the focus from merely achieving grades to understanding the learning process. This approach reduces the pressure on students, as they perceive assessments not as a final judgment of their abilities but as a part of their learning journey. Consequently, formative assessment can lead to increased student motivation and engagement.

In conclusion, formative assessment is a powerful tool that, when effectively implemented, can significantly enhance the learning experience. It provides invaluable insights for both teachers and students, promotes a growth-oriented learning environment, and supports the continuous development of essential skills. As education evolves, the role of formative assessment will undoubtedly continue to be central in fostering successful and meaningful learning experiences.

SUMMATIVE ASSESSMENT: EVALUATING LEARNING OUTCOMES IN THE FORM OF TERMINAL/FINAL EXAMINATION

Summative assessment is a fundamental component of the educational process, designed to evaluate student learning at the conclusion of an instructional period. Unlike formative assessment, which provides ongoing feedback during the learning process, summative assessment serves as a final measure of what students have learned. Typically administered at the end of a unit, course, or academic year. Summative assessment aims to determine the extent to which educational objectives have been achieved.

The primary purpose of summative assessment is to assess the overall effectiveness of instruction and learning. It provides a conclusive evaluation of student performance, often in the form of tests, final projects, or standardized exams. These assessments generate grades or scores that reflect a student's achievement in a given subject area over a specific period or time duration.

Summative assessment is often used to make critical decisions regarding student progression, certification, or placement in subsequent educational levels. Additionally, summative assessments provide valuable data that inform curriculum development and instructional strategies. By analyzing summative assessment results, educators can identify trends, strengths, and weaknesses within their instructional approaches, allowing for improvements in future teaching.

In conclusion, summative assessment plays a critical role in the educational process by providing a final evaluation of student learning. While it differs from formative assessment in its focus and application, it is an essential tool for measuring academic achievement. When balanced with formative assessments, summative assessments contribute to a well-rounded and effective approach to evaluating and supporting student learning.

National Curriculum of Pakistan 2022-2023

Assessment Framework Physics Grade-IX (SSC-I)

Details of Content Areas/ SLOs

NCP SLOs Description	Form of Assessment	Cognitive Level	Remarks	Number of PeriodsRequired (1 period=40 minutes)
Domain: A Measurements				
[SLO: P-09-A-01] Differentiate Between physical and non-physical quantities	Summative	Knowledge + Understanding	Question(s) will be asked in final examination.	10 periods
[SLO: P-09-A-02] Explain with examples that physics is based on physical quantities [Including that these consist of a magnitude and a unit]	Summative	Understanding	Question(s) will be asked in annual examination.	
[SLO: P-09-A-03] Differentiate between base and derived physical quantities and units.	Summative	Knowledge + Understanding	Question(s) will be asked in final examination.	
[SLO: P-09-A-04] Apply the seven units of System International (SI) [along with their symbols and physical quantities (standard definitions of SI units are not required]	Summative	Application	Question(s) will be asked in final examination.	
[SLO: P-09-A-05] Analyze and express numerical data using scientific notation [In measurements and calculations]	Summative	Understanding+ Application	Question(s) will be asked in final examination.	
[SLO: P-09-A-06] Analyze and express numerical data, using prefixes. [including use of their symbol to indicate decimal submultiples or multiples of both base and derived units. Specially: Pico (p), nano (n) micro (μ), milli (m), centi (c) deci (d), kilo (k), mega (M), giga (G), tera (T). This also includes: interconverting the prefixes and their symbol to indicate multiples and sub-multiples for both base and drive units.]	Summative	Understanding + Application	Question(s) will be asked in final examination.	
[SLO: P-09-A-07] Differentiate between scalar and vector quantities. [A scalar has magnitude (size) only and that a vector quantity has magnitude and direction. students should be able to represent vectors graphically]	Summative	Knowledge + Understanding	Question(s) will be asked in final examination.	
[SLO: P-09-A-08] Justify that distance, speed, time, mass, energy, and temperature are scalar quantities.	Summative	Understanding	Question(s) will be asked in final examination.	
[SLO: P-09-A-09] Justify that displacement, force; weight, velocity, acceleration, momentum, electric field strength and gravitational field strength are vector quantities.	Summative	Understanding	Question(s) will be asked in final examination.	
[SLO: P-09-A-10] Determine, by calculation or graphically, the resultant of two vectors at right angles	Summative	Application	Question(s) will be asked in final examination.	
[SLO: P-09-A-11] Make reasonable estimates of physical quantities [of those that are discussed in the topics of this grade level]	Summative	Application	Question(s) will be asked in final examination.	

NCP SLOs Description	Form of Assessment	Cognitive Level	Remarks	Number of PeriodsRequired (1 period=40 minutes)
[SLO: P-09-A-12] Justify and illustrate the use of common lab instruments to measure length [including how to measure a variety of lengths with appropriate precision using tapes, rulers, micrometers, and Vernier calipers (including reading the scales on analogue calipers and micrometers)]	Summative for PBA (Practical Based Assessment)	Knowledge+ Understanding+ Application	Lab work-Question(s) will be asked in PBA	12 periods
[SLO: P-09-A-13] Justify and illustrate the use of measuring cylinders to measure volume [including both measurement of volume of liquid and determining the volume of a solid by displacement]	Summative for PBA (Practical Based Assessment)	Understanding+ Application	Lab work-Question(s) will be asked in PBA	
[SLO: P-09-A-14] Justify and illustrate how to measure time intervals using lab instruments [including clocks and digital timers]	Summative for PBA (Practical Based Assessment)	Understanding+ Application	Lab work-Question(s) will be asked in PBA	
[SLO: P-09-A-15] Determine an average value for an empirical reading [including small distance and for a short interval of time by measuring multiples (including the period of oscillations of a pendulum)]	Summative for PBA (Practical Based Assessment)	Understanding + Application	Lab work-Question(s) will be asked in PBA	
[SLO: P-09-A-16] Round off and justify calculational estimates [Based on empirical data to an appropriate number of significant figures]	Summative for PBA (Practical Based Assessment)	Understanding + Application	Lab work-Question(s) will be asked in PBA	
[SLO: P-09-A-17] Critique and analyze experiments for sources of error [including identifying sources of systematic and random error in measurements and suggesting steps to correct them]	Summative	Understanding + Application	Question(s) will be asked in final examination.	
[SLO: P-09-A-18] Differentiate between precision and accuracy	Summative	Understanding	Question(s) will be asked in final examination.	
[SLO: P-09-A-19] Determine the least count of a data collection instrument (analog) from its scale	Summative for PBA (Practical Based Assessment)	Understanding+ Application	Lab work-Question(s) will be asked in PBA	

