**REPUBLIC OF RWANDA CLASS & COMBINATION: S5……..**

**MINEDUC CLASS SIZE…….**

**GASABO DISTRICT**

**SCHOOL NAME: ………… NUMBER OF PERIOD PER WEEK:7**

**TEACHER’S NAMES………………………………………**

***PHYSICS - SCHEME OF WORK / UNIT PLAN 2022-2023 ACADEMIC YEAR***

***1st TERM, 2022-2023***

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Time | Topic, subtopic area and unit | Lesson title+ Evaluation | Learning activities and links to other subjects | References and pedagogical materials | Observation |
| 26/10-21/11/2022  **4 weeks**  **28 periods** | Topic:  **Light**  Unit:  **Wave and Particle nature of light** | * Planck’s quantum theory * Photon theory of light and the photoelectric effect. * Wave theory of monochromatic light. * Properties of a light wave. * Black-body radiation * Measure of Plank’s constant * Application of photoelectric effect. * Energy, mass and momentum of photon * Compton effect (X-rays). * Photon interactions. * Wave-particle duality: * The principle of complementarities * The wave nature of matter. * Electron microscope. * **General quiz** | * Make group   presentation on Planck’s quantum Theory (hypothesis).   * Discuss in groups   and make presentations  about black and white body radiation   * Solving problems on   light energy and photon theory   * Perform an   experiment on photoelectric effect and report.  **Links to other subjects:** Radiography and physiotherapy in Medicine, electrons and photons in Chemistry, Astronomy in geography.   * **General quiz** | Avison, J. (1989). The world of PHYSICS. Cheltenham: Thomas Nelson and Sons Ltd.  S5 physics student book, REB | . |
| 24/10-04/11/2022  **2 weeks**  **14 weeks** | Topic:  **Oscillations and wave**  Sub-Topic:  **Energy changes in simple harmonic**  **Motion**  Unit:  **Simple harmonic motion.** | * Kinematics and simple   harmonic motion   * Simple harmonic   oscillators.   * Equations of simple   harmonic motion.   * Energy changes and   conservation in oscillating systems.   * Superposition of   harmonic motion with same frequency   * **General quiz** | * Discuss in groups   kinematics and simple harmonic motion and report.   * Discuss examples of   simple harmonic oscillators.   * Working in groups   solve simple harmonic motion problems.   * Derive expressions   of energy exchanges and  conservation in oscillating  systems.   * Devise experiment to   illustrate superposition of  harmonic motions of same  frequency.   * **General quiz** | Breithaupt, J. (2000). Understanding Physics For Advanced Level. (4 ed.). Ellenborough House, Italy: Stanley Thorners. |  |
| 07/11-02/12/2022  **4 weeks**  **28 periods** | Topic:  **Oscillations and wave**  Sub-Topic:  **Forced oscillations and resonance**  Unit:  **Forced oscillations and resonance of**  **a system** | * Damped oscillations. * Types of damped   oscillations.   * Natural frequency of a   vibration and forced oscillation.   * Variation of forced   frequency on graph at amplitude close to natural frequency of  vibration.   * Examples of resonance * Effect of resonance on   a systems   * **General quiz** | * Perform an   experiment to demonstrate damping of oscillating systems.   * Suggest examples of   damped oscillators.   * Working in groups   of 3’s to discuss natural vibration and forced oscillations   * Graphically illustrate   forced oscillations.   * Perform an   experiment on resonance and suggest more examples on it.   * Use computer   Simulation to analyze forced  oscillations and resonance  in systems.  **Links to other subjects**: Beats in music, electrons   * **General quiz** | Chand, S., & S.N., G. S. (2003). Atomic Physics (Modern Physics) (1 ed.). India  CPMD. (2015). Advanced Level Physics Sylabus. Kigali: REB. Cunningham, & William, P. (2000). Environmental science (6 ed.). Mc Graw-Hill. Cutnell, J. D., & Johnson, K. W. (2006). Essentials of Physics. USA: John Wlley &Sons, Inc. Cutnell, J. D., & Johnson, K. W. (2007). Physics. (7 ed.). USA: John Wiley; Sons, Inc |  |
| **05-09/12/2022**  **1 week**  **7 periods** | Revision + Examination | Revision + Examination | Revision + Examination |  |  |
| **12-16/12/2022**  **1 week**  **7 periods** | Examination+ marking | Examination+ marking | Examination+ marking |  |  |
| **19-23/12/2022**  **1 week**  **7 periods** | Marking+ reporting | Marking+ reporting | Marking+ reporting |  |  |

