

UNIVERSITY OF BUEA
FACULTY OF ENGINEERING AND TECHNOLOGY
ENTRANCE EXAMINATION
PHYSICS

September 2019

Time: 3 Hours

Answer all Questions

Each question has four suggested answers A, B, C, D. Select only one answer.

<p>1. Which of the following sets x, y, and z contains two vector quantities and one scalar?</p> <table border="1" style="margin-left: auto; margin-right: auto; border-collapse: collapse; width: fit-content;"> <thead> <tr> <th></th><th>x</th><th>y</th><th>z</th></tr> </thead> <tbody> <tr> <td>A</td><td>power</td><td>velocity</td><td>E-field</td></tr> <tr> <td>B</td><td>Force</td><td>Energy</td><td>Pressure</td></tr> <tr> <td>C</td><td>Weight</td><td>Momentum</td><td>Displacement</td></tr> <tr> <td>D</td><td>Mass</td><td>Torque</td><td>temperature</td></tr> </tbody> </table>		x	y	z	A	power	velocity	E-field	B	Force	Energy	Pressure	C	Weight	Momentum	Displacement	D	Mass	Torque	temperature	<p>5. A battery is connected to a parallel-plate capacitor that stores $6.0 \times 10^{-4} J$ of energy. If the separation between the plates of the capacitor is doubled, which of the following would be the value of the energy stored?</p> <p>A $1.5 \times 10^{-4} J$ B $1.2 \times 10^{-4} J$ C $3.0 \times 10^{-4} J$ D $6.0 \times 10^{-4} J$</p>
	x	y	z																		
A	power	velocity	E-field																		
B	Force	Energy	Pressure																		
C	Weight	Momentum	Displacement																		
D	Mass	Torque	temperature																		
<p>2. A small mass m is suspended from one end of a vertical string and then whirled in a horizontal circle at a constant velocity v</p> <p>A The centripetal force acting on m is $T\cos\theta$ B The only force on m is its weight C The weight of the mass is given by $T\sin\theta$ D The string becomes inclined to the vertical at an angle θ, where $\tan\theta = v^2/rg$</p>	<p>6. An electrically charged pith ball of mass $4.0 \times 10^{-4} kg$ is suspended by a light thread of negligible mass and placed in a uniform electric field of strength $4.0 \times 10^2 N/C$. If the ball is deflected through an angle of 10° then the magnitude of the charge on it is</p> <p>A $2.0 C$ B $2.0 \times 10^{-6} C$ C $2.0 \times 10^{-4} C$ D $2.0 \times 10^6 C$</p>																				
<p>3. An iron ball X and a copper ball Y of the same volume are thrown horizontally with the same velocity μ from the top of a tall building. Which of the following statements is true if air resistance is ignored?</p> <p>A X reaches the ground before Y at the same distance from the building B X reaches the ground at the same time with Y but a smaller distance from the building C X reaches the ground at the same time with Y but at a greater distance from the building D X and Y reach the ground at the same time and at the same distance from the building</p>	<p>7. The resonant frequency in an L-C circuit is 40MHz. When the inductance is increased by a factor of four keeping the capacitance constant, which of the following is the correct value for the new resonant frequency in MHz?</p> <p>A 10 B 20 C 5 D 40</p>																				
<p>4. A snooker ball x collides head-on with another snooker ball y moving in the opposite direction. Which of the following statement below is the correct statement of the conservation of momentum?</p> <p>A The total momentum in the x and y directions stay constant B The initial and final momentum of x is the same C The sum of x and y components of the momentum is zero D The final momentum of x is the same as the final momentum of y</p>	<p>8. Which other essential information is required to calculate the energy needed to change 0.5 kg of ice at $-10^\circ C$ to water at $20^\circ C$ if energy lost to the surroundings and calorimeter is negligible</p> <p>A Mass of water, Specific latent heat of fusion of ice, Specific heat capacity of water B Mass of calorimeter, Specific heat capacity of water, Specific latent heat of fusion of ice C Specific heat capacity of ice, Specific latent heat of fusion of ice, Specific heat capacity of water D Specific heat capacity of ice, Temperature rise, Specific latent heat of fusion of ice and Time taken</p>																				

