**REPUBLIC OF RWANDA CLASS & COMBINATION: S6…..**

**MINEDUC**

**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, sub topic area and unit | Lesson title+ Evaluation | Learning activities and links to other subjects  | References and pedagogical materials  | References and pedagogical materials  | Observation  |
| 26/10-21/10/2022**4 weeks****28 periods** | Topic:**Oscillations and waves**Sub-Topic:**Waves.**Unit:1**Sound waves** | -Reflection and transmission of waves at boundary of two media.-Snell’s law and waves.-Diffraction of waves.-Principle of superposition of waves.-Production of sound waves.-Properties of sound waves (reflection, refraction, diffraction and interference)-Speeds of sound in various medium-Characteristics of soundwaves (amplitude, loudness, frequency, pitch, quality and overtones, frequency limits of audibility)-Resonance, vibrations in strings and pipes ( frequency and length pipe)-Harmonics in strings and pipes-Sound Intensity-Doppler’s effect in sound waves-Solve problems concerning Doppler’s effect-  **General quiz** | -Discuss in groups reflection and transmission in two media.-Perform an experiment to demonstrate diffraction of waves.-Demonstrate interference using two loudspeakers and signal generator-Perform an experiment to illustrate propagation of sound wave.-Solve problems on fundamental frequency of stretched strings-Devise an experiment to illustrate Doppler effect and report-In groups discuss and solve question on Doppler’s effect in sound waves-Project work; Work in groups and report on Doppler’s Effect observed for moving car sound.**Links to other subjects**: molecules musical Instruments.* **General quiz**
 | Avison, J. (1989). The world of PHYSICS. Cheltenham: Thomas Nelson and Sons Ltd.S5 physics student book, REB |  |  |
| 24/10-11/11/2022**3 weeks****21 periods** | Topic:**Energy, power and climate** **Change** Sub-Topic:**Greenhouse effect**Unit:2**Climate change and Greenhouse effect.** | -Definition of climate change and relate facts-Causes of climate change (Gas emissions)-Intensity of the sun’s radiation reaching planets-Factors determining planet’s albedo-Greenhouse effect-Impact of green house effect on climate change-Black body radiation, and emission-Climate change mitigation- **General quiz** | -Discus in groups causes of climate change -Investigate sources of major greenhouse gases-Discuss molecular behavior of greenhouse gases in relation to radiation absorption.-In group discuss and present on the application of energy from greenhouse effect-Search internet for information on climate change and greenhouse effect.**Links to other subjects:** Agronomy, astronomy, Geography (Climate change).* **General quiz**
 | Breithaupt, J. (2000). Understanding Physics For Advanced Level. (4 ed.). Ellenborough House, Italy: Stanley Thorners. |  |  |
| 14/11-02/12/2022**3weeks****21 periods** | Topic:**Energy, power and climate change** Sub-Topic:**Agricultural physics**Unit:3**Application of Physics in Agriculture** | -Atmosphere constituents.-Heat and Mass transfer.-Water vapor in the atmosphere, Variation of atmospheric pressure, air density and water vapor with altitude.-Physical properties of soil (soil texture and structure).-Mechanical weathering(Temperature changes, freezing of water in rocks and different rates of expansion and mineral composition soilerosion and deposition from water, ice and wind). | -Undertake fieldwork and make group presentation on the applications of physics in Agriculture.-Discus and in groups physical properties of soil.-Search internet for application of Physics in Agriculture.**Links to other subjects**: Graphs in mathematics, Photograph interpretations in Geography , compounds in Chemistry , Environment in Agriculture | Chand, S., & S.N., G. S. (2003). Atomic Physics (Modern Physics) (1 ed.). IndiaCPMD. (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 | Hewitt, P. G., SUCH0CKI, J., & Hewitt, L. A. (1999). Conceptual Physical Science. (2 ed.). Addison Wesley Longman. Hirsch, A. S. (2002). Nelson Physics 12. Toronto: University Preparation. Hugh, D. Y., & Roger, A. F. (2012). University Physics with Modern Physics (13 ed.). San Francisco, USA: Pearson Education, Inc. IPCC. (1996). Economics of Greenhouse Gas limitation, Main report “Methodological Guidelines. John, M. (2009). Optical Fiber Communications, Principals and Practice (3rd Ed.). London: Pearsnon Prentice Hall. Jones, E. R., & Childers, R. L. (1992). Contemporary College Physics. (2 ed.). USA: Addison-Wesley Publishing Company. Kansiime, J. K. (2004). Coumpound Physical Geography: Morphology, Climatology, Soils and Vegetation. uganda. Linda, W. (2004). Earth Sceience demystified a self-teaching guide. USA: McGraw-Hill Campanies, inc. Michael, E. B. (1999). Schaum's outline of Theory and Problems of Physics for Engineering and Science. USA: McGRAW-HILL Companies, Inc. Michael, J. P., Loannis, M., & Martha, C. (2006). Science Explorer, Florida Comprehensive Science. Boston: Pearson Prentice Hall. |  |
| 05/12- 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: S6…...**