**REPUBLIC OF RWANDA CLASS & COMBINATION: S5…..**

**MINEDUC CLASS SIZE……...**

**GASABO DISTRICT**

**SCHOOL NAME……………… NUMBER OF PERIOD PER WEEK:7**

**TEACHER’S NAMES………………………………………**

**2nd TERM, 2022-2023**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Time | Topic, sub topic area and unit | Lesson title+ Evaluation | Learning activities and links to other subjects | References and pedagogical materials | Observation |
| 09-20/01/2023  **2 weeks**  **14 periods** | Topic:  **Oscillations and wave**  Sub-Topic:  **Waves**  Unit:  **Propagation of mechanical waves.** | * Wave concept * Types of waves * Waves Terms * Characteristics of waves * Relationship between   wavelength, frequency (Period)  and velocity   * Properties of waves   (Reflection, refraction,  interference, diffraction)   * Young double slit   Experiment   * Progressive and   stationary waves   * Equation of a progressive wave * Example of progressive,   Wave on a vibrating string   * **General quiz** | * Practical   demonstration of wave concept   * Demonstrate   longitudinal and transverse waves using rope and slinky spring.   * Use ripple tank to   demonstrate wave fronts, frequency, crest/trough,   * Use a vibrating   rope to demonstrate nodes and antinodes   * Use guided   discovery on interference of sound wave coherent source and microphone  connected to a cathode ray  oscilloscope   * Use group   discussion to describe  Young’s double slit experiment to determine wavelength, slit separation and fringe separation.   * Use internet to   access information on applications of waves.  **Links to other subjects:** Telecommunication and Music   * **­General quiz** | S5 physics student book, REB  Advanced Level Physics Sylabus. Kigali: REB. Cunningham, & William, P. (2000). Environmental science (6 ed.). Mc Graw-Hill. Cutnell, J. D., & Johnson, K. W. (2006). Essentials of Physics. USA: John Wlley &Sons, Inc. Cutnell, J. D., & Johnson, K. W. (2007). Physics. (7 ed.). USA: John Wiley; Sons, Inc |  |
| 23/01-03/2023  **2 weeks**  **14 periods** | Topic:  **Electricity**  Sub-Topic:  **Current electricity**  Unit:  **Complex electrical circuit** | * Kirchhoff ‘s laws   (Junction rule and loop rule).   * Resistors and   electromotive forces in series and parallel   * complex circuits. * Design of complex   electrical circuits.   * Simple potentiometer circuits. * Advantages and   disadvantages of potentiometer.   * Potentiometer and other   devices (Ammeter and voltmeter.).   * Problems involving   complex circuit.   * **General quiz** | * Perform complex   circuit analysis using Kirchhoff’s laws.   * Discuss in groups   applications of Kirchhoff ‘s laws   * Work in groups and   Present on steps for analyzing a complex electric circuit.   * Experimentally   design circuit to illustrate application of simple potentiometer   * Discuss in groups   Advantages and disadvantages of potentiometer over voltmeter and report.   * Solve complex   problems on the potentiometer.  **Links to other subjects:** Electrons and conductor( chemistry).Radio Volume adjustment Circuits   * **General quiz** | S5 physics student book, REB  Advanced Level Physics Sylabus. Kigali: REB. Cunningham, & William, P. (2000). Environmental science (6 ed.). Mc Graw-Hill. Cutnell, J. D., & Johnson, K. W. (2006). Essentials of Physics. USA: John Wlley &Sons, Inc. Cutnell, J. D., & Johnson, K. W. (2007). Physics. (7 ed.). USA: John Wiley; Sons, Inc |  |
| 06-17/02/2023  **2 weeks**  **14 periods** | Topic:  **Energy, power and climate change**  Unit:  **Fossil and non fossil fuel and power production** | -Definition of Fossil fuel and non-fossil fuel  -Controlled and uncontrolled  nuclear fission.  -Controlled fission (power  production) and uncontrolled  fission (nuclear weapons)  -Energy transformations in a  nuclear power station.  -Problems associated with the  production of nuclear power  -Advantages and disadvantages  associated with transportation  and storage of fossil fuels.  -Environmental problems of fossil  fuels  -Safety issues and risks associated  with nuclear power.  - **General quiz** | -Research in scientific for  environmental problems associated with use of fossil fuels in power stations.  -Discuss in groups and present on problems of using nuclear power.  -Discuss in groups and make presentations on safety issues and risks of nuclear power stations.  -Search internet for cleaner energy sources  **Links to other subjects:** Graphs in Mathematics and Geography, Elements and fission in Chemistry, Data presentations and interpretations in  Geography.   * **General quiz** | S5 physics student book, REB  Advanced Level Physics Sylabus. Kigali: REB. Cunningham, & William, P. (2000). Environmental science (6 ed.). Mc Graw-Hill. Cutnell, J. D., & Johnson, K. W. (2006). Essentials of Physics. USA: John Wlley &Sons, Inc. Cutnell, J. D., & Johnson, K. W. (2007). Physics. (7 ed.). USA: John Wiley; Sons, Inc |  |