<p>9. Tungsten obeys Ohm's law because</p> <ul style="list-style-type: none"> A The current decreases with increase in temperature B The current in it is proportional to the number of charge carriers C The current through it is proportional to the p.d. across it at constant temperature D The resistance is proportional to temperature 	<p>14. A converging lens of focal length 12.0 cm forms an upright image four times the size of its real image. Which of the following is the distance of the object?</p> <ul style="list-style-type: none"> A 15 cm B 30 cm C 12 cm D 24 cm 						
<p>10. The first law of thermodynamics for an ideal gas may be stated in the form $\Delta U = \Delta Q + \Delta W$. Which of the following is the most correct statement about the equation?</p> <ul style="list-style-type: none"> A $\Delta Q = -\Delta W$ when the temperature increases slightly B $\Delta U = 0$ when no heat enters or leaves the system C ΔW is the work done by the gas D $\Delta U=0$ when the heat is supplied at constant temperature 	<p>15. An observer is moving towards a sound source of constant frequency with a velocity of 40ms^{-1}. He observes the frequency to be 560 Hz. If the velocity at which the observer is moving towards the sound doubles, what will be the new observed frequency? (speed of sound in air is 330ms^{-1}).</p> <ul style="list-style-type: none"> A 620 Hz B 500 Hz C 660 Hz D 380 Hz 						
<p>11. Two bodies P and Q are in thermal equilibrium. This statement means that</p> <ul style="list-style-type: none"> A There is no transfer of energy between P and Q B The rate of transfer of heat between P and Q is constant C P and Q have the same amount of internal energy D P and Q are in physical contact with each other 	<p>16. A parallel plate capacitor is connected in series with a battery. Which of the following procedures will result in doubling the capacitance of the capacitor?</p> <table border="1"> <tbody> <tr> <td>1 Increase area by 4</td> <td>Half the distance</td> </tr> <tr> <td>2 Keep area constant</td> <td>Increase distance by 4</td> </tr> <tr> <td>3 Half area</td> <td>Increase distance by 4</td> </tr> </tbody> </table> <ul style="list-style-type: none"> A 1 and 2 B 2 and 3 C 1 only D 3 only 	1 Increase area by 4	Half the distance	2 Keep area constant	Increase distance by 4	3 Half area	Increase distance by 4
1 Increase area by 4	Half the distance						
2 Keep area constant	Increase distance by 4						
3 Half area	Increase distance by 4						
<p>12. An electron moves in a circular orbit in a uniform magnetic field. Which of the following statements is the most correct?</p> <ul style="list-style-type: none"> A The period of the electron in the orbit is independent of the speed of the electron B The force on the electron is parallel to the field C The speed of the electron is independent of the radius of the orbit D The B-field is proportional to the radius of the circle 	<p>17. Which of the following deductions is/are true for Newton's first law of motion?</p> <ul style="list-style-type: none"> 1. A body is in uniform motion only when no force acts on it 2. A resultant force is necessary to cause an object to accelerate 3. The motion of a body in the absence of a net force is rectilinear <ul style="list-style-type: none"> A 1 and 2 B 2 and 3 C 1 only D 3 only 						
<p>13. Which of the following quantities has the smallest numerical values in SI units?</p> <ul style="list-style-type: none"> A The charge on an electron B The mass of an electron C The mass of an α particle D The mass of a hydrogen atom 	<p>18 2.5 kg of water is heated in an open container for 5 minutes using a heater of power 2 kW. Which of the following statements about the temperature of the water is true? (The specific heat capacity of water is $4200\text{ J kg}^{-1}\text{K}^{-1}$)</p> <ul style="list-style-type: none"> A The change in the temperature of the water is 58.3°C B The change in the temperature of the water is 57.3°C C The change in the temperature of the water is greater than 57.3°C D If the initial temperature of the water was 23.7°C then its final temperature would be 810°C 						