**MINEDUC**

**GASABO DISTRICT CLASS SIZE…….**

**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:**Environmental physics**Unit:4**Earthquakes, Tsunami, floods landslides and cyclones** | -Definition of Earthquakes, Tsunami, floods landslide and cyclone-Causes of earthquakes, Tsunami, floods landslide and cyclone.-Intensity of earthquakes -Size and frequency of earthquakes-Seismic activity.-Effect of earthquakes on environment (geological faults, Volcanic activity, landslides, mine blasts, and nuclear tests).-Earthquake location?-Causes and occurrence of floods, landslides and Tsunami,-Safety and emergency measures | -Work in groups simulate earthquakes, flood, tsunami, cyclone etc-In groups, discuss relationship of physics concepts to occurrence of earthquakes, landslide, floods and tsunami-Carry out internet search or occurrence and impact of earthquakes, Tsunami and landslides on the environment.**Links to other subjects**: Graphs in mathematics and Geography, interpretations and presentation. | Content and Activities for Term 1, 2& 3 Physics S6, REB |  |
|  23/01-10/02/ 20233 weeks21 periods | Topic:**Atomic physics**Sub-Topic:**Nuclear physics**Unit:5**Atomic nuclei and radioactive decay**. | -Atomic nuclei-nuclide-Radioactivity and nuclei stability-Unified atomic mass-Equivalent of atomic mass in electro volt-Einstein’s mass-energy relation-Binding energy and mass defect-Nuclei fusion and fission-Radioactivity radiations-Radiation detectors-Properties of emitted radiations-Radioactive decay -Application of radioactivity-Hazards and safety precautions of when handling radiations.- **General quiz** | -Discus and establish characteristics of radiations.-Work in groups and establish the exponential decay rate equation.-Discus methods of radiations detecting.-Role-play radioactivity decay-Discuss ways of protection against radiations.-Group discussion on the hazards and precautions of radiations-Make group presentation on the applications of radioactivity and write report- Search internet to for details photoelectric emission.**Links to other subjects:** Radioactivity and mutation (Biology, and Chemistry), History(carbon dating), Medicine(treatment of cancer), Archaeology (carbon dating), Geology(radioactive).* **General quiz**
 | Avison, J. (1989). The world of PHYSICS. Cheltenham: Thomas Nelson and Sons Ltd.Content and Activities for Term 1, 2& 3 Physics S6, REB |  |
| 13/02-24/02/2023**2 weeks****14 periods** | Topic**Digital technology**Sub-Topic:**Analog and digital signals**Unit:6**Application of optical fiber in telecommunication** **systems.** | -Definition of optical fiber-Types of optical fiber: single mode, multi-mode and special purpose optical fibers.-Principle of operation of optical fibers: refraction index of light, total internal reflection, and optical amplification.-Mechanism of attenuation: light scattering and absorption.- Light sources (transmitters and receivers).-Repeater attenuation, regenerator and optical amplifiers.-Optical transmitter and optical receiver.-Advantages of digital communication and optical fiber over other communication systems.- **General quiz** | -Discuss terms used in optic fiber installation.-Roles play on optic fiber transmission and communication.-Search internet for functioning of optic fiber transmission. **Links to other subjects**:  ICT (Internet, mobile phone, computers etc) in social sciences and in research.* **General quiz**
 | Breithaupt, J. (2000). Understanding Physics For Advanced Level. (4 ed.). Ellenborough House, Italy: Stanley Thorners. |  |
| 27/02-10/03/2023**2 weeks****14 periods** | Topic:**Digital technology**Sub-Topic:**Analog and digital signals**Unit:7Block diagram of telecommunication systems | -Microphone-Definition of; Audio frequency (AF), amplitude Modulation (AM), frequency modulation (FM), Audio amplifier, short wave (SW), medium wave (MW),-Carrier wave, and Modulator-Oscillator, Radio frequency amplifier, Power amplifier-Types of antenna-Block diagrams of telecommunication systems.- **General quiz** | -Discuss in groups parts of block diagram.-Roles play communication of microphone and antenna and present.**Links to other subjects**: Biology-blood circulation transport, transmission of information etc.* **General quiz**
 | Chand, S., & S.N., G. S. (2003). Atomic Physics (Modern Physics) (1 ed.). IndiaCPMD. (2015). Advanced Level Physics Sylabus. Kigali: REB. Cunningham,  |  |
| 13-17/03/2023**1 week****7periods** | Topic:**Relativity and particle** **Physics**Sub-Topic:**Particles and interaction**Unit:8**Nature of particles and their interactions** | -Elementary particles.-Classification of elementary particles.-Classification of particles by spin.-Antiparticle.-Pauli’s exclusion Principle-Fundamental interactions by particle exchange-Uncertainty Principle for time and energy and particle creation.-Matter and antimatter (pair production and annihilation).- **General quiz** | -Discuss in groups elementary particles and their identifications.-Describe and discuss elementary particles in terms of mass and quantum numbers.-Discuss classification of particles by spin.-Research on antiparticles and report-Discuss fundamental interactions in terms of exchange particles.-Discuss in groups uncertainty principle for time and energy in the context of particle creation and report-Search internet for details on matter and antimatter.**General quiz** |  |  |
| 20-24/3/2023**1 week****7 periods**  | Revision + Examination | Revision + Examination | Revision + Examination |  |  |
| 27/03-31/03/2023**1 week****7 periods** | Examination+ marking | Examination+ marking | Examination+ marking |  |  |