| 20/02-03/03/2023  **2 weeks**  **14 periods** | Topic:  **Motion in fields**  Sub-Topic:  **Electric field potential and energy**  Unit:  **Electric field potential and gravitational potential.** | -Electric potential energy and  potential difference.  -Electric potential and electric  field.  -Electric potential due to point  charges.  -Potential due to electric dipole.  -Conservation of electric  energy.  -Cathode ray tube :( TV,  computer monitors and  cathode ray oscilloscope).  -Electrodynamics.  -Gravitational field and  gravitational potential.  -Energy conservation in electric  and gravitational fields.  -Solve problems on electric and  gravitational fields.  - **General quiz** | -In groups discuss, calculations of potential due to one or more point charges.  -In group discuss, determine potential due to one or more point masses.  -In groups, analyze and interpret the path of a charge in cathode ray tube and report  -Discuss in groups and present, the difference between electric and  gravitational potential.  -Using ICT tools to simulate electric and gravitational potential  **Links to other subjects:** electrocardiography (Medicine), ICT.   * **General quiz** | S5 physics student book, REB |  |
| 06-10/03/2023  **1week**  **7 periods** | Topic:  **Motion in fields**  Unit:  **Motion in Orbits** | -Newton’s law of gravitation.  -Kepler’s laws of planetary motion.  -Verification of Kepler’s third law of planetary motion.  -Verification of acceleration due to the gravity at the surface of the Earth.  -Variation of gravity above and below the earth surface.  -Satellites and Rockets.  -Satellites and their applications.  -Work done in planetary motion.  -Cosmic velocity (first, second and third).  - Problems on motion in orbits.  - **General quiz** | -Use simulators to demonstrate Kepler’s laws  of planetary motion and  present  -In working in groups  discuss Kepler’s laws of  planetary motion and present summary.  Discuss in groups cosmic  velocities and present findings.  -Work in groups to compute problems related  to planetary motion and cosmic velocities.  Search internet for details on planetary motion.  **Links to other subjects**: Electron motion (Chemistry) and solar system (Geography)   * **General quiz** | S5 physics student book, REB  Advanced Level Physics Sylabus. Kigali: REB. Cunningham, & William, P. (2000). Environmental science (6 ed.). Mc Graw-Hill. Cutnell, J. D., & Johnson, K. W. (2006). Essentials of Physics. USA: John Wlley &Sons, Inc. Cutnell, J. D., & Johnson, K. W. (2007). Physics. (7 ed.). USA: John Wiley; Sons, Inc |  |
| 13-17/03/2023  **1week**  **7 periods** | Topic:  **Atomic physics**  Sub-Topic:  **Quantum physis**  Unit:  **Atomic models and photoelectric effect.** | -Structure of atom.  -Atomic models (Rutherford’s atomic model and Bohr’s atomic model)  -Energy levels and spectral lines.  -Thermionic emission ( thermo electronic emission)  -Applications of cathode rays (oscilloscope and TV tubes)  -Photoelectric emission laws’  -Photoelectric effect  -Factors affecting photoelectric emission  -Photon, work function and Plank constant  -Einstein’s equation photoelectric effect  -Application of photoelectric effect  -Compton effect. | - Use simulators to demonstrate emission of  spectra lines from various  materials  -In groups discuss  Rutherford and Bohr atom  models (enumerate similarities and differences)  -Discuss thermo electronic  emission phenomenon in  TV tubes.  -Establish mathematically  the deflection of an electron in an electric field.  -Describe photoelectric  emission experiments  -Establish the Compton  wavelength using the laws  of conservation of linear  momentum and energy.  -Search internet for  applications of photoelectric emission | S5 physics student book, REB |  |
| **20-24/03/2023**  **1 week**  **7 periods** | Revision + Examination | Revision + Examination | Revision + Examination |  |  |
| **27-31/03/2023**  **1 week**  **7 periods** | Examination+ marking | Examination+ marking | Examination+ marking |  |  |