<p>19. A dielectric increases the capacitance of a capacitor by:</p> <ol style="list-style-type: none"> Increasing the strength of the electric field between the plates of the capacitor Drawing electrons off the negative plate to the positive plate Reducing the potential difference between the plates of the capacitor <p>Which of the above statement(s) is/are true?</p> <ol style="list-style-type: none"> 1 and 2 2 and 3 1 only 3 only 	<p>23. Using a steady force of 150 N, a farmer succeeds in pulling horizontally a 20 kg bag of potatoes through 20 m along a flat horizontal pavement. As she does so, she overcomes a frictional force of 50 N. How much work is done on the bag?</p> <ol style="list-style-type: none"> 1000 J 2000 J 3000 J 4000 J
<p>20. Which of the following statements about heat transfer is NOT true?</p> <ol style="list-style-type: none"> Radiation transmits heat through air with the speed of light in air In a fluid, heat is transmitted upwards mainly by mass movement of fluid molecules A poor conductor has a low value of thermal conductivity All good thermal conductors are not necessarily good electrical conductors 	<p>24. Consider the following statements about capacitors connected in series in a circuit which is in the process of charging.</p> <ol style="list-style-type: none"> The charge on each capacitor is the same The effective capacitance of all the capacitors is less than the individual capacitances The voltage across each capacitor is the same <p>Which of the statement(s) is/are correct?</p> <ol style="list-style-type: none"> 1 and 2 2 and 3 1 only 3 only
<p>21. Which of the following quantities that are associated with Kirchoff's first and second laws respectively obey the principle of conservation?</p> <ol style="list-style-type: none"> Energy and charge Energy and momentum Charge and energy Voltage and charge 	<p>25. An ideal gas absorbs 1000 J of heat energy and expands from a volume of 0.025m^3 to a volume of 0.05m^3 at a constant pressure of $20 \times 10^3 \text{ Pa}$.</p> <p>Consider the following statements about the gas:</p> <ol style="list-style-type: none"> The work done by the gas is 100 J The work done by the gas is 500 J The internal energy of the gas changes by 500 J. <p>Which of the statement(s) is/are true?</p> <ol style="list-style-type: none"> 1 and 2 2 and 3 1 only 3 only
<p>22. In the formation of a nucleus, the actual mass of the nucleus formed is less than the sum of the masses of the individual protons and neutrons. The energy equivalence of the mass difference is referred to as</p> <ol style="list-style-type: none"> Binding Energy Work function Mass defect Lost energy 	<p>26. Which of the following statements about the first law of thermodynamics is/are true?:</p> <ol style="list-style-type: none"> The amount of energy received by a system is always greater than the work done by the system The efficiency of an engine can be greater than one if and only if there is no energy loss The internal energy change in a system must be equal to the energy absorbed by the system <ol style="list-style-type: none"> 1 and 2 2 and 3 1 only 3 only

