Term wise division of syllabus 9702 2020-21

A2 First Term

1. **Motion in a circle**
   - Kinematics of uniform circular motion
   - Centripetal acceleration and centripetal force
2. **Gravitational Fields**
   - Gravitational field
   - Gravitational force between point masses
   - Gravitational field of a point mass
   - Gravitational potential
3. **Oscillations**
   - Simple Harmonic Motion
   - Energy in SHM
   - Damped and forced oscillations, resonance
4. **Electric Field**
   - Electric forces between point charges
   - Electric field of a point charge
   - Electric potential
5. **Capacitance**
   - Capacitors and capacitance
   - Energy stored in a capacitor
6. **Magnetic Fields**
   - Concept of Magnetic Field
   - Force on a current carrying conductor
   - Force on a moving charge
   - Magnetic fields due to currents
   - use of calibrated Hall probe (from 2.1)
7. **Electromagnetic Induction**
   - Laws of electromagnetic induction
8. **Alternating Currents**
   - Characteristic of alternating currents
   - The transformer
   - Transmission of electrical energy
   - Rectification
   - Smoothing

A2 Second Term

1. **Quantum Physics**
   - Energy of a photon
   - Photoelectric emission of electrons
   - Wave-particle duality
   - Energy levels in atoms and line spectra
   - Band theory
2. **Particle and nuclear Physics**
   - Mass defect and Nuclear binding energy
   - Radioactive decay
   - The Avogadro constant (1.3)
3. **Ideal Gases**
   - Equation of state
   - Kinetic theory of gases
   - Kinetic theory of a molecule
4. **Temperature**
   - Thermal equilibrium
   - Temperature scales
   - Practical thermometers
5. **Thermal properties of materials**
   - Specific heat capacity and specific latent heat
   - Internal energy and the first law of thermodynamics
6. **Electronics**
   - The ideal operational amplifier
   - Operational amplifier circuits
   - Output devices
   - Potential Dividers (20.3 c & d)
   - Sensing devices (19.4)
7. **Imaging of Internal Structures**
   - Production and use of ultrasound in diagnosis (14.6)
   - Nuclear Magnetic Resonance Imaging (22.5)
   - Production and use of X-Rays (25.6)
   - CT Scanning

8. **Communication**

- Communication channels
- Modulation
- Digital communication
- Relative merits of digital communication
- Attenuation

Data

speed of light in free space	$c = 3.00 \times 10^{8}\,\text{m s}^{-1}$
permeability of free space	$\mu_0 = 4\pi \times 10^{-7}\,\text{H m}^{-1}$
permittivity of free space	$\varepsilon_0 = 8.85 \times 10^{-12}\,\text{F m}^{-1}$
	$(\frac{1}{4\pi\varepsilon_0} = 8.99 \times 10^{9}\,\text{m F}^{-1})$
elementary charge	$e = 1.60 \times 10^{-19}\,\text{C}$
the Planck constant	$h = 6.63 \times 10^{-34}\,\text{J s}$
unified atomic mass unit	$1\,\text{u} = 1.66 \times 10^{-27}\,\text{kg}$
rest mass of electron	$m_e = 9.11 \times 10^{-31}\,\text{kg}$
rest mass of proton	$m_p = 1.67 \times 10^{-27}\,\text{kg}$
molar gas constant	$R = 8.31\,\text{J K}^{-1}\,\text{mol}^{-1}$
the Avogadro constant	$N_A = 6.02 \times 10^{23}\,\text{mol}^{-1}$
the Boltzmann constant	$k = 1.38 \times 10^{-23}\,\text{J K}^{-1}$
gravitational constant	$G = 6.67 \times 10^{-11}\,\text{N m}^2\,\text{kg}^{-2}$
acceleration of free fall	$g = 9.81\,\text{m s}^{-2}$

Paper 4 A Level Structured Questions **2 hours** This paper consists of a variable number of questions of variable mark value. All questions will be based on the A Level syllabus but may require knowledge of material first encountered in the AS Level syllabus. Candidates will answer all questions. Candidates will answer on the question paper. [100 marks]	–	38.5%
Paper 5 Planning, Analysis and Evaluation **1 hour 15 minutes** This paper consists of two questions of equal mark value based on the practical skills of planning, analysis and evaluation. The context of the questions may be outside the syllabus content, but candidates will be assessed on their practical skills of planning, analysis and evaluation rather than their knowledge of theory. Candidates will answer both questions. Candidates will answer on the question paper. [30 marks]	–	11.5%

Formulae

uniformly accelerated motion	$s = ut + \frac{1}{2}at^2$ $v^2 = u^2 + 2as$
work done on/by a gas	$W = p\Delta V$
gravitational potential	$\phi = -\frac{Gm}{r}$
hydrostatic pressure	$p = \rho gh$
pressure of an ideal gas	$p = \frac{1}{3}\frac{Nm}{V}\langle c^2 \rangle$
simple harmonic motion	$a = -\omega^2 x$
velocity of particle in s.h.m.	$v = v_0 \cos \omega t$ $v = \pm \omega \sqrt{(x_0^2 - x^2)}$
Doppler effect	$f_o = \frac{f_s v}{v \pm v_s}$
electric potential	$V = \frac{Q}{4\pi\varepsilon_0 r}$
capacitors in series	$1/C = 1/C_1 + 1/C_2 + \ldots$
capacitors in parallel	$C = C_1 + C_2 + \ldots$
energy of charged capacitor	$W = \frac{1}{2}QV$
electric current	$I = Anvq$
resistors in series	$R = R_1 + R_2 + \ldots$
resistors in parallel	$1/R = 1/R_1 + 1/R_2 + \ldots$
Hall voltage	$V_H = \frac{BI}{ntq}$
alternating current/voltage	$x = x_0 \sin \omega t$
radioactive decay	$x = x_0 \exp(-\lambda t)$
decay constant	$\lambda = \frac{0.693}{t_{\frac{1}{2}}}$