**REPUBLIC OF RWANDA CLASS & COMBINATION: S5…..**

**MINEDUC CLASS SIZE……..**

**GASABO DISTRICT**

**SCHOOL NAME:………………… NUMBER OF PERIOD PER WEEK:7**

**TEACHER’S NAMES……………………………………**

3RD TERM 2022-2023

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Time | | Topic, sub topic area and unit | | Lesson title+ Evaluation | Learning activities and links to other subjects | References and pedagogical materials | Observation |
| 17-28/04/2023  **2 weeks**  **14periods** | | Topic:  **Digital technology**  Sub-Topic:  **Analog and digital signals**  Unit:  **Analog and digital signals** | | -Types of information and requirements.  -Simplex, half-duplex and full-duplex communications.  - Frequency and bandwidth.  -Analogue signal system.  - Principle of digital signal systems  -Advantages of digital technology  - Examples of messages  - **General quiz** | -Work in groups and discuss analogue and digital system of communication.  -Role play advantages of  digital system and compare with analogue system.  -Work in groups to analyse  logic gates (AND, NAND,  OR, NOR, NOT…) and  Report  **Links to other subjects**: blood circulation, transport, transmission of information Computer (number representation)   * **General quiz** | S5 physics student book, REB |  |
| **01-12/05/2023**  **2 weeks**  **14periods** | | Topic:  **Digital technology**  Sub-Topic:  **Analog and digital signals**  Unit:  **Mobile phone and radio communication**. | | -Concepts of transmission system.  -Principle of cellular radio  -Structure of cellular network.  -Principle of cellular network.  -Mobile communication systems.  - Radio transmission (AM,  FM, PM).  -Post, telegraph and telephone (PTT).  - **General quiz** | -Discuss difference in telephone and radio systems  -Role play in groups about types of modulation  -Work in groups and assemble simple cellular radio.  **Links to other subjects**: blood circulation (Biology and Medicine), transport networks, transmission of information...   * **General quiz** | S5 physics student book, REB |  |
| 15-26/05/2023  **2 weeks**  **14periods** | | Topic:  **Relativity and particle physics**  Sub-Topic:  **Concepts and postulates of**  **Special relativity**  Unit:  **Relativity concepts and postulates of special**  **relativity** | | -Definition of relativity  -Concept of space, time and mass.  -Concept of Frame of reference  -Galilean equation of transformation  -Postulates of special theory of relativity  -Concept of simultaneity.  - **General quiz** | -Use simulations and role plays to demonstrate relativity and postulates of special relativity.  -In groups discuss space, time and mass and report results  -Discuss in groups frame and inertial frame of reference and present  -Discuss in groups Galilean equation of transformation.  -Solve problems involving relative velocity using Galilean transformation equation.  -Discuss in groups simultaneity.  -Search internet for relativity and postulates of special relativity.  **Links to other subjects**: Space (Geography).   * **General quiz** | S5 physics student book, REB  Advanced Level Physics Sylabus. Kigali: REB. Cunningham, & William, P. (2000). Environmental science (6 ed.). Mc Graw-Hill. Cutnell, J. D., & Johnson, K. W. (2006). Essentials of Physics. USA: John Wlley &Sons, Inc. Cutnell, J. D., & Johnson, K. W. (2007). Physics. (7 ed.). USA: John Wiley; Sons, Inc |  |