NCP SLOs Description	Form of Assessment	Cognitive Level	Remarks	Number of PeriodsRequired (1 period=40 minutes)
Domain: B Mechanics				
[SLO: P-09-B-01] Differentiate between different types of motion [i.e. translatory (linear, random and circular), rotatory and vibratory motions and distinguish among them]	Summative	Knowledge + Understanding	Question(s) will be asked in final examination.	16 periods
[SLO: P-09-B-02] Differentiate between distance and displacement, speed and velocity	Summative	Knowledge + Understanding	Question(s) will be asked in final examination.	
[SLO: P-09-B-03] Define and Calculate Speed [using the equation speed = distance/time, $v = \Delta s/\Delta t$ (this should include an understanding of term instantaneous) speed]	Summative	Understanding+ Application	Question(s) will be asked in final examination.	
[SLO: P-09-B-04] Define and Calculate average speed [average speed = (total distance travelled)/(total time taken)]	Summative	Knowledge+ Understanding+ Application	Question(s) will be asked in final examination.	
[SLO: P-09-B-05] Differentiate between average and instantaneous speed	Summative	Understanding	Question(s) will be asked in final examination.	
[SLO: P-09-B-06] Differentiate between uniform velocity and non- uniform velocity	Summative	Understanding	Question(s) will be asked in final examination.	
[SLO: P-09-B-07] Define and calculate acceleration [includes deriving the units of acceleration as m/s^2 from the formula $a = \Delta v/\Delta t$ and using the formula to solve problems. This also includes knowing that deceleration is negative acceleration and using fact in calculations.]	Summative	Understanding+ Application	Question(s) will be asked in final examination.	
[SLO: P-09-B-08] Differentiate between uniform acceleration and non-uniform acceleration	Summative	Understanding	Question(s) will be asked in final examination.	
[SLO: P-09-B-09] Sketch, plot and interpret distance— time and Speed-time graphs. This includes determining from the shape of a distance-time graph when an object is: [(a) at rest, (b) moving with constant speed, (c) accelerating, (d) decelerating, Students are Also required to know how to calculate speed from gradient of a distance-time graph. It also includes determining from the shape of a speed time graph when an object is: (a) at rest, (b) Moving with constant speed (c) moving with constant acceleration (d) moving with changing acceleration]	Summative	Understanding+ Application	Question(s) will be asked in final examination.	
[SLO: P-09-B-10] Use the approximate value $9.8m/s^2$ for free fall acceleration near Earth to solve problems	Summative	Understanding + Application	Question(s) will be asked in final examination.	
[SLO: P-09-B-11] Justify how the gradient of a distance Vs. time graph gives the speed	Summative	Understanding + Application	Question(s) will be asked in final examination.	

NCP SLOs Description	Form of Assessment	Cognitive Level	Remarks	Number of PeriodsRequired (1 period=40 minutes)
[Without using calculus]				
[SLO: P-09-B-12] Analyze the Distance travelled in speed vs time graphs [by determining the area under the graph for cases of motion with constant speed or constant acceleration]	Summative	Application	Question(s) will be asked in final examination.	
[SLO: P-09-B-13] Derive how the area beneath a speed Vs. time graph gives the distance traveled (without calculus)	Summative	Application	Question(s) will be asked in final examination.	
[SLO: P-09-B-14] Calculate acceleration from the gradient of a speed—time graph	Summative	Application	Question(s) will be asked in final examination.	
[SLO: P-09-B-15] Justify how the gradient of the speed vs time graph gives the acceleration [Without using calculus]	Summative	Understanding + Application	Question(s) will be asked in final examination.	
[SLO: P-09-B-16] State that there is a universal speed limit for any object in the universe that is approximately 3 x 10^8m/s [Students should just be aware that this phenomenon is true; they do not need to study relativity in any depth. The purpose is that students appreciate that there is a universal speed limit.]	Summative	Application	Questions will be asked in annual examination.	04 periods
[SLO: P-09-B-17] Illustrate that mass is a measure of the quantity of matter in an object	Summative	Knowledge	Questions will be asked in annual examination.	
[SLO: P-09-B-18] Explain that the mass of an object resists change from its state of rest or motion (inertia)	Summative	Understanding	Questions will be asked in annual examination.	
[SLO: P-09-B-19] Define and calculate weight [weight is the force exerted on an object with mass by a planet's gravity, and use W=mg]	Summative	Understanding+ Application	Question(s) will be asked in final examination.	
[SLO: P-09-B-20] Define and calculate gravitational field strength [this includes being able to state that a gravitational field is a region in which a mass experiences a force due to gravitational attraction. Student should be able to define gravitational field strength (g) as force per unit mass. Use the equation gravitational field strength = weight/mass g = W/m [and know that this is equivalent to the acceleration of free fall)]	Summative	Knowledge + Understanding+ Application	Question(s) will be asked in final examination.	03 periods
[SLO: P-09-B-21] Justify and illustrate the use of electronic balances to measure mass [Understand the internal workings of the electronic balance is not required: just how to practically used instrument in appropriate situations]	Summative for PBA (Practical Based Assessment)	Understanding+ Application	Lab work-Question(s) will be asked in PBA	
[SLO: P-09-B-22] Justify and illustrate the use of a force meter to measure weight	Summative for PBA (Practical Based	Understanding+ Application	Lab work-Question(s) will be asked in PBA	

NCP SLOs Description	Form of Assessment	Cognitive Level	Remarks	Number of PeriodsRequired (1 period=40 minutes)
	Assessment)			
[SLO: P-09-B-23] Differentiate between contact and noncontact forces	Summative	Knowledge + Understanding	Question(s) will be asked in final examination.	12 periods
[SLO: P-09-B-24] Differentiate between different types of forces [Including weight (gravitational force), friction, drag, air resistance, tension (elastic force), electrostatic force, magnetic force, trust (driving force) and contact force]	Summative	Knowledge + Understanding	Question(s) will be asked in final examination.	
[SLO: P-09-B-25] State that there are three fundamental forces and describe them in terms of their relative strengths [These are gravitational strong and electro weak forces. Student should know that Pakistani scientist won the prize Nobel Prize for helping prove that the week force and electromagnetic force are actually unified]	Summative	Knowledge + Understanding	Question(s) will be asked in final examination.	
[SLO: P-09-B-26] Represent the forces acting on a body using free body diagrams	Summative	Application	Question(s) will be asked in final examination.	
[SLO: P-09-B-27] State and apply Newton's first law	Summative	Knowledge + Understanding + Application	Question(s) will be asked in final examination.	
[SLO: P-09-B-28] Identify the effect of force on velocity [It may change the velocity of an object by changing its direction of motion or its speed]	Summative	Knowledge + Understanding	Question(s) will be asked in final examination.	
[SLO: P-09-B-29] Determine the resultant of two or more forces acting along the same straight line	Summative	Application	Question(s) will be asked in final examination.	
[SLO: P-09-B-30] State and apply Newton's second law in terms of acceleration	Summative	Knowledge + Understanding + Application	Question(s) will be asked in final examination.	
[SLO: P-09-B-31] State and apply Newton's third law	Summative	Knowledge + Understanding + Application	Question(s) will be asked in final examination.	
[SLO: P-09-B-32] Explain with examples how Newton's third law describes pairs of forces of the same type acting on different objects	Summative	Understanding	Question(s) will be asked in final examination.	
[SLO: P-09-B-33] State the limitations of Newton's laws of motion. [That they are not exact but provide a good approximation, unless and object is moving close to the speed of light or is small enough that quantum effects becomes significant (for example, in the case of high speed bodies, the theory of relativistic mechanics is used. In the case of very small objects at the subatomic level, quantum mechanics is used]	Summative	Understanding	Question(s) will be asked in final examination.	

