

CU ATS CONTENT

1. Kinematics
 - a. Definition of constant speed vs constant velocity
 - b. Definition of acceleration
 - c. How acceleration affects velocity with drawing vectors (increase, decrease, change direction)
 - d. S, U, V, a, T
 - e. Projectile motion

2. Force
 - a. Newton 3 laws of motion
 - b. X axis & Y axis motion diagram
 - c. Incline plane
 - d. Pulley
 - e. Kinematics + force problems

3. Circular Motion & Gravitational force
 - a. Tangential speed
 - b. Centripetal acceleration
 - c. Centripetal force
 - d. Horizontal circular motion
 - e. Vertical circular motion
 - f. Gravity field and force
 - g. Orbital speed

4. Energy
 - a. Kinetic energy
 - b. Gravitational Potential energy
 - c. Work
 - d. Conservation of energy
 - e. Power

5. Momentum
 - a. Impulse
 - b. Collisions

6. Simple harmonic motion
 - a. Pendulum
 - b. Spring

7. Electric

- a. Electric plate
 - i. Electric field
 - ii. Electric force
 - iii. Electric potential
 - iv. Electric potential energy combines with conservation of energy
- b. Electric charge
 - i. Electric field
 - ii. Electric force
 - iii. Electric potential
 - iv. Electric potential energy combines with conservation of energy

8. Electric circuit

- a. Capacitor
- b. Series
- c. Parallel
- d. Power

9. Magnetism

- a. Magnetic field of current carrying wire
- b. Magnetic force on moving charge particle
- c. Magnetic force on current carrying wire
- d. Electromagnetic induction (Faraday's Law and Lenz Law)
- e. Electric field + magnetic field problems

10. Wave

- a. Property of wave
 - i. Velocity
 - ii. Wavelength
 - iii. Frequency
 - iv. Amplitude
- b. Refraction
- c. Diffraction (single and double slit)
- d. Wave function $y = A \sin(kx - \omega t)$
- e. Decibel - Intensity conversion

11. Optics

- a. Lens
 - i. Converging vs diverging
- b. Mirror
 - i. Converging vs diverging
- c. Magnification formula
- d. Focal length formula

12. Thermal Property

- a. Heat
 - i. $Q=mcT$
 - ii. $Q=mL$
 - iii. Combine two objects and find final temperature
- b. Ideal gas law
- c. Kinetic theory of ideal gas
 - i. v_{rms}
 - ii. E_k
- d. First Law of Thermodynamic

13. Quantum phenomena

- a. Photoelectric effect
- b. Energy level of hydrogen / helium

14. Nuclear physics

- a. Half life
- b. Alpha decay
- c. Beta decay
- d. Gamma decay
- e. $E = mc^2$ calculate energy from nuclear reaction

15. Fluid Mechanics

16. Young Modulus

17. Center of mass