**REPUBLIC OF RWANDA CLASS & COMBINATION: S6…..**

**MINEDUC CLASS SIZE……..**

**GASABO DISTRICT**

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

**TEACHER’S NAMES……………………………………………………..**

***3rd TERM ,2022-2023***

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Time  | Topic and sub topic area | Lesson title+ Evaluation  | Learning activities and links to other subjects  | References and pedagogical materials  | Observation  |
| 17-21/04/2023**1weeks****7 periods** | Topic:**Relativity and particle** **Physics**Sub-Topic:**Quarks**Unit:9**Properties and basic principles of quarks**. | -Types of quarks.-Terms quarks, antiquarks and hadrons (baryons and mesons) -The quark as constituent of proton and neutron.-Baryon number and the law of conservation of baryon number.-Spin structure of hadrons (baryon and mesons)-Colour in forming of bound states of quarks.-Colour as component of quarks and gluons. | -Discuss in groups quarks, antiquarks, and hadrons (baryons and mesons) -Discuss in groups the quark as contents of proton and neutron.-Discuss in groups baryon number and law of conservation of baryon number.-Discuss in groups the spin structure of hadrons(baryon and mesons)-Discuss in groups how colour forms bound states of quarks.**Links to other subjects**: molecules, fluids, intermolecular force. | Content and Activities for Term 1, 2& 3 Physics S6, REB |  |
| 24/04-05/05/2023**2 weeks****14 periods** | Topic:**Electromagnetic waves**Sub-Topic:**x-rays**Unit:10**Effect of x-rays** | -Production of X-rays-Properties of x-rays; uses and dangers-X-rays as part of the electromagnetic spectrum-The origins and characteristicfeatures of an x-ray spectrum.-Applications of x-rays in medicine, industries, security, and scientific research.-Problems involving accelerating potential and minimum wavelength.- **General quiz** | -Discuss in groups production of x-rays.-Discuss in groups the origins of the features of characteristic x-ray spectrum. -Discuss in groups application of x-rays in medicine, industries, research and scientific investigations.-Solve problems on accelerating potential andminimum wavelength.-Search internet on production of X-rays , spectrum characteristics and applications.**Links to other subjects:** Medicine(detection of fractures, cancer treatment), Transportation(detection of metal objects), Security departments.* **General quiz**
 | Content and Activities for Term 1, 2& 3 Physics S6, REBAdvanced physics by Tom Duncan 9th Edition |  |
| 08-1905/2023 **2 weeks****14 periods** | Topic:11**Electromagnetic waves**Sub-Topic:**LASER**Unit:**Effect of laser** | -Monochromatic and coherent sources of light.-Properties of a LASER beam-LASER beam as a source of coherent light.-Production of LASER beam-Applications and dangers of LASER beam **- General quiz** | -Working in groups discuss and present meaning of monochromatic, coherent sources, stimulated emission and spontaneous emission -Discuss in groups about LASER as a source of coherent light.-Discuss in groups productionmechanism of LASER beam.-Discuss in groups and present on applications and dangers of LASER beams.-Search internet and use ICT simulators analyze characteristics properties of LASER beam.**Links to other subjects**: LASER application in telecommunication, Medicine(eye surgery) and in Mechanical engineering (drilling and welding of metals)* **General quiz**