NCP SLOs Description	Form of Assessment	Cognitive Level	Remarks	Number of PeriodsRequired (1 period=40 minutes)
[SLO: P-09-B-34] Describe and identify states of equilibrium [This include the types, conditions, and states of equilibrium and identifying examples of them in our daily life]	Summative	Knowledge + Understanding	Question(s) will be asked in final examination.	
[SLO: P-09-B-35] Analyze the dissipative effect of friction [this include identifying where dissipation may occur and giving example such as rubbing hands together produces heat, asteroids that enter the Earth's atmosphere disintegrate due to high temperature generated from air resistance]	Summative	Application+ Understanding	Question(s) will be asked in final examination.	18 periods
[SLO: P-09-B-36] Analyze the dynamics of an object reaching terminal velocity	Summative	Application	Question(s) will be asked in final examination.	
[SLO: P-09-B-37] Differentiate qualitatively between rolling and sliding friction [no need for coefficient of friction]	Summative	Understanding	Question(s) will be asked in final examination.	
[SLO: P-09-B-38] Justify methods to reduce friction.	Summative	Understanding + Application	Question(s) will be asked in final examination.	06 periods
[SLO: P-09-B-39] Define and calculate momentum	Summative	Knowledge + Understanding+ Application	Question(s) will be asked in final examination.	
[SLO: P-09-B-40] Define and calculate impulse [use the equation impulse = $F\Delta t = m\Delta v$]	Summative	Knowledge+Understanding +Application	Question(s) will be asked in final examination.	
[SLO: P-09-B-41] Apply the principle of the conservation of momentum to solve simple problems in one dimension	Summative	Application	Question(s) will be asked in final examination.	
[SLO: P-09-B-42] Define resultant force in terms of momentum [As the change in momentum per unit time; recall and use the equation resultant force = change in momentum/time taken $F = \Delta p/\Delta t$]	Summative	Understanding + Application	Question(s) will be asked in final examination.	
[SLO: P-09-B-43] Differentiate between like and unlike Parallel forces.	Summative	Understanding	Question(s) will be asked in final examination.	14 periods
[SLO: P-09-B-44] Analyze problems involving turning effects of forces [Students should know that moment of a force = force x perpendicular distance from the pivot and be able to use this in simple problems and be able to give examples and applications of turning effects in real life]	Summative	Knowledge + Application	Question(s) will be asked in final examination.	
[SLO: P-09-B-45] Analyze objects in equilibrium using the principle of moments	Summative	Application	Question(s) will be asked in final examination.	
[SLO: P-09-B-46] Justify experiment to verify the principle of moments	Summative	Application	Question(s) will be asked in final examination.	
[SLO: P-09-B-47] State what is meant by center of mass and center of gravity	Summative	Knowledge+	Question(s) will be asked in	

NCP SLOs Description	Form of Assessment	Cognitive Level	Remarks	Number of PeriodsRequired (1 period=40 minutes)
		Understanding	final examination.	
[SLO: P-09-B-48] Describe how to determine the position of the center of gravity of a plane lamina using a plumb Line	Summative for PBA (Practical Based Assessment)	Understanding + Application	Lab work-Question(s) will be asked in PBA	
[SLO: P-09-B-49] Analyze, qualitatively, the effect of the position of the center of gravity on the stability of simple objects	Summative	Application	Question(s) will be asked in final examination.	
[SLO: P-09-B-50] Propose how the stability of an object can be improved [by lowering the centre of mass and increasing the base area of the object]	Summative	Application	Question(s) will be asked in final examination.	
[SLO: P-09-B-51] Illustrate the applications of stability physics in real life [such as this concept is Central to Engineering Technology such as balancing toys and racing cars]	Summative	Application	Question(s) will be asked in final examination.	
[SLO: P-09-B-52] Predict qualitatively the motion of rotating bodies [describe qualitatively that analogous to Newton's first law for translational motion, an object that is rotating will continue to do so at the same rate unless acted upon by resultant moment (in which case it would begin to accelerate or decelerate its rotational motion]	Summative	Understanding	Question(s) will be asked in final examination.	
[SLO: P-09-B-53] Describe qualitatively motion in a circular path due to a centripetal force	Summative	Knowledge + Understanding	Question(s) will be asked in final examination.	03 periods
[SLO: P-09-B-54] identify the sources of centripetal force in real life examples [e.g. tension in a string for a stone being swirled around, gravity for the Moon orbiting the Earth]	Summative	Application	Question(s) will be asked in final examination.	
[SLO: P-09-B-55] Illustrate that forces may produce a change in size and shape of an object	Summative	Application	Question(s) will be asked in final examination.	06 periods
[SLO: P-09-B-56] Define and calculate the spring constant [Apply the equation, Spring Constant = force/extension k= F/x to solve problem involving simple Springs]	Summative	Knowledge + Understanding + Application	Question(s) will be asked in final examination.	
[SLO: P-09-B-57] Sketch, plot and interpret load—extension graphs for an elastic solid and describe the associated experimental procedures	Summative for PBA (Practical Based Assessment)	Understanding+ Application	Lab work-Question(s) will be asked in PBA	
[SLO: P-09-B-58] Define and use the term 'limit of proportionality' for a load—extension	Summative	Knowledge+	Lab work-Question(s) will	

NCP SLOs Description	Form of Assessment	Cognitive Level	Remarks	Number of PeriodsRequired (1 period=40 minutes)
graph [Including identifying this point on the graph (an understanding of the elastic limit is not required)	for PBA (Practical Based Assessment)	Understanding + Application	be asked in PBA	
[SLO: P-09-B-59] Illustrate the applications of Hooke's Law [such as that it is the fundamental principle behind engineering many measurement instruments such as the spring scale, the Galvanometer and the balance wheel of the mechanical clock	Summative	Application	Question(s) will be asked in final examination.	
[SLO: P-09-B-60] Define work done.	Summative	Knowledge	Question(s) will be asked in final examination.	25 periods
[SLO: P-09-B-61] Use the equation work done = force x distance moved in the direction of the force W = F x d to solve problems	Summative	Application	Question(s) will be asked in final examination.	
[SLO: P-09-B-62] Define energy as the ability to do work	Summative	Knowledge	Question(s) will be asked in final examination.	
[SLO: P-09-B-63] Explain that energy may be stored [Such as gravitational potential, chemical, elastic (strain), nuclear, electrostatic and internal (thermal) energies]	Summative	Knowledge+ Understanding	Question(s) will be asked in final examination.	
[SLO: P-09-B-64] Prove that Kinetic Energy E_k = 1/2 mv^2 [use of equations of motion not `needed; proof through kinematic graphs will suffice]	Summative	Application	Question(s) will be asked in final examination.	
[SLO: P-09-B-65] Prove and use the formula for Gravitational potential energy	Summative	Application	Question(s) will be asked in final examination.	
[SLO: P-09-B-66] Use the formulas for kinetic and Gravitational potential energy to solve problems involving simple energy conversions [Make use of the conversion of energy from one form to the other, including case involving loss of energy to the surroundings]	Summative	Application	Question(s) will be asked in final examination.	
[SLO: P-09-B-67] Describe how energy is transferred and stored during events and processes [e.g. work done during transfer by mechanical work done, electrical work done and heat]	Summative	Understanding	Question(s) will be asked in final examination.	
[SLO: P-09-B-68] State and apply the principle of the conservation of energy	Summative	Knowledge + Understanding + Application	Question(s) will be asked in final examination.	
[SLO: P-09-B-69] Justify why perpetual energy machines do not work	Summative	Understanding	Question(s) will be asked in final examination.	
[SLO: P-09-B-70] Differentiate between and list renewable and non- renewable energy	Summative	Knowledge +	Question(s) will be asked in	

