FRP in physics = Final Revision Paper in physics:

Edited at 11pm 24.7.2017.

s is your student number. k = s mod 10000. T = s mod 100. m = s mod 35. a = s mod 25.

L = s mod 10. $d\_{2}=\frac{T-L}{10}$. e = s mod 8. m7 = s mod 7. m6 = s mod 6. m5 = s mod 5. m4 = s mod 4. m3 = s mod 3.

m2 = s mod 2.

Classical electromagnetism:

1. Find V1 for the transformer if V2 = T volts, N1 = k and N2 = s.

http://physics16.weebly.com/uploads/5/9/8/5/59854633/transformer.txt

2. T kilowatts of electric power is sent to a town from a power plant. The transmission lines have the total resistance of 0.1T Ohms. Calculate the power loss if the power is transmitted at:

(a) 0.03k Volts (b) n Volts

http://physics16.weebly.com/uploads/5/9/8/5/59854633/losses4transmitting4power.txt

3. A circular coil of wire has a diameter of 0.002k cm and contains 10 loops. The current in each loop is 3A, and the coil is placed into 2TESLA external magnetic field. Determine the maximum and minimum torque exerted on the coil by the field.

http://physics16.weebly.com/uploads/5/9/8/5/59854633/torque.txt

Circuits:

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

http://physics18.weebly.com/uploads/5/9/8/5/59854633/series\_parallel\_circuits.txt

5. Find the electrical current i in the circuit for R = T, L = 1/k, C = 1/s, ω = k, and εm = T.

http://physics16.weebly.com/uploads/5/9/8/5/59854633/2054\_ch21a.pdf

Classical optics:

6. A man 0.25k mm tall stands in front of a vertical plane mirror. His eyes are 10 cm bellow the top of his head. What are the sizes and the best location of the smallest possible mirror so that he can see his entire body?

http://physics16.weebly.com/uploads/5/9/8/5/59854633/height4mirror.txt

7. For convex mirror with a radius of curvature of 0.002k meters, determine the location of the image and its magnification for an object 0.0012k meters from the mirror.

http://physics16.weebly.com/uploads/5/9/8/5/59854633/mirror.txt

8. A spy satellite camera can recognize T cm objects from the altitude of n meters. If diffraction was the only limitation (the wave length Lambda = 0.1k nanometers), determine what diameter lens the camera has.

http://physics16.weebly.com/uploads/5/9/8/5/59854633/satellite4spying.txt

Scattering:

9.

m4 = 0: What visible light is the fastest? Why?

m4 = 1: What visible light is the most noticeable? Why?

m4 = 2: What visible light has the most energy? Why?

m4 = 3: What visible light is the most absorbed? Why?

Classical electrodynamics:

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

http://physics16.weebly.com/uploads/5/9/8/5/59854633/rlc4circuit4natural4frequency4period.txt

Spectroscopy:

11. Suppose a star has a surface temperature of 4k degrees. What are the wavelength and the color this star appears?

http://physics16.weebly.com/uploads/5/9/8/5/59854633/color4black4body.txt

Quantum physics:

12. Find energy and momentum of photon of s Hz frequency.

13. Calculate the energy and momentum of a photon for Lambda = 0.05k nanometers.

http://physics16.weebly.com/uploads/5/9/8/5/59854633/energy4photon.txt

14. Determine the wavelength of an electron that has been accelerated through the potential difference of T Volts.

http://physics16.weebly.com/uploads/5/9/8/5/59854633/wavelength4electron.txt

15. Calculate the wavelength of k grams desk moving T centimeters per second.

http://physics16.weebly.com/uploads/5/9/8/5/59854633/waves4matter.txt

16. What is the matter wave length of T gram book?

17. Find the energy level and angular momentum for hydrogen according to the Bohr Model.

http://physics16.weebly.com/uploads/5/9/8/5/59854633/bohr.txt

Relativity theory, annihilation and nuclear physics:

18. Calculate the Schwarzschild radius for the k grams desk.

http://physics16.weebly.com/uploads/5/9/8/5/59854633/radius4schwarzschild.txt

19. Find the annihilation energy of k grams of matter.

http://physics16.weebly.com/uploads/5/9/8/5/59854633/energy4binding.txt

20. Calculate the remaining mass (it is NOT 0) of the decaying substance after k seconds if the decay ratio is T and initial mass is s. Calculate the half-life.

http://physics16.weebly.com/uploads/5/9/8/5/59854633/code4nuclear4decay4half4life.txt

Particle physics:

21. Perform correlation and regression analyses of the periodic table for T+2 elements and for m7 + 3 elementary particles.

http://physics16.weebly.com/uploads/5/9/8/5/59854633/correlations4periodic4table.xlsx

http://physics16.weebly.com/uploads/5/9/8/5/59854633/regression4periodic4table.txt

http://physics16.weebly.com/uploads/5/9/8/5/59854633/evergy4lifetime.xlsx

http://physics16.weebly.com/uploads/5/9/8/5/59854633/regression4elementary4particles4energies4life4times.txt

Elementary particles:

m3 = 0: 22. What particles mediate electromagnetic interaction?