<p>27. Which of the following statements can be explained by the second law of thermodynamics</p> <ol style="list-style-type: none"> Net heat flows only in a particular direction in the universe The entropy of the universe changes with time Heat does not flow from a cold to hot object <p>A 1 and 2 B 2 and 3 C 1 only D 3 only</p>	<p>31. The magnitude of the force, F, between two masses m_1 and m_2 separated by a distance r is given by the expression</p> $F = \frac{Gm_1 m_2}{r^2}$ <p>The base units for G are</p> <p>A $kg^3 m^3 s^{-2}$ B $kg^{-1} m^3 s^{-2}$ C $kg m^3 s^{-2}$ D $kg^{-1} ms^{-2}$</p>
<p>28. A pipe of length L is opened at both ends. It is made to resonate such that its second harmonic is at a frequency f_2. Given that the velocity of sound in air is $V \text{ ms}^{-1}$, which of the following statement(s) is/ are true?</p> <ol style="list-style-type: none"> The fundamental frequency f_o is larger than f_2 The fundamental frequency f_o is the same as f_2 The fundamental frequency f_o is half f_2 <p>A 1 and 2 B 2 and 3 C 1 only D 3 only</p>	<p>32. Which of the following must be taken seriously into consideration when choosing LASER equipment for school laboratory experiments?</p> <ol style="list-style-type: none"> It should produce a coherent beam It should produce an intense beam It should be low powered It should produce a monochromatic beam of light
<p>29. Consider the following statements about a mass spectrometer:</p> <ol style="list-style-type: none"> The electric and magnetic fields are arranged perpendicularly to each other The mass/charge ratio, m/q, is inversely proportional to the radius r of the circular path of the charge The velocity V in the circular path is independent of the magnetic field B <p>Which of these statement(s) is/ are true?</p> <p>A 1 and 2 B 2 and 3 C 1 only D 3 only</p>	<p>33. A ball is thrown vertically upward so that it returns to the thrower. The value of the acceleration of the ball at the highest point reached is</p> <p>A 9.8 ms^{-2} downward B 10 ms^{-2} downward C 0 ms^{-2} D 9.8 ms^{-2} upwards</p>
<p>30. In an RCL circuit, the current in the circuit is</p> $I = \frac{V}{\sqrt{(X_L - X_C)^2 + R^2}}$ <p>where V is the voltage</p> <p>Consider the following statement(s) :</p> <ol style="list-style-type: none"> The quantity $\sqrt{(X_L - X_C)^2 + R^2}$ is called the impedance of the system and has the unit of ohm A maximum current flows in the circuit if $X_L = X_C$ The resistance R at the resonance point is always zero <p>Which of the statement(s) is/ are true?</p> <p>A 1 and 2 B 2 and 3 C 1 only D 3 only</p>	<p>34. A diffracting grating with 600 lines per millimetre is illuminated normally by a monochromatic light of wavelength 600 nm. The number of fringes seen excluding the central fringe is</p> <p>A 5 B 2 C 3 D 4</p>

35. A simple pendulum oscillates such that it makes four complete oscillations per second. The length of such a pendulum is therefore

- A 15.5 cm
- B 15.5 mm
- C 6.25 cm
- D 62.5 cm

36. Which of the following statements is correct?

- A It is possible for the speed of a body to change without the body accelerating
- B It is possible for the velocity of a body to change with a change in speed
- C It is possible for a body to be accelerating while travelling at a constant speed
- D It is possible for a body to be moving with resultant force acting on it

37. Which of the following pairs of statements about fusion and fission is correct?

	FUSION	FISSION
A	Occurs at very high temperatures in the order of 10^8 K	Occurs at normal temperatures
B	Environmentally friendly	Environmentally friendly
C	Expensive and scarce raw material	Cheap and readily available raw material
D	Reactor is surrounded by a thick concrete	Reactor does not need to be surrounded by a thick concrete

38. In which of the following sets do we have one scalar and two vectors?

- A Velocity, Pressure, Work
- B Velocity, Force, Acceleration
- C Displacement, Momentum, Power
- D Work, Power, Energy

39. Which of the following wave types labelled A to D correctly matches its method of production?

A	Light	Deceleration of electrons in aerials
B	Radio	Acceleration of electrons in aerials
C	X-rays	Radioactive decay of the nucleus
D	Microwaves	Movement of electrons from a higher to a lower energy level

40. Which of the following is the reason why a balance point may NOT be found in a potentiometer?

- A The positive terminal of the test cell is connected to the positive terminal of the driver cell
- B The potential difference of the driver cell is greater than the potential difference across the potentiometer wire
- C The potential difference to be measured is greater than the potential difference across the potentiometer wire
- D The potentiometer wire is not uniform and long enough

41. Which of the following reasons best explains why the numerical value of a temperature expressed on the scale of the resistance thermometer differs from the value on the gas thermometer except at the fixed points

- A The resistance thermometer has a wide range
- B The variation of the gas pressure with temperature is different from the variation of resistance with temperature
- C The resistance thermometer is not as sensitive as the gas thermometer
- D The gas thermometer is used as a standard for measuring other temperatures

42. A pipe opened at both ends, containing air, is made to resonate such that its harmonic is 1200 Hz. Therefore, its fundamental frequency f_0 is

