SEKOLAH HARAPAN BANGSA
SECONDARY
COURSE OUTLINE
ACADEMIC YEAR 2024-2025

Subject : Physics
Grade : XI
Semester : 2

Objectives:

9 Electricity

9.1 Electric current

1 understand that an electric current is a flow of charge carriers
2 understand that the charge on charge carriers is quantised
3 recall and use Q = It
4 use, for a current-carrying conductor, the expression I = Anvq, where n is the number density of charge carriers

9.2 Potential difference and power

1 define the potential difference across a component as the energy transferred per unit charge
2 recall and use V = W / Q
3 recall and use P = VI, P = I^2R and P = V^2 / R

9.3 Resistance and resistivity

1 define resistance
2 recall and use V = IR
3 sketch the I–V characteristics of a metallic conductor at constant temperature, a semiconductor diode and a filament lamp
4 explain that the resistance of a filament lamp increases as current increases because its temperature increases
5 state Ohm's law
6 recall and use R = ρL/A
7 understand that the resistance of a light-dependent resistor (LDR) decreases as the light intensity increases
8 understand that the resistance of a thermistor decreases as the temperature increases (it will be assumed that thermistors have a negative temperature coefficient)

10 D.C. circuits

10.1 Practical circuits

1 recall and use the circuit symbols shown in section 6 of this syllabus
2 draw and interpret circuit diagrams containing the circuit symbols shown in section 6 of this syllabus
3 define and use the electromotive force (e.m.f.) of a source as energy transferred per unit charge in driving charge around a complete circuit
4 distinguish between e.m.f. and potential difference (p.d.) in terms of energy considerations
5 understand the effects of the internal resistance of a source of e.m.f. on the terminal potential difference

10.2 Kirchhoff's laws

1 recall Kirchhoff's first law and understand that it is a consequence of conservation of charge
2 recall Kirchhoff's second law and understand that it is a consequence of conservation of energy
3 derive, using Kirchhoff's laws, a formula for the combined resistance of two or more resistors in series
4 use the formula for the combined resistance of two or more resistors in series
5 derive, using Kirchhoff's laws, a formula for the combined resistance of two or more resistors in parallel
6 use the formula for the combined resistance of two or more resistors in parallel
7 use Kirchhoff's laws to solve simple circuit problems

10.3 Potential dividers

1 understand the principle of a potential divider circuit
2 recall and use the principle of the potentiometer as a means of comparing potential differences
3 understand the use of a galvanometer in null methods
4 explain the use of thermistors and light-dependent resistors in potential dividers to provide a potential difference that is dependent on temperature and light intensity

11 Particle physics

11.1 Atoms, nuclei and radiation

1 infer from the results of the a-particle scattering experiment the existence and small size of the nucleus
2 describe a simple model for the nuclear atom to include protons, neutrons and orbital electrons

3 distinguish between nucleon number and proton number
4 understand that isotopes are forms of the same element with different numbers of neutrons in their nuclei
5 understand and use the notation AX for the representation of nuclides
6 understand that nucleon number and charge are conserved in nuclear processes
7 describe the composition, mass and charge of a-, b- and g-radiations (both b– (electrons) and b+ (positrons) are included)
8 understand that an antiparticle has the same mass but opposite charge to the corresponding particle, and that a positron is the antiparticle of an electron
9 state that (electron) antineutrinos are produced during b– decay and (electron) neutrinos are produced during b+ decay
10 understand that a-particles have discrete energies but that b-particles have a continuous range of energies because (anti)neutrinos are emitted in b-decay
11 represent a- and b-decay by a radioactive decay equation of the form 238U 234 Th + 4 α
12 use the unified atomic mass unit (u) as a unit of mass
11.2 Fundamental particles
1 understand that a quark is a fundamental particle and that there are six flavours (types) of quark: up, down, strange, charm, top and bottom
2 recall and use the charge of each flavour of quark and understand that its respective antiquark has the opposite charge (no knowledge of any other properties of quarks is required)
3 recall that protons and neutrons are not fundamental particles and describe protons and neutrons in terms of their quark composition
4 understand that a hadron may be either a baryon (consisting of three quarks) or a meson (consisting of one quark and one antiquark)
5 describe the changes to quark composition that take place during b– and b+ decay
6 recall that electrons and neutrinos are fundamental particles called leptons

Assessments:

Items	Weighing	Due Date
A. Process ● Project (ex: observation, models, surveys, making models or charts), presentation (simulation, demonstration) ● Homework ● Group Work ● Unit tests, Quizzes	70%	
B. Summative Assessments ● Mid Test/ Final Test	30%	To be announced

References:

- Crundell, M., Goodwin, G., Mee, Chris. (2021). Cambridge International AS and A Level Physics Second Edition with CD-ROM. Hodder Education.
- Sang, D., Jones, G., Chadha G., & Woodside R., (2021). Cambridge International AS and A Level Physics Coursebook with CD-ROM. Cambridge University Press.
- Past Papers AS Level.
- https://sites.google.com/view/physicscorners/grade-11

Kota Tangerang Selatan, 04 January 2025
Prepared by,

Sugeng Riyanto, M.Sc.
Physics Teacher