A. electrons

B. protons

C. positrons

D. photons

m3 = 1: 23. What particles mediate strong interaction?

A. neutrons

B. gluons

C. photons

D. protons

m3 = 2: 24. How many times is Electromagnetic Force weaker than the Strong Force?

A. 137

B. 758

C. 3592

D. 126434

25. Thermodynamics:

m4 = 0: Write Ideal Gas equation.

m4 = 1: Give isothermal process equation.

m4 = 2: Give isobaric process equation.

m4 = 3: Give isochoric process equation.

26. Optics:

m5 = 0: Explain plane mirror.

m5 = 1: Explain convex mirror.

m5 = 2: Explain concave mirror.

m5 = 3: Explain converging lens.

m5 = 4: Explain diverging lens.

27. Maxwell equations:

m2 = 0: Explain Maxwell equations.

m2 = 1: Give the solution to the simplified Maxwell equations.

Waves:

L = 0: 28. What is Doppler Effect?

https://en.wikipedia.org/wiki/Doppler\_effect

L = 1: 29. How does radar work?

https://en.wikipedia.org/wiki/Radar

Nuclear weapons:

L = 3: 30. Explain implosion.

https://en.wikipedia.org/wiki/Nuclear\_weapon\_design

L = 4: 31. What is the Fat Man?

https://en.wikipedia.org/wiki/Fat\_Man

Tunneling effect:

L = 5: 32. Explain the tunneling effect.

https://en.wikipedia.org/wiki/Quantum\_tunnelling

Quantum computing and quantum communication:

L = 6: 33. What is photon polarization?

https://en.wikipedia.org/wiki/Photon\_polarization

L = 7: 34. How is photon polarization used in quantum computing and quantum cryptography?

https://en.wikipedia.org/wiki/Quantum\_computing

https://en.wikipedia.org/wiki/Quantum\_cryptography

L = 8: 35. Explain quantum teleportation.

Nuclear computing:

L = 9: 36. What is Nuclear magnetic resonance quantum computer?

https://en.wikipedia.org/wiki/Nuclear\_magnetic\_resonance\_quantum\_computer

L = 0: 37. Explain cosmology.

https://en.wikipedia.org/wiki/Cosmology

L = 1: 38. Explain the Big Bang.

https://en.wikipedia.org/wiki/Big\_Bang

L = 2: 39. What is the Standard Model of Physics?

https://en.wikipedia.org/wiki/Standard\_Model

L = 3: 40. Explain the Theory of Everything.

https://en.wikipedia.org/wiki/Theory\_of\_everything

Extraterrestrial life:

L = 4: 41. Explain extraterrestrial life.

https://en.wikipedia.org/wiki/Extraterrestrial\_life

42. Thermodynamics:

m4 = 0: Explain Heat Engine.

m4 = 1: What is thermodynamics of air-conditioning?

m4 = 2: Give thermodynamics laws.

m4 = 3: Explain real gas.

L = 5: 43. What is Compton Effect?

https://en.wikipedia.org/wiki/Compton\_scattering

L = 6: 44. Explain Hole Effect.

https://en.wikipedia.org/wiki/Hall\_effect

L = 7: 45. Solve the secondary school physics problems.

http://physics18.weebly.com/

Special Relativity:

46. If your velocity would be $v=\left(1-\frac{1}{e+2}\right)c$ then how would your height, mass, and time change?

L = 8: 47. Explain inertial reference frame.

L = 9: 48. What is General relativity?

L = 0: 49. Explain the Dark Matter.

L = 1: 50. What is Dark Energy?

L = 2: 51. Explain Critical Density of the Universe.

L = 3: 52. Give the equation for the critical density of the Universe.

L = 4: 53. Is the density of our Universe smaller, the same or larger than the critical density?

FFC= Fundamental Physical Constants:

L = 5: 54. Explain the fundamental physical constants.

L = 6: 55. Explain the Big Bang.

L = 7: 56. Explain Bose-Einstein Condensate.

L = 8: 57. What happens if the temperature = 0K?

L = 9: 58. Explain the physical vacuum.

Nuclear weapons:

L = 0: 59. Is North Korea capable of creating a hydrogen bomb?

L = 1: 60. What is the probability of the nuclear war and how to prepare to that?

L = 2: 61: Explain Heisenberg Uncertainty Principle.

Energy, mass and momentum equivalence:

62. Find the energy of a coin with mass of T grams, moving with the speed of T meters per second.

63. Find the energy of the photon with the frequency of s Hz.

E2 = (mc2)2 + (pc)2.

Nucleons structure:

L = 3: 64. Give the structure of neutron.

L = 4: 65. Give the structure of proton.

Faster than the speed of light:

L = 5: 66. How can we travel faster than the speed of light?

L = 6: 67. Explain the Universe expanding faster than the speed of light.

L = 7: 68. What is tachyon?

https://en.wikipedia.org/wiki/Tachyon

Quantum computing and quantum communication:

L = 8: 69. Explain quantum computing and quantum communication.

What you have learned:

70. What have you learned in my physics class?

Project:

71. Explain your project.

Deadline: before the final exam.