- A 400 Hz
- B 600 Hz
- C 800 Hz
- D 1000 Hz

<p>43. Suppose that the force on a 1 Kg mass on the surface of the earth is 10N and that the radius of the earth is about 6000 km. Then the force on an 8 kg mass placed at a point 2000 km from the centre of the earth will be</p> <p>A 26.7 N B 2.67 N C 25.0 N D 2.50 N</p>	<p>48. Which of the following phenomena can be used to explain the formation of a rainbow?</p> <p>A Reflection B Refraction C Interference D Diffraction</p>
<p>44. When a ray of light passes from glass into air it undergoes a change of</p> <p>A Both wavelength and frequency B Both frequency and speed C Both wavelength and speed D Wavelength only</p>	<p>49. Which of the following statements is true about $0.14c$, where c is the speed of light</p> <p>A It is the boundary for classical and relativistic mechanics B It is the upper limit for a particle to exist C It is the lower limit for relativistic mechanics D It is the lower limit for quantum physics</p>
<p>45. A person jumps from a height of 1m and lands stiff-legged on bare ground. The person's mass is 60 kg and he is travelling at a velocity of 45m/s just prior to hitting the ground. If the person takes 0.05s to land, the force developed will be</p> <p>A 5400 N B 54000 N C 540 N D -5400 N</p>	<p>50. From the equation $P = \frac{3}{2}KT$, where K is the Boltzmann's constant and T is absolute temperature, one can deduce that the unit of P is the same as that of</p> <p>A Power B Pressure C Energy D Work done per second</p>
<p>46. A set of three quantities in the following sets that are all vectors is</p> <p>A Energy, Power, Weight B Torque, Impulse, Field Strength C Moment, Power, Weight D Force, Impulse, Pressure</p>	<p>51. Which of the following statements is true for Young's modulus slit experiment?</p> <p>A Doubling the slit spacing only would double the fringe separation B Doubling both the slit-screen distance and the slit separation would double the fringe separation C Reducing the slit width by half only would double the fringe separation D Changing the slit width has no effect on the fringe separation</p>
<p>47. Binding Energy refers to</p> <p>A The difference between the total mass of the nucleons and its nuclear mass B The work done in separating its nucleus C The energy used in forming the nucleus from its constituent parts D The energy equivalent of the mass of the nucleus</p>	<p>52. Which of the following statements about Electric Fields is/are true?</p> <ol style="list-style-type: none"> The lines of force originate from the negative charge and terminate on the positive charge The lines of force are usually smooth curves which touch each other The strength of the Electric Field can be measured from the density of the lines <p>A 1 and 2 B 2 and 3 C 1 only D 3 only</p>

<p>53. Which of the following statements about the half-life of a radioactive nuclide is/are true?</p> <ol style="list-style-type: none"> 1. A fundamental property of the nuclei 2. A function of the mass number 3. Depends on its atomic number <p>A 1 and 2 B 2 and 3 C 1 only D 3 only</p>	<p>56. Which of the following statements is/are true about forces?</p> <ol style="list-style-type: none"> 1. Gravitational and magnetic forces are both action-at-distance forces 2. All action-at-distance forces obey the inverse square law 3. All forces between elementary particles and friction are contact forces <p>A 1 and 2 B 2 and 3 C 1 only D 3 only</p>												
<p>54. Which of the following statements about the elastic collision of two bodies is/are true?</p> <ol style="list-style-type: none"> 1. The relative speed of separation is equal to the relative speed of approach between the two bodies 2. The total energy of the system is conserved 3. The impulse is continuously changing <p>A 1 and 2 B 2 and 3 C 1 only D 3 only</p>	<p>57. The speed of five molecules in m/s is 10, 20, 30, 40 and 50 respectively. Which of the following statements is/are true about the speeds of the molecules?</p> <ol style="list-style-type: none"> 1. The mean square speed of the molecules is 90 m/s 2. The root-mean square speed of the molecules is 74 m/s 3. The mean square speed of the molecules is always greater than the root-mean square speed <p>A 1 and 2 B 2 and 3 C 1 only D 3 only</p>												
<p>55. Which of the sets of quantities x and y vary according to the inverse square law?</p> <table border="1"> <thead> <tr> <th></th> <th>x</th> <th>y</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Potential due to a point charge</td> <td>Distance from the point charge</td> </tr> <tr> <td>2</td> <td>Force of attraction between two masses</td> <td>Distance between the masses</td> </tr> <tr> <td>3</td> <td>The Electric Field due to a point charge</td> <td>Distance from the point charge</td> </tr> </tbody> </table> <p>A 1 and 2 B 2 and 3 C 1 only D 3 only</p>		x	y	1	Potential due to a point charge	Distance from the point charge	2	Force of attraction between two masses	Distance between the masses	3	The Electric Field due to a point charge	Distance from the point charge	<p>58. Which of the following statements is/are true about a coherent beam of light?</p> <ol style="list-style-type: none"> 1. Their rays have the same colour 2. The phase difference of the wave front is constant 3. The waves must originate from two monochromatic sources <p>A 1 and 2 B 2 and 3 C 1 only D 3 only</p>
	x	y											
1	Potential due to a point charge	Distance from the point charge											
2	Force of attraction between two masses	Distance between the masses											
3	The Electric Field due to a point charge	Distance from the point charge											