NCP SLOs Description	Form of Assessment	Cognitive Level	Remarks	Number of PeriodsRequired (1 period=40 minutes)
sources		Understanding	final examination.	
[SLO: P-09-B-71] Describe how useful energy may be obtained from natural resources [including the cases of (chemical energy stored in fossil fuels, chemical energy stored in biofuels, hydroelectric resources, solar radiation, nuclear fuel, geothermal resources, wind, tides, waves in the seas [while including references to a boiler, turbine and generator where they are used]	Summative	Application	Question(s) will be asked in final examination.	
[SLO: P-09-B-72] Describe advantages and disadvantages of methods of energy generation [Limited to whether it is renewable, when and whether it is available, and its impact on the environment]	Summative	Understanding	Question(s) will be asked in final examination.	
[SLO: P-09-B-73] Define and calculate power [as work done per unit time and also as energy transferred per unit time. This also include applying the equations: (a) power = work done/time taken, P = W/t. Power = energy transferred/time taken, P = W/t to solve simple problems]	Summative	Knowledge + Application	Question(s) will be asked in final examination.	
[SLO: P-09-B-74] Define and calculate efficiency [Including: (a) percentage efficiency = (useful energy output) /(Total energy input)(x100%) (b) percentage efficiency = (useful power output) /(Total power input)(x100%)]	Summative	Knowledge + understanding+ Application	Question(s) will be asked in final examination.	
[SLO: P-09-B-75] Apply the concept of efficiency to simple problems involving energy transfer	Summative	Application	Question(s) will be asked in final examination.	
[SLO: P-09-B-76] State that a system cannot have an efficiency of 100% due to unavoidable energy losses	Summative	Knowledge	Question(s) will be asked in final examination.	
[SLO: P-09-B-77] Define and calculate pressure [As force per unit area. Use equation pressure = force/area P = F/A to solve simple problem]	Summative	Knowledge + Understanding + Application	Question(s) will be asked in final examination.	
[SLO: P-09-B-78] Describe how pressure varies with force and area in the context of everyday examples	Summative	Understanding	Question(s) will be asked in final examination.	
[SLO: P-09-B-79] Analyze in situations how pressure at surface produces a force in a direction at right angles to the surface [Can make reference to experiments to verify this principle]	Summative	Application	Question(s) will be asked in final examination.	
[SLO: P-09-B-80] Justify that the atmosphere exerts a pressure.	Summative	Understanding	Question(s) will be asked in final examination.	
[SLO: P-09-B-81] Describe that atmospheric pressure decreases with the increase in height above the Earth's surface.	Summative	Understanding	Question(s) will be asked in final examination.	
[SLO: P-09-B-82] Explain that changes in atmospheric pressure in a region may indicate a , change in the weather.	Summative	Understanding	Question(s) will be asked in final examination.	

NCP SLOs Description	Form of Assessment	Cognitive Level	Remarks	Number of PeriodsRequired (1 period=40 minutes)
[SLO: P-09-B-83] Analyze the workings and applications of a liquid barometer	Summative	Application	Question(s) will be asked in final examination.	
[SLO: P-09-B-84] Justify why and analyze quantitatively how pressure varies with depth in a liquid.	Summative	Understanding + Application	Question(s) will be asked in final examination.	
[SLO: P-09-B-85] Analyze the workings and applications of a manometer	Summative	Application	Question(s) will be asked in final examination.	
[SLO: P-09-B-86] Define and apply Pascal's law [Apply Pascal's law to systems such as the transmission of pressure in hydraulic system with particular reference to hydraulic press and Hydraulic brakes on vehicles.]	Summative	Knowledge + Understanding+ Application	Question(s) will be asked in final examination.	
Domain C: Heat and Thermodynamics				
[SLO: P-09-C-01] Define and calculate density	Summative	Understanding+ Application	Question(s) will be asked in final examination.	02 periods
[SLO: P-09-C-02] Justify and illustrate how to determine the density of a substance [Including for a liquid of regular shaped solid and of an irregularly shaped solids which sinks in a liquid (volume by a displacement), including appropriate calculations]	Summative	Understanding+ Application	Question(s) will be asked in final examination.	
[SLO: P-09-C-03] Describe, qualitatively, the particle structure of solids, liquids and gasses. [including relating their properties to the forces and distance between particles and to the motion of the particles (atoms, molecules, ions and electrons)	Summative	Knowledge + Understanding	Question(s) will be asked in final examination.	02 periods
[SLO: P-09-C-04] Describe plasma as a fourth state of matter [in which a significant portion of the material is made up of ions or electrons e.g. in stars neon lights and lighting streamers]	Summative	Understanding	Question(s) will be asked in final examination.	
[SLO: P-09-C-05] Describe the relationship between the motion of particles and temperature [Including the idea that there is lowest possible temperature (approximately -273 ^{o}C), known as absolute zero, where the particles have least kinetic energy]	Summative	Understanding	Question(s) will be asked in final examination.	10 periods
[SLO: P-09-C-06] State that an increase in the temperature of an object increases its internal energy	Summative	Knowledge + understand	Question(s) will be asked in final examination.	
[SLO: P-09-C-07] Explain, with examples, how a physical property which varies with temperature may be used for the measurement of temperature	Summative	Understanding	Question(s) will be asked in final examination.	
[SLO: P-09-C-08] Justify the need for fixed points in the calibration of thermometers [Including what is meant by the ice point and steam point.]	Summative	Knowledge + Understanding	Question(s) will be asked in final examination.	
[SLO: P-09-C-09] illustrate what is meant by the sensitivity, range and linearity of	Summative	Knowledge +	Question(s) will be asked in	

NCP SLOs Description	Form of Assessment	Cognitive Level	Remarks	Number of PeriodsRequired (1 period=40 minutes)
thermometers.		Understanding+ Application	final examination.	
[SLO: P-09-C-10] Differentiate between the structure and function of liquid-in-glass and of thermocouple thermometers	Summative	Understanding	Question(s) will be asked in final examination.	
[SLO: P-09-C-11] Analyze how the structure of a liquid in-glass thermometer affects its sensitivity, range and linearity	Summative	Application	Question(s) will be asked in final examination.	
Domain E: Electricity and Magnetism				
[SLO: P-09-E-01] Describe the forces between magnetic poles and between magnets and magnetic materials [including the use of the terms north pole (N pole), South Pole (S pole), attraction and repulsion, magnetized and un-magnetized]	Summative	Knowledge + Understanding	Question(s) will be asked in final examination.	15 periods
[SLO: P-09-E-02] Describe induced magnetism	Summative	Knowledge	Question(s) will be asked in final examination.	
[SLO: P-09-E-03] State the difference between magnetic and non- magnetic materials	Summative	Knowledge	Question(s) will be asked in final examination.	
[SLO: P-09-E-04] Differentiate Between Temporary and Permanent Magnets	Summative	Knowledge + Understanding	Question(s) will be asked in final examination.	
[SLO: P-09-E-05] Describe magnetic fields [As a region in which a magnetic pole experiences a force]	Summative	Knowledge + Understanding	Question(s) will be asked in final examination.	
[SLO: P-09-E-06] Illustrate the plotting of magnetic field lines with a compass or iron filings	Summative	Application	Question(s) will be asked in final examination.	
[SLO: P-09-E-07] Draw the pattern and direction of the magnetic field lines around a bar magnet	Summative	Application	Question(s) will be asked in final examination.	
[SLO: P-09-E-08] State that the direction of the magnetic field at a point is the direction of the force on the N pole of a magnet at that point	Summative	Knowledge	Question(s) will be asked in final examination.	
[SLO: P-09-E-09] state that the relative strength of a magnetic field is represented by the spacing of the magnetic field lines	Summative	Understanding	Question(s) will be asked in final examination.	
[SLO: P-09-E-10] Describe uses of permanent magnets and electromagnets	Summative	Application	Question(s) will be asked in final examination.	
[SLO: P-09-E-11] Explain qualitatively in terms of the domain theory of magnetism how materials can be magnetized and demagnetized [Stroking method, heating, orienting in north-south direction and striking, use of a solenoid]	Summative	Knowledge + Understanding	Question(s) will be asked in final examination.	

