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STUDENT NAME	
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Paper Type	

Q1. Choose the correct answer. **17X1=17**

1. Malus's law is applicable to:

(A) Refraction **(B)** Diffraction **(C)** Polarized light **(D)** Monochromatic ligh

2. According to Malu's law, when the polarizer and analyzer are perpendicular, the transmitted intensity is:

(A) Maximum **(B)** Half of orignal **(C)** Zero **(D)** Doublw

3. Which of the following materials would best work for a Faraday cage?

(A) Wood **(B)** Glass **(C)** Plastic **(D)** Cooper

4. Emf is induced due to change in:

(A) Electric flux **(B)** Magnetic flux **(C)** Electric potential **(D)** Electric, current

5. Which force balance the magnetic attraction to prevent ferrofluids from settling?

(A) Buoyant force **(B)** Brownian motion **(C)** Electrostatic repulsion **(D)** Gravitational pull

6. What does a seismometer measure?

(A) Rainfall **(B)** Earthquakes **(C)** Wind speed **(D)** Temperature

7. The working principle of a seismometer is based on:

(A) Magnetic fields **(B)** Electrical resistance **(C)** Inertia of a suspended mass **(D)** Buoyancy

8. Relative velocity between two bodies moving in opposite directions is:

(A) Sum of their velocities **(B)** Product of their velocities **(C)** Difference of their velocities **(D)** Zero

9. The Earth is considered an inertial frame for most purposes because:

(A) It is at absolute rest **(B)** It does not rotate **(C)** Newton's laws do not work on Earth **(D)** Its acceleration is negligible compared to objects on its surface

10. The stability of a nucleus depends mainly on the:

(A) Number of electrons **(B)** Mass number **(C)** Neutron-to-proton ratio **(D)** Binding energy of electrons

11. Pair production can only occur if the photon has energy:

(A) Less than 0.5 Mev **(B)** Exactly 0.51 MeV **(C)** Greater than 1.02 MeV **(D)** Greater than 0.1 MeV

12. Which of the following is conserved during pair production?

(A) Energy only **(B)** Momentum only **(C)** Mass only **(D)** Energy and Momentum

13. Which radioactive emision increases the atomic number by 1 but leaves the mass number unchanged?

(A) Alpha emission **(B)** Gamma emission **(C)** Beta-plus emission **(D)** Beta-minus emission

14. Which type of the decay is the most penetrating?

(A) Alpha **(B)** Beta **(C)** Gamma **(D)** All of these

15. Which combination of quarks makes up a proton?

(A) uud **(B)** udd **(C)** ddu **(D)** uuu

16. A mason is made up of:

(A) Two quarks **(B)** Three quarks **(C)** One quark and one anti-quark **(D)** One proton and one neutron

17. The Higgs boson is a type of:

(A) Lepton **(B)** Quark **(C)** Boson **(D)** Fermion

Q2. Write short answers of the following questions. Any 8 **8X2=16**

1 . Do stationary waves transfer energy?

2 . What is coherent light?

3 . Can stationary waves be formed in air columns?

4 . Which is richer harmonics, and why?

5 . Why does sound travels faster in solids than in gases?

6 . Is Malus' law applicable to unpolarized light?

7 . What is the effect of gravitational waves on matter?

8 . How do gravitational waves travel?

9 . How are gravitational waves detected?

10 . Why are gravitational waves important in astronomy?

11 . How does LIGO detect gravitational waves?

12 . What causes interference?

Q3. Write short answers of the following questions. Any 8 **8X2=16**

1 . Electric lines of force never cross each other. Why?

2 . How is electric field strength related to p.d?

3 . How do electric field lines appear between two opposite charges?

4 . Electric lines of forces never cross. why?

5 . Does electric flux depend on the shape of the surface?

6 . How does Gauss's law help us to calculate?

7 . What is electric potential?

8 . What are the difficulties in testing whether the filament of a lighted bulb obeys Ohm's law?

9 . Why does the resistance of a conductor rise with temperature?

10 .

Do bends in a wire affect its electrical resistance? Explain.

11 . On what principle does a potentiometer work?

12 . How a galvanometer is converted into: (i) an ammeter (ii) a Voltmeter

Q4. Write short answers of the following questions. Any 6 **6X2=12**

1 . The potential is constant throughout a given region of space. Is the electric field zero or non-zero in this region? Explain.

2 . Does electric flux depend on the shape of the surface?

3 . Define electric intensity and electric potential.

4 . What is equipotential surface?

5 . What is meant by zero electric potential?

6 . What is an electron volt?

7 . What is Faraday;s cage?

8 . Where is electrostatic shielding used in real life?

9 . Why does resistance of a thermistor changes as temperature increases?

Q5. Write detailed answers of the following questions. Any 6 **6X4=24**

1 . What are standing waves? Illustrate a detailed experiment that demonstrates the standing waves using stretched strings.

2 . The speed of a wave on a typical string is 24 ms^{-1}. What driving frequency will it resonate if its length is 6.0 m?

3 . Define and exemplify diffraction of waves. Describe this phenomenon by ripple tank experiment.

4 . The lowest resonance frequency for a guitar string of length 0.75 m is 400 Hz. Calculate the speed of a transverse wave on the string.

5 . What do you understand by progressive waves? Discuss the intensity of progressive waves.

6 . A radio antenna broadcasts 500 watts of power. If the signal is received at a distance of 10 km, what is the intensity of the signal?

7 .
Keeping in mind "Doppler effect", analyze the following cases:(a) when source of sound moves away from the stationary observer.(b) when source of sound moves towards the stationary observer

8 .
A light wave passes through a polarizer with its electric field aligned at 30 deg to the horizontal. If the amplitude of the wave is 10 units, what is the amplitude of the wave passing through the polarizer?

9 . State Malus's law. Explain the intensity formula.

10 .
An unpolarized light having intensity of 15 Wm^{-2} is incident on a pair of polarizers.The first polaroid filter has its transmission axis at 50 deg from the vertical. The second polaroid filter has its transmission axis at 20^{o} from the vertical. Calculate the intensity of light transmitted to both filters.