 | Content and Activities for Term 1, 2& 3 Physics S6, REB |  |
| 22/05-02/06/2023**2 weeks****14 periods** | Topic:**Electromagnetic waves**Sub-Topic:**Medical Imaging**Unit:12**Medical Imaging** | -Sound pressure and variation in fluids.-Frequency range for normal person-Observed sound intensity and ear response -Logarithmic response of the ear versus intensity.-Specific purposes of imaging techniques-Technology and radiation imaging (radiography and mammography)-Ultrasound (echography), Endoscopy, thermography-Radionuclide imaging-Magnetic resonance imaging(MRI)- **General quiz** | -Discuss in groups how sound pressure in air changes into larger pressure with fluid variation -Discuss in groups about the logarithmic response of the ear to intensity.-Discuss the effects of various imaging techniques and their purposes.**Links to other subjects:** Fluids, molecules.* **General quiz**
 | Content and Activities for Term 1, 2& 3 Physics S6, REBAdvanced physics by Tom Duncan 9th Edition |  |
| 05-16/06/2023**2 weeks****14 periods** | Topic:**Electromagnetic waves**Sub-Topic:**Radiation** Unit:13**Radiation and Medicine.** | -Radiation dosimetry, exposure, absorbed dose, quality factor (relative to biological effectiveness) and dose equivalent -Safety precautions to observed when handling radiations-Concept of balanced risk.-Physical half-life, biological half-life and effective half-life.-Problems involving radiation dosimetry.-The basics of radiation therapy for cancer treatment | -Discuss in groups the terms radiation dosimetry, exposure, absorbed dose, quality factor (relative biological effectiveness) and dose equivalent-Discuss in groups safety precautions to taken while handling radiation.-Discuss in groups evaluate physical half-life, biological half-life and effective half-life.-Discuss in groups the basics of radiation therapy for cancer and present results.**Links to other subjects**: gases, molecules, biology(radiotherapy), tracer elements (agriculture) | Content and Activities for Term 1, 2& 3 Physics S6, REBAdvanced physics by Tom Duncan 9th Edition |  |
| 19-23/06/2023**2 weeks****14 periods** | Topic:**Astrophysics**Sub-Topic:**Earth and space**Unit:14**Cosmology, Galaxies and Expansion of** **universe** | -The structure of the Milky wayGalaxy.-Types of Galaxies: spiral galaxies, elliptical galaxies, irregular galaxies-Clusters of galaxies.-Big Bang theory: Doppler shift due to cosmic expansion and Hubble's law**- General quiz** | -Working in group to analyze data from universities, and research organizations on the structure and types of galaxies.-Use telescope and Galileo scope to observe planets and present the findings.-Working in groups to solve problems on planetary motion. -Search internet for information on the structure of galaxies, the expansion of universe and their impact on environment.**Links to other subjects**: Geography (climate change and seasons), telecommunication (radio, Global positioning system)* **General quiz**
 | Advanced physics by Tom Duncan 9th Edition |  |
| 26/06-30/06/2023**1 week****7 periods** | Revision + Examination | Revision + Examination | Revision + Examination |  |  |
| 03-07/07/2023**1 week****7 periods** | Examination+ marking | Examination+ marking | Examination+ marking |  |  |
| 10-14/07/2023**1 week****7 periods** |  Marking + Reporting |