NCP SLOs Description	Form of Assessment	Cognitive Level	Remarks	Number of PeriodsRequired (1 period=40 minutes)
[SLO: P-09-E-12] Differentiate between ferromagnetic, paramagnetic and diamagnetic materials [by making reference to the domain theory of magnetism and effect of external magnetic fields on these materials]	Summative	Understanding	Question(s) will be asked in final examination.	
[SLO: P-09-E-13] Describe the nature of the Earth's magnetic field [Specifically that: - is opposite to its geographical north-south orientation - protects life on the planet from cosmic radiation - allows animals that make use of biomagnetism (e.g. many birds and turtles) to navigate during migration)]	Summative	Understanding	Question(s) will be asked in final examination.	
[SLO: P-09-E-14] Analyze applications of magnets in recording technology. [and illustrate how electronic devices need to be kept safe from strong magnetic field]	Summative	Application	Question(s) will be asked in final examination.	
[SLO: P-09-E-15] State that soft magnetic materials such as soft iron) can be used to provide shielding from magnetic fields	Summative	Knowledge+ understanding	Question(s) will be asked in final examination.	
Domain F: Modern Physics				
[SLO: P-09-F-01] Define and calculate average orbital speed [from the equation $v = 2\pi r/T$ Where r is the average radius of the orbit and T is the orbital period; apply this equation to solve numerical problems]	Summative	Knowledge + Understanding+ Application	Question(s) will be asked in final examination.	03 periods
[SLO: P-09-F-02] Interpret and compare given planetary data [about orbital distance, orbital period, density, surface temperature and uniform gravitational field strength at the planet's surface]	Summative	Knowledge + Understanding+ Application	Question(s) will be asked in final examination.	
Domain G: Nature of Science				
[SLO: P-09-G-01] Describe physics as the study of matter, energy, space, time and their mutual connections and interactions	Summative	Understanding	Question(s) will be asked in final examination.	12 periods
[SLO: P-09-G-02] Explain with examples that physics has many sub- fields, and in today's world involves interdisciplinary fields. (Students should be able to distinguish in terms of the broad subject matter that is studied between the fields: Biophysics, Astronomy, Astrophysics, Cosmology, Thermal Physics, Optics, Classical Mechanics, Quantum Mechanics, Relativistic Mechanics, Nuclear Physics, Particle Physics, Electromagnetism, Acoustics, Computational Physics, Geophysics, Climate Physics)	Summative	Knowledge + Understanding	Question(s) will be asked in final examination.	
[SLO: P-09-G-03] Explain with examples how Physics is a subset of the Physical Sciences and of the natural sciences	Summative	Understanding	Question(s) will be asked in final examination.	

NCP SLOs Description	Form of Assessment	Cognitive Level	Remarks	Number of PeriodsRequired (1 period=40 minutes)
[SLO: P-09-G-04] State that scientists who specialize in the research of physics are called Physicists	Summative	Knowledge	Question(s) will be asked in final examination.	
[SLO: P-09-G-05] Brief with examples that science is a collaborative field that requires interdisciplinary researchers working together to share knowledge and critique ideas	Summative	Understanding	Question(s) will be asked in final examination.	
[SLO: P-09-G-06] Understand the terms 'hypothesis', theory' and 'law' in the context of research in the physics	Summative	Understanding	Question(s) will be asked in final examination.	
[SLO: P-09-G-07] Explain, with examples in Physics, falsifiability as the idea that a theory is scientific only if it makes assertions that can be disproven	Summative	Understanding	Question(s) will be asked in final examination.	
[SLO: P-09-G-08] Differentiate the terms 'science', 'technology' and 'engineering' with suitable examples	Summative	Application	Question(s) will be asked in final examination.	
Domain H: Experimentation Skills				
[SLO: P-09-10-N-01] explain, with examples, how hazards in a science lab can be classified into: ((i) physical hazards, (ii) chemical hazards, (iii) biological hazards, (v) safety hazards)	Formative for PBA	Understanding	Question will not be asked in final examination, however, it will be part of Lab work.	55 periods
[SLO: P-09-10-N-02] Identify for a given experimental procedure -what would be the most appropriate personal protective equipment to wear before setting up the apparatus.	Formative for PBA	Understanding	Question will not be asked in final examination, however, it will be part of Lab work.	
[SLO: P-09-10-N-03] Identify the meaning of common hazard signs in the laboratory	Formative for PBA	Knowledge	Question will not be asked in final examination, however, it will be part of Lab work.	
[SLO: P-09-10-N-04] call emergency services in case of an accident in the lab	Formative for PBA	Understanding	Question will not be asked in final examination, however, it will be part of Lab work.	
[SLO: P-09-10-N-05] Define and use the below terms: -True value: the value that would be obtained in an ideal measurement - Measurement error: the difference between a measured value and the true value of a quantity -Accuracy: a measurement result is described as accurate if it is close to the true value -Precision: how close the measured values of a quantity are to each other -Repeatability: a measurement is repeatable if the same or similar result is obtained when the measurement is repeated under the same conditions, using the same method, within the same experiment -Reproducibility: a measurement is reproducible if the same or similar result is obtained when the measurement is made under either different conditions or by a	Formative for PBA	Application	Question will not be asked in final examination, however, it will be part of Lab work.	

NCP SLOs Description	Form of Assessment	Cognitive Level	Remarks	Number of PeriodsRequired (1 period=40 minutes)
different method or in a different experiment -Validity of experimental design: an experiment is valid if the experiment tests what it says it will test. The experiment must be a fair test where only the independent variable and dependent variable may change, and controlled variables are kept constant -Range: the maximum and minimum value of the independent or dependent variables - Anomaly: an anomaly is a value in a set of results that appears to be outside the general pattern of the results, i.e., an extreme value that is either very high or very low in comparison to others - Independent variables: independent variables are the variable that are changed in a scientific experiment by the scientist. Changing an independent variable may cause a change in the dependent variable - Dependent variables: dependent variables are the variable that are observed or measured in a scientific experiment. Dependent variable may change based on changes made to the independent variables				
[SLO: P-09-10-N-06] identify appropriate apparatus for collecting the data.	Formative for PBA	Understanding	Question will not be asked in final examination, however, it will be part of Lab work.	
[SLO: P-09-10-N-07] visualize how the collected data would be tabulated or graphed	Formative for PBA	Understanding	Question will not be asked in final examination, however, it will be part of Lab work.	
[SLO: P-09-10-N-08] explain step by step the methodology for analyzing the data (e.g. gradient of line of best fit, plugging average value of dependent Variable into a formula etc.)	Formative for PBA	Understanding	Question will not be asked in final examination, however, it will be part of Lab work.	
[SLO: P-09-10-N-09] suggest how sources of human and systematic error could be mitigated	Formative for PBA	Application	Question will not be asked in final examination, however, it will be part of Lab work.	
[SLO: P-09-10-N-10] set up experimental apparatus under supervision from an instructor	Formative for PBA	Application	Question will not be asked in final examination, however, it will be part of Lab work.	
[SLO: P-09-10-N-11] take steps to avoid parallax error	Formative for PBA	Knowledge	Question will not be asked in final examination, however, it will be part of Lab work.	
[SLO: P-09-10-N-12] identify and correct for potential zero error	Formative for PBA	Application	Question will not be asked in final examination, however, it	