| **29/05-09/06/2023**  **2 weeks**  **14periods** | | Topic:  **Electromagnetic waves**  Sub-Topic:  **Electromagnetic waves and interference of light Waves**  Unit:  **Interference of light waves.** | | -Nature of electromagnetic  waves.  -Conditions for interference to occur given two sources of light.  -Principle of superposition,  -Interference patterns of two  coherent point sources of light.  -Double-slit experiment  -Intensity distribution of fringe pattern.  -Problem’s double- slit experiment.  - **General quiz** | -Discuss in groups conditions necessary for  interference  -Discuss in groups the  principle of superposition and production of interference patterns from two coherent point sources.  -Devise and perform double-slit experiment and estimate the wavelength of light  -Solve problems double slit experiment  -Search internet for information on light interference.  **Links to other subjects:** Electrons (chemistry)   * **General quiz** | Advanced Level Physics Sylabus. Kigali: REB. Cunningham, & William, P. (2000). Environmental science (6 ed.). Mc Graw-Hill. Cutnell, J. D., & Johnson, K. W. (2006). Essentials of Physics. USA: John Wlley &Sons, Inc. Cutnell, J. D., & Johnson, K. W. (2007). Physics. (7 ed.). USA: John Wiley; Sons, Inc  Advanced Physics by TOM Duncan 9th edition |  |
| **12-23/06/2023**  **2 weeks**  **14periods** | | Topic:  **Astrophysics**  Sub-Topic:  **Earth and space**  Unit:  **Stellar distance and radiation** | | -Sun's atmosphere and interior  -Brightness and magnitude scale  -Star temperature, color, and spectra  -Types of stars:  -Spectra of stars  -Hertzsprung-Russel diagram  -Stellar distance and masses: Parallax, binary stars and mass luminosity relationship.  - **General quiz** | -Work in groups to analyze the sun’s atmosphere and report  -Work in groups to observe stars brightness, color spectra and present  to observe planets and present findings  -Solve problems on planetary motion.  -Search internet for simulations on planetary motion.  **Links to other subjects:** Geography (Planet motion)   * **General quiz** | Advanced Level Physics Sylabus. Kigali: REB. Cunningham, & William, P. (2000). Environmental science (6 ed.). Mc Graw-Hill. Cutnell, J. D., & Johnson, K. W. (2006). Essentials of Physics. USA: John Wlley &Sons, Inc. Cutnell, J. D., & Johnson, K. W. (2007). Physics. (7 ed.). USA: John Wiley; Sons, Inc  Advanced Physics by TOM Duncan 9th edition |  |
| **26/06-03/07/2023**  **1 week**  **7 periods** | | Revision + Examination | | Revision + Examination | Revision + Examination |  |  |
| **03-**  **07/2022**  **1 week**  **7 periods** | | Examination+ marking | | Examination+ marking | Examination+ marking |  |  |
| 10-  14/07/2023  1 week  7 periods | Marking +school  report | | Marking + school report | | Marking + school report |  |  |