Physics UTS mid-term exam 2023, prepared by Michael Marchenko

1. How many significant figures are there in your T number?

2. Find velocity and acceleration for motion with equation x = -k + Lt + Tt2.

3. Solve inelastic collision problem of two balls of masses L and T, velocities s and k.

4. Solve elastic collision problem for u1 = k, u2 = k/2, m1 = k, m2 = 2k.

5. Find centre of mass of 2 equal masses k meters apart. Solve the projectile problem.

6. Find acceleration of a simple pulley and tension in rope for two masses L and T.

7. Find gravity acceleration g, orbital velocity Vo and escape velocity Ve for the planet.

8. Find acceleration of mass at inclined plane with A = T and μ = 1/T.

9. Find hangover for s blocks in blocks stacking problem.

10. Find angular velocity and linear acceleration for v = T and R = k.

11. Find Schwarzschild radius for k grams desk. Are black or white clothes warmer? Why?

12. Calculate Doppler effect for sound. λ changed from 17 m to 16 m. What is velocity?

13. Find T for C1 m1 T1, C2 m2 T2, m1=k,m2=2k.C1=k/11,C2=k/222,T1=k/111,T2=k/22

14. Find force between two charges of L and T Coulombs, m meters apart.

15. Calculate series and parallel circuits with e.m.f. of T, resistors L+1, 2 and 3 ohms.

16. Show that maximum loss in circuit is when R = r. E = I(R+r). Waste = RI2.

17. Find frequency and period of harmonic oscillator. L = k μH and C = T μF.

18. Find V1 for transformer if V2 = T, N1 = k, N2 = s. What colour is the Sun? Why?