NCP SLOs Description	Form of Assessment	Cognitive Level	Remarks	Number of PeriodsRequired (1 period=40 minutes)
			will be part of Lab work.	
[SLO: P-09-10-N-13] take an appropriate number of readings to average out errors	Formative for PBA	Application	Question will not be asked in final examination, however, it will be part of Lab work.	
[SLO: P-09-10-N-14] take correct meniscus readings	Formative for PBA	Application	Question will not be asked in final examination, however, it will be part of Lab work.	
[SLO: P-09-10-N-15] record sources of potential error (e.g. lack of lighting due to power outage)	Formative for PBA	Understanding	Question will not be asked in final examination, however, it will be part of Lab work.	
[SLO: P-09-10-N-16] take steps to avoid systematic error in specific context of the experiment e.g. ensuring that the table the set-up in on is level	Formative for PBA	Application	Question will not be asked in final examination, however, it will be part of Lab work.	
[SLO: P-09-10-N-17] make measurements using common laboratory apparatus, such as millimetre scales, protractors, top-pan balances, newton meters, analogue or digital electrical meters, measuring cylinders, vernier calipers, micrometer screw gauges and thermometers	Summative For Practical Based Assessment (PBA)	Application	Laboratory work- will be assessed in PBA.	
[SLO: P-09-10-N-18] use a stop-watch to measure intervals of time, including the period of an oscillating system by timing an appropriate number of consecutive oscillations	Summative for Practical Based Assessment	Application	Laboratory work- will be assessed in PBA.	
[SLO: P-09-10-N-19] use both analogue scales and digital displays. Be familiar with the following experimental contexts	Summative for Practical Based Assessment	Application	Laboratory work- will be assessed in PBA.	
[SLO: P-09-10-N-20] measurement of physical quantities such as length, volume or force	Summative for Practical Based Assessment	Application	Laboratory work- will be assessed in PBA.	
[SLO: P-09-10-N-21] measurement of small distances or short intervals of time	Summative for Practical Based Assessment	Application	Laboratory work- will be assessed in PBA.	

NCP SLOs Description	Form of Assessment	Cognitive Level	Remarks	Number of PeriodsRequired (1 period=40 minutes)
[SLO: P-09-10-N-22] determining a derived quantity such as the extension per unit load for a spring, the value of a known resistance or the acceleration of an object	Summative for Practical Based Assessment	Application	Laboratory work- will be assessed in PBA.	
[SLO: P-09-10-N-23] testing and identifying the relationship between two variables such as between the potential difference across a wire and its length	Summative for Practical Based Assessment	Application	Laboratory work- will be assessed in PBA.	
[SLO: P-09-10-N-24] comparing measured quantities such as angles of reflection	Summative for Practical Based Assessment	Understanding	Laboratory work- will be assessed in PBA.	
[SLO: P-09-10-N-25] comparing derived quantities such as density	Summative for Practical Based Assessment	Understanding	Laboratory work- will be assessed in PBA.	
[SLO: P-09-10-N-26] cooling and heating, including measurement of temperature	Summative for Practical Based Assessment	Application	Laboratory work- will be assessed in PBA.	
[SLO: P-09-10-N-27] experiments using springs and balances	Summative for Practical Based Assessment	Application	Laboratory work- will be assessed in PBA.	
[SLO: P-09-10-N-28] timing motion or oscillations	Summative for Practical Based Assessment	Application	Laboratory work- will be assessed in PBA.	
[SLO: P-09-10-N-29] electric circuits, including the connection and reconnection of these circuits, and the measurement of current and potential difference	Summative for Practical Based Assessment	Understanding	Laboratory work- will be assessed in PBA.	
[SLO: P-09-10-N-30] optics experiments using equipment such as optics pins, mirrors,	Summative	Application	Laboratory work- will be	

NCP SLOs Description	Form of Assessment	Cognitive Level	Remarks	Number of PeriodsRequired (1 period=40 minutes)
prisms, lenses, glass or Perspex blocks (both rectangular and semi- circular), including the use of transparent, translucent and opaque substances to investigate the transmission of light	for Practical Based Assessment		assessed in PBA.	
[SLO: P-09-10-N-31] procedures using simple apparatus, in situations where the method may not be familiar to the candidate	Formative for Practical Based Assessment	Application	Question will not be asked in final examination, however, it will be part of Lab work.	
Use the below good practices in tabulating data [SLO: P-09-10-N-32] to [SLO: P-09-10-N-37]: [SLO: P-09-10-N-32] Record measured and calculated quantities with correct units accompanying them	Formative for Practical Based Assessment	Application	Question will not be asked in final examination, however, it will be part of Lab work.	
[SLO: P-09-10-N-33] Organize tabulated results with the following elements present: the heading of each column, the name or symbol of the measured or calculated quantity, together with the appropriate unit	Formative for Practical Based Assessment	Application	Question will not be asked in final examination, however, it will be part of Lab work.	
[SLO: P-09-10-N-34] Label axes with quantities and units	Formative for Practical Based Assessment	Application	Question will not be asked in final examination, however, it will be part of Lab work.	
[SLO: P-09-10-N-35] Use scales for the axes that allow the majority of the graph paper to be used in both directions, and be based on sensible ratios, e.g. 2cm on the graph paper representing 1, 2 or 5 units of the variable (or 10, 20 or 50, etc.).	Formative for Practical Based Assessment	Application	Question will not be asked in final examination, however, it will be part of Lab work.	
[SLO: P-09-10-N-36] Plot data points to an accuracy of better than one half of one of the smallest squares on the grid.	Formative for Practical Based Assessment	Application	Question will not be asked in final examination, however, it will be part of Lab work.	
[SLO: P-09-10-N-37] Plot data points using small crosses or fine dots with a circle drawn around them.	Formative for Practical Based Assessment	Application	Question will not be asked in final examination, however, it will be part of Lab work.	
[SLO: P-09-10-N-38] Use measuring instruments to their full precision	Formative for Practical	Application	Question will not be asked in final examination,	

NCP SLOs Description	Form of Assessment	Cognitive Level	Remarks	Number of PeriodsRequired (1 period=40 minutes)
	Based Assessment		however, it will be part of Lab work.	
[SLO: P-09-10-N-39] Estimate the number of significant figures for calculated quantities as being the same as the least number of significant figures in the raw data used.	Formative for Practical Based Assessment	Application	Question will not be asked in final examination, however, it will be part of Lab work.	
[SLO: P-09-10-N-40] Show clear working in calculations, and key steps in reasoning	Formative for Practical Based Assessment	Application	Question will not be asked in final examination, however, it will be part of Lab work.	
[SLO: P-09-10-N-41] Express calculated ratios as decimal numbers, of two or three significant figures.	Formative for Practical Based Assessment	Application	Question will not be asked in final examination, however, it will be part of Lab work.	
[SLO: P-09-10-N-42] Sketch lines of best fit with an equal number of points on either side of the line over its entire length (the points should not be seen to lie all above the line at one end, and all below the line at the other end)	Formative for Practical Based Assessment	Application	Question will not be asked in final examination, however, it will be a part of Lab work.	
[SLO: P-09-10-N-43] Convey the calculations for the gradient of a straight line by using a triangle whose hypotenuse extends over at least half the length of the plotted graph line.	Formative for Practical Based Assessment	Application	Question will not be asked in final examination, however, it will be part of Lab work.	
[SLO: P-09-10-N-44] Determine the intercept of a straight-line graph	Formative for Practical Based Assessment	Understanding	Question will not be asked in final examination, however, it will be part of Lab work.	
[SLO: P-09-10-N-45] Take readings from graphs by extrapolation or interpolation	Formative for Practical Based Assessment	Application	Question will not be asked in final examination, however, it will be part of Lab work.	
[SLO: P-09-10-N-46] Identify whether an experimental procedure has validity (whether the results really do represent what they are supposed to measure) regarding the hypothesis being tested, and suggest changes to ensure validity as appropriate	Formative for Practical Based	Application	Question will not be asked in final examination, however, it will be part of Lab work.	

NCP SLOs Description	Form of Assessment	Cognitive Level	Remarks	Number of PeriodsRequired (1 period=40 minutes)
	Assessment			
[SLO: P-09-10-N-47] identify whether an experimental procedure is reliable (whether the results can be reproduced under the same conditions), and suggest changes to ensure reliability as appropriate	Formative for Practical Based Assessment	Application	Question will not be asked in final examination, however, it will be part of Lab work.	
[SLO: P-09-10-N-48] recommend how to mitigate sources of random and systematic error inherent in the given experimental design	Formative for Practical Based Assessment	Application	Question will not be asked in final examination, however, it will be part of Lab work.	
[SLO: P-09-10-N-49] identify unsafe procedure in an experimental design and suggest ways to mitigate any hazards	Formative for Practical Based Assessment	Application	Question will not be asked in final examination, however, it will be part of Lab work.	

Note: The experiments or list of practicals will be extracted from the SLOs for Practical Based Assessment.

PBA STANDS FOR “PRACTICAL BASED ASSESSMENT”.

Federal Board SSC-I Examination
Physics Model Question Paper
Curriculum 2022-2023 (Inclusive Scheme of Studies 2024)

ROLL NUMBER					
0	0	0	0	0	0
1	1	1	1	1	1
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3	3	3	3	3	3
4	4	4	4	4	4
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7	7	7	7	7	7
8	8	8	8	8	8
9	9	9	9	9	9

Version No.			
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2	2	2	2
3	3	3	3
4	4	4	4
5	5	5	5
6	6	6	6
7	7	7	7
8	8	8	8
9	9	9	9

Section - A (Marks 12)

Time Allowed: 20 minutes

Section – A is compulsory. All parts of this section are to be answered on this page and handed over to the Centre Superintendent. Deleting/ overwriting is not allowed. *Do not use lead pencil.*

Candidate Sign._____ **Invigilator Sign**. _____

Q1. **Fill the relevant bubble against each question according to curriculum. Each part carries one mark.**

S #	Question	(A)	(B)	(C)	(D)	(A)	(B)	(C)	(D)
1.	When a body moves in a circular path, its velocity is:	Constant	Variable	Zero	Increasing	○	○	○	○
2.	The force which opposes the relative motion between two surfaces in contact is known as:	Friction	Gravitational force	Electrostatic force	Nuclear force	○	○	○	○
3.	A train is traveling at 20 m/s and comes to a stop in 40 seconds. What is the magnitude of deceleration of the train?	0.5 m/s^2	2 m/s^2	0.05 m/s^2	0.2 m/s^2	○	○	○	○
4.	If two objects, one heavy and one light, are dropped from the same height, neglecting air resistance, which object will hit the ground first?	The heavy object	The light object	Both objects will hit the ground at the same time	It depends on the shape of the objects	○	○	○	○
5.	What will be weight of a 5kg object on moon where gravitational acceleration is 1.6 ms^{-2}?	1.6 N	8 N	9.8 N	80 N	○	○	○	○
6.	When electric current passes through an air-cored coil, the compass needle placed nearby deflects due to the magnetic field. If an iron nail is inserted into the coil, the compass needle will:	Not deflect at all	Deflect less and slowly	Deflect more quickly and strongly	Point only in the direction of Earth's magnetic field	○	○	○	○
7.	Which of the followings is a greatest prefix?	Deca	Deci	Milli	Nano	○	○	○	○
8.	joule (J) is the unit of work which is equal to:	Newton	kg m s^{-2}	Watt second	Newton second	○	○	○	○
9.	A car, an elephant and a cricket ball have same kinetic energies. Which of these have greater speed?	Car	Elephant	Cricket	All have same speed	○	○	○	○
10.	Magnetic field lines:	Are farthest at poles	Intersect each other	Never intersect each other	Do not pass in vacuum	○	○	○	○
11.	The Branch of Physics that is most important when studying how glasses help people see:	Thermodynamics	Electromagnetism	Mechanics	Optics	○	○	○	○
12.	Which term describes a thoroughly tested idea in physics?	Idea	Hypothesis	Theory	Law	○	○	○	○

Federal Board SSC-I Examination
Physics Model Question Paper

Curriculum 2022-2023 (Inclusive Scheme of Studies 2024)

Time allowed: 2.45 hour **Total Marks: 48**

Note: Answer all parts from Section 'B' and all questions from Section 'C' on the **E-sheet**.
Write your answers on the allotted/given spaces.

SECTION – B (Marks 30)

Q.2 Attempt the following questions. **(10x3 = 30)**

Q#	Question	Marks		Question	Marks
(i)	Differentiate between precision and accuracy	**03**	**OR**	Differentiate between center of gravity and center of mass.	**03**
(ii)	Draw the speed time graph for uniform acceleration. Use this graph to show that gradient of speed time graph gives acceleration.	**03**	**OR**	Which will have greater spring constant, steel spring or rubber spring?	**03**
(iii)	Differentiate between strong nuclear force and electromagnetic force.	**03**	**OR**	Define astrophysics, biophysics and optics	**03**
(iv)	Define impulse. Write its formula and SI unit.	**03**	**OR**	How a vector is represented graphically and symbolically?	**03**
(v)	With the help example from everyday life, elaborate that how pressure exerts perpendicular force on any surface?	**03**	**OR**	How can we increase sensitivity and range of liquid-in-glass thermometre?	**03**
(vi)	Differentiate between paramagnetic materials and diamagnetic materials.	**03**	**OR**	Why plasma is called fourth state of matter?	**03**
(vii)	State Pascal law. List any two its applications	**2+1**	**OR**	What are domains? Show alignment of domains in figures for magnetized and un magnetized materials.	**2+1**
(viii)	How manometer is used to measure the gas pressure?	**03**	**OR**	What is average speed of a car if it completes a circle of radius 200m in 5minutes?	**03**
(ix)	Cutting edge of knife is made sharper. How does it cut vegetables easily?	**03**	**OR**	If radius of the orbit is doubled then what will be effect on its orbital velocity of a satellite?	**03**
(x)	What steps would you take to minimize random error from measurement?	**03**	**OR**	How magnetic field is used to record sound on magnetic tapes or on hard discs?	**03**

SECTION – C (Marks 18)

Note: Attempt all questions. Marks of each question are equal. $(3 \times 6 = 18)$

Q.3	What are different types of motion? Give two examples of each.	**06**	**OR**	What are soft magnetic materials? Discuss magnetic shielding effect of soft magnetic materials.	**01+05**
Q.4	State and prove Newton's second law of motion	**01+05**	**OR**	Define kinetic energy and derive its formula.	**01+05**
Q.5	A long uniform steel bar of length of 100 cm is balanced on a wedge at its middle. Two weights W_1 and W_2 are suspended at distance of 0.2 m and 0.4 m respectively form the wedge. If weight W_1 is 70 N then find weight W_2	**06**	**OR**	A hydraulic press lifts mass of 500 kg when we apply force of 10 N on small piston. Radius of its small piston is 15 cm, find the radius of its large piston.	**06**

Federal Board SSC-I Examination

Physics Model Question Paper

(Curriculum 2022-23)