<p>59. Which of the following pairs of statements correctly matches energy losses in a transformer with its method of reducing energy lost?</p> <table border="1"> <tr> <td>1 Heat losses in the connecting wires; Use wires of larger diameter</td> </tr> <tr> <td>2 Hysteresis losses; Replace iron with steel in the core</td> </tr> <tr> <td>3 Flux linkage; Laminate the core</td> </tr> <tr> <td>A 1 and 2 B 2 and 3 C 1 only D 3 only</td> </tr> </table>	1 Heat losses in the connecting wires; Use wires of larger diameter	2 Hysteresis losses; Replace iron with steel in the core	3 Flux linkage; Laminate the core	A 1 and 2 B 2 and 3 C 1 only D 3 only	<p>63. Which of the following statements is/are true about Gravitational and electrostatic forces?</p> <ol style="list-style-type: none"> 1. They Obey an inverse square law 2. They originate from the charge of a body 3. They are all action-at-distance forces <table border="1"> <tr> <td>A 1 and 2</td> </tr> <tr> <td>B 2 and 3</td> </tr> <tr> <td>C 1 only</td> </tr> <tr> <td>D 3 only</td> </tr> </table>	A 1 and 2	B 2 and 3	C 1 only	D 3 only
1 Heat losses in the connecting wires; Use wires of larger diameter									
2 Hysteresis losses; Replace iron with steel in the core									
3 Flux linkage; Laminate the core									
A 1 and 2 B 2 and 3 C 1 only D 3 only									
A 1 and 2									
B 2 and 3									
C 1 only									
D 3 only									
<p>60. In a hydro-electric power station the turbine is driven by fast flowing water from a dam. Which of the following statements is/are true?</p> <ol style="list-style-type: none"> 1. Energy is gained from the surrounding as sound 2. The power available depends on the vertical height through which water falls 3. One of the energy transformations in the generator converts the kinetic energy of the rotating turbine to electrical energy <table border="1"> <tr> <td>A 1 and 2</td> </tr> <tr> <td>B 2 and 3</td> </tr> <tr> <td>C 1 only</td> </tr> <tr> <td>D 3 only</td> </tr> </table>	A 1 and 2	B 2 and 3	C 1 only	D 3 only	<p>64. A beam of electrons travelling in a horizontal direction is deflected downwards by an electrostatic field. Which of the following actions would cause the beam to return to its original direction?</p> <ol style="list-style-type: none"> 1. Apply a magnetic field perpendicular to the directions of both the electron beam and the original electrostatic field 2. Apply electrostatic field perpendicular to the directions of both paths of the electrons beam and the original electrostatic field 3. Apply a magnetic field in the same direction as that of the electrostatic field <table border="1"> <tr> <td>A 1 and 2</td> </tr> <tr> <td>B 2 and 3</td> </tr> <tr> <td>C 1 only</td> </tr> <tr> <td>D 3 only</td> </tr> </table>	A 1 and 2	B 2 and 3	C 1 only	D 3 only
A 1 and 2									
B 2 and 3									
C 1 only									
D 3 only									
A 1 and 2									
B 2 and 3									
C 1 only									
D 3 only									
<p>61. Which of the following statements about an electron is/are correct?</p> <ol style="list-style-type: none"> 1. It sets up only an electric field when it is in motion 2. It sets up both electric and magnetic fields when in motion 3. It sets up only an electric field when stationary <table border="1"> <tr> <td>A 1 and 2</td> </tr> <tr> <td>B 2 and 3</td> </tr> <tr> <td>C 1 only</td> </tr> <tr> <td>D 3 only</td> </tr> </table>	A 1 and 2	B 2 and 3	C 1 only	D 3 only	<p>65. Which of these statements is/are true about two bodies which are in thermal contact for a long time?</p> <ol style="list-style-type: none"> 1. The quantity of heat in one body is equal to the quantity of heat in the other body 2. The bodies are said to be in thermal equilibrium when there is no net change in their physical properties 3. The two bodies will have the same temperature at thermal equilibrium <table border="1"> <tr> <td>A 1 and 2</td> </tr> <tr> <td>B 2 and 3</td> </tr> <tr> <td>C 1 only</td> </tr> <tr> <td>D 3 only</td> </tr> </table>	A 1 and 2	B 2 and 3	C 1 only	D 3 only
A 1 and 2									
B 2 and 3									
C 1 only									
D 3 only									
A 1 and 2									
B 2 and 3									
C 1 only									
D 3 only									
<p>62. Which of the following statements is/are true for light and sound waves</p> <ol style="list-style-type: none"> 1. The ratio of the speed of sound to that of light is $1:10^6$ 2. Both wave types are electromagnetic 3. Both wave types are transverse <table border="1"> <tr> <td>A 1 and 2</td> </tr> <tr> <td>B 2 and 3</td> </tr> <tr> <td>C 1 only</td> </tr> <tr> <td>D 3 only</td> </tr> </table>	A 1 and 2	B 2 and 3	C 1 only	D 3 only	<p>66. An object of height 2.0 cm is placed 10.0 cm to the left of a convex lens of focal length 20.0 cm. Which of the following statements is/are true?</p> <ol style="list-style-type: none"> 1. The image of the object is magnified as much as twice the size of the object 2. The image would be formed 20.0 cm to the left of the lens 3. The image is virtual, magnified and inverted <table border="1"> <tr> <td>A 1 and 2</td> </tr> <tr> <td>B 2 and 3</td> </tr> <tr> <td>C 1 only</td> </tr> <tr> <td>D 3 only</td> </tr> </table>	A 1 and 2	B 2 and 3	C 1 only	D 3 only
A 1 and 2									
B 2 and 3									
C 1 only									
D 3 only									
A 1 and 2									
B 2 and 3									
C 1 only									
D 3 only									

