



LIDETA SUB CITY ADMINISTRATION EDUCATION OFFICE

GRADE 12 PHYSICS MODEL EXAMINATIONS

2016E.C/ 2024G.C

NUMBER OF QUESTIONS: 50

TIME ALLOWED: - 2 HOURS

GENERAL DIRECTIONS

THIS BOOKLET CONTAINS EXAMINATION PHYSICS. IN THIS EXAMINATION, THERE ARE A TOTAL OF 50 MULTIPLE CHOICE QUESTIONS. CAREFULLY SELECT THE BEST ANSWER AND BLACKEN ONLY THE LETTER OF YOUR CHOICE ON THE SEPARATE ANSWER SHEET PROVIDED. FOLLOW THE INSTRUCTIONS ON THE ANSWER SHEET AND THE EXAMINATION PAPER CAREFULLY. USE ONLY PENCIL TO MARK YOUR ANSWERS. YOUR ANSWER MARK SHOULD BE HEAVY AND DARK, COVERING THE ANSWER SPACE COMPLETELY. PLEASE ERASE ALL UNNECESSARY MARKS COMPLETELY FROM YOUR ANSWER SHEET.

YOU ARE ALLOWED TO WORK ON THE EXAM FOR 2 HOURS. WHEN TIME IS CALLED, YOU MUST IMMEDIATELY STOP WORKING, PUT YOUR PENCIL DOWN, AND WAIT FOR FURTHER INSTRUCTIONS.

ANY FORM OF CHEATING OR AN ATTEMPT TO CHEAT IN THE EXAMINATION WILL RESULT IN AN AUTOMATIC DISMISSAL FROM THE EXAMINATION HALL AND CANCELLATION OF YOUR SCORE (S).

PLEASE MAKE SURE THAT YOU HAVE WRITTEN ALL THE REQUIRED INFORMATION ON THE ANSWER SHEET BEFORE YOU START TO WORK ON THE EXAMINATION.

DO NOT TURN THIS PAGE UNTIL YOU ARE TOLD TO DO SO.

DIRECTIONS:

Each of the following questions is followed by four possible alternatives. Read each question and carefully blacken the letter of your best choice on the separate answer sheet provided.

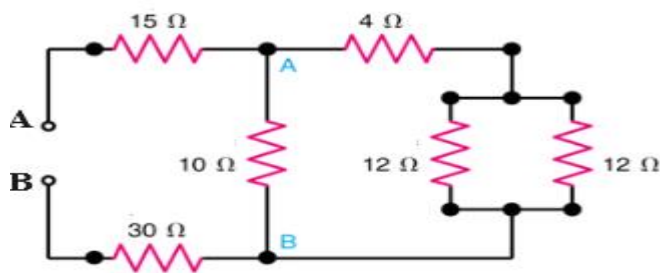
You may refer to the information given below when you work on some of the questions.

Constants you may need:

$\sin 37^\circ = 0.6$	$\cos 37^\circ = 0.8$
$g = 10\text{m/s}^2$	$G = 6.67 \times 10^{-11} \text{Nm}^2/\text{C}^2$
$C_{\text{aluminum}} = 0.215 \text{Cal/g}^\circ\text{C}$	$C_{\text{water}} = 1.0 \text{Cal/g}^\circ\text{C}$
$\rho_{\text{seawater}} = 1030 \text{kg/m}^3$	$\rho_{\text{w}} = 1000 \text{kg/m}^3$ $C = 3 \times 10^6 \text{m/s}$

1. A car is moving on a straight road at constant speed. The car exhibit motion with:
A. Constant acceleration. C. Non-Uniformly varying displacement.
B. Zero acceleration. D. Velocity increasing constantly
2. What is the purpose of a simple machine?
A. To multiply either force or distance.
B. To multiply energy, force, and speed.
C. To multiply work, speed, and change direction.
D. To multiply both force and speed at the same time.
3. A simple machine is able to move a 1200 N load a distance of 400 cm when a force of 600 N is moved through a distance of 10 m what is the efficiency of the machine?
A. 40% B. 60% C. 80% D. 90%
4. The difference between mechanical and electromagnetic waves is:
A. Both Mechanical waves and electromagnetic waves require a material medium.
B. Electromagnetic waves do not require material medium to travel, but mechanical waves required.
C. Mechanical waves can travel through vacuum, but electromagnetic waves cannot travel through vacuum.
D. Both electromagnetic and mechanical wave dot not requires material medium.

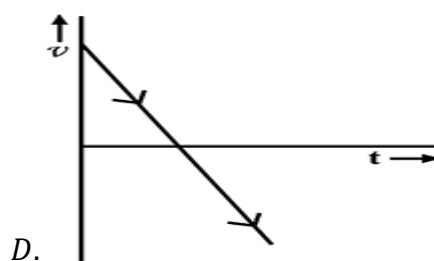
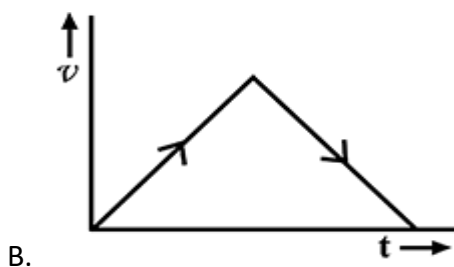
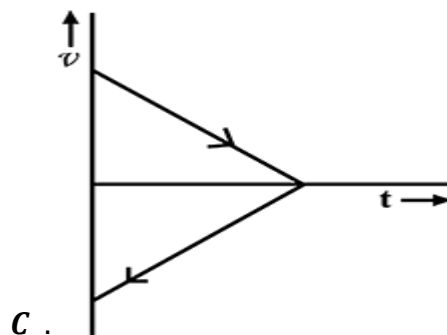