Alignment of Questions with Student Learning Outcomes

Sr No	Section: Q. No. (Part no.)	Content Domain / Area	Student Learning Outcomes	Cognitive Level *	Allocated Marks in Model Paper
1	A: Q1(1)	Domain B	[SLO: P-09-B-53] Describe qualitatively motion in a circular path due to a centripetal force	U	1
2	A: Q1(2)	Domain B	[SLO: P-09-B-35] Analyze the dissipative effect of friction	U	1
3	A: Q1(3)	Domain B	[SLO: P-09-B-07] Define and calculate acceleration	A	1
4	A: Q1(4)	Domain B	[SLO: P-09-B-10] Use the approximate value 9.8m/s^2 for free fall acceleration near Earth to solve problems	U	1
5	A: Q1(5)	Domain B	[SLO: P-09-B-19] Define and calculate weight [weight is the force exerted on an object with mass by a planet's gravity, and use W=mg]	A	1
6	A: Q1(6)	Domain E	[SLO: P-09-E-10] Describe uses of permanent magnets and electromagnets	A	1
7	A: Q1(7)	Domain A	[SLO: P-09-A-06] Analyze and express numerical data using prefixes	U	1
8	A: Q1(8)	Domain B	SLO: P-09-B-60 Define work done.	K	1
9	A: Q1(9)	Domain B	SLO: P-09-B-66 Use the formulas for kinetic and Gravitational potential energy to solve problems involving simple energy conversions	A	1
10	A: Q1(10)	Domain E	[SLO: P-09-E-09] state that the relative strength of a magnetic field is represented by the spacing of the magnetic field lines	U	1
11	A: Q1(11)	Domain G	[SLO: P-09-G-02] Explain with examples that physics has many sub- fields, and in today's world involves interdisciplinary fields.	K	1
12	A: Q1(12)	Domain G	[SLO:P-09-G-06] Understand the terms 'hypothesis', theory' and 'law' in the context of research in the physics	K	1
13	B: Q2(i)	Domain A Domain B (Dynamics)	[SLO: P-09-A-18] Differentiate between precision and accuracy OR [SLO: P-09-B-47] State what is meant by center of mass and center of gravity	U	3
14	B: Q2(ii)	Domain B (Kinematics) Domain B (Dynamics)	[SLO: P-09-B-09] Sketch, plot and interpret distance— time and Speed-time graphs. OR [SLO: P-09-B-56] Define and calculate the spring constant [Apply the equation, Spring Constant = force/extension k= F/x to solve problem involving simple Springs]	U	3
15	B: Q2(iii)	Domain B (Dynamics) Domain G	[SLO: P-09-B-25] State that there are three fundamental forces and describe them in terms of their relative strengths OR [SLO: P-09-G-02] Explain with examples that physics has many sub- fields, and in today's world involves interdisciplinary fields.	K	3
16	B: Q2(iv)	Domain B (Dynamics) Domain A	[SLO: P-09-B-40] Define and calculate impulse. OR [SLO: P-09-A-07] Differentiate between scalar and vector quantities. [scalar is magnitude (size) only and that a vector quantity has magnitude and direction. students should be able to represent vectors graphically]	K	3

17	B: Q2(v)	Domain B (Pressure and deformation in solids) Domain C	[SLO: P-09-B-78] Describe how pressure varies with force and area in the context of everyday examples OR [SLO: P-09-C-09] illustrate what is meant by the sensitivity, range and linearity of thermometers	U	3
18	B: Q2(vi)	Domain E Domain C	[SLO: P-09-E-12] Differentiate between ferromagnetic, paramagnetic and diamagnetic materials. OR [SLO: P-09-C-04] Describe plasma as a fourth state of matter	U	3
19	B: Q2(vii)	Domain B (Dynamics) Domain E	[SLO: P-09-B-86] Define and apply Pascal's law OR [SLO: P-09-E-11] Explain qualitatively in terms of the domain theory of magnetism how materials can be magnetized and demagnetized	K	3
20	B: Q2(viii)	Domain B (Pressure and deformation in solids) Domain B (Kinematics)	[SLO: P-09-B-85] Analyze the workings and applications of a manometer OR [SLO: P-09-B-04] Define and Calculate average speed	A	3
21	B: Q2(ix)	Domain B (Pressure and deformation in solids) Domain F	SLO: P-09-B-78 Describe how pressure varies with force and area in the context of everyday examples OR [SLO: P-09-F-01] Define and calculate average orbital speed	U	3
22	B: Q2(x)	Domain A Domain E	[SLO: P-09-A-17] Critique and analyze experiments for sources of error [including identifying sources of systematic and random error in measurements and suggesting steps to correct them] OR [SLO: P-09-E-14] Analyze applications of magnets in recording technology	U	3
24	C: Q3	Domain B (Kinematics) Domain E	[SLO:P-09-B-01] Differentiate between different types of motion OR [SLO: P-09-E-15] State that soft magnetic materials such as soft iron) can be used to provide shielding from magnetic fields	K	6
25	C: Q4	Domain B (Dynamics) Domain B (Work, Energy)	[SLO: P-09-B-30] State and apply Newton's second law in terms of acceleration OR [SLO: P-09-B-64] Prove that Kinetic Energy $Ek = 1/2\ mv^2$	U	6
26	C: Q5	Domain B (Dynamics) Domain B (Pressure and deformation in solids)	[SLO: P-09-B-45] Analyze objects in equilibrium using the principle of moments OR [SLO: P-09-B-86] Define and apply Pascal's law [Apply Pascal's law to systems such as the transmission of pressure in hydraulic system with particular reference to hydraulic press and Hydraulic brakes on vehicles.]	A	6

*Cognitive Level

K: Knowledge

U: Understanding

A: Application

Table of Specification Model Paper Physics SSC-I

Cognitive Level	Measurements A	Mechanics B				Heat and Thermodynamics C	Electricity and Magnetism E	Modern Physics F	Nature of Science G		
Assessment Objectives	**(A1-A19)**	**Kinematics (B1-B15)**	**Dynamics (B1-B54)**	**Pressure & Deformation in Solids (B77-B86 & B55-B59)**	**Work And Energy (B60-B76)**	**(C1-C11)**	**(E1-E15)**	**(F1-F2)**	**(G1-G8)**	**Total Marks**	**Percentage**
K (Knowledge)	Q2(iv /s)3	Q3(f)6	Q2(iv/f)3 Q2(iii/f)3	Q2(vii/f)3	Q1(8)1		Q3(s)6 Q2(vii/s)3		Q1(11)1 Q2(iii/s)3 Q1(12)1	33	31%
U (Understanding)	Q1(7)1 Q2(x/f)3 Q2(i/f)3	Q2(ii/f)3 Q1(4)1	Q2(i/s)3 Q1(1)1 Q1(2)1 Q4(f)6	Q2(ix/f)3 Q2(ii/s)3 Q2(v/f)3	Q4(s)6	Q2(vi/s)3 Q2(v/s)3	Q1(10)1 Q2(vi/f)3 Q2(x/s)3	Q2(ix/s)3		61	49%
A (Application)		Q2(viii/s)3 Q1(3)1	Q1(v)1 Q5(f)6	Q2(viii/f)3 Q5(s)6	Q1(9)1		Q1(6)1			22	20%
Total Marks	10	14	24	21	08	06	17	03	05	108	
Total Percentages	9%	13%	22%	19%	7%	6%	16%	3%	5%		100%

Note:

1 This ToS does not reflect policy, but it is particular to this model question paper.

2 Proportionate / equitable representation of the content areas may be ensured.

3 The percentage of cognitive level is 30%, 50%, and 20% for knowledge, understanding, and application, respectively with **± 5%** variation.

4 While selecting alternative questions for Short Response Questions (SRQs) and Extended Response Questions (ERQs), it must be kept in mind that:

- Difficulty levels of two alternative questions of the internal choice will be same
- SLOs of the two alternative questions of the internal choice must be different

Key: Question Number (part/ first choice) marks example: Q2 (i / f) 2
Question Number (part/ second choice) marks Q2 (i / s) 2



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