67. When analogue and digital electronics are compared, which of the following pairs of statements is/are true?

	Analogue	Digital
1	Output is proportional to input	Contains the switching type circuit
2	Can be transmitted over long distances	Require amplification as signals fade with time
3	Signals fit well with modern technology	Signals can be used for data processing

- A 1 and 2
- B 2 and 3
- C 1 only
- D 3 only

68. Which of the following may render long distance optical fiber communications easy?

- 1. Information transmitted is in analogue form
 - 2. The fiber link has boosters or repeaters
 - 3. Signals are carried by electromagnetic waves
- A 1 and 2
 - B 2 and 3
 - C 1 only
 - D 3 only

69. Which of the following statements is/are true about the wave-particle duality principle?

- 1. It explains the deflection of an electron beam by an electric field.
 - 2. It explains the photoelectric effect.
 - 3. It explains electron diffraction patterns in a crystal
- A 1 and 2
 - B 2 and 3
 - C 1 only
 - D 3 only

70. Which of the following statements is/are true about oscillatory motion?

- 1. In the absence of external forces, the amplitude of oscillation remains constant
 - 2. The maximum amplitude is obtained when the system is at resonance
 - 3. Damping usually gives rise to a decrease in the frequency of oscillation
- A 1 and 2
 - B 2 and 3
 - C 1 only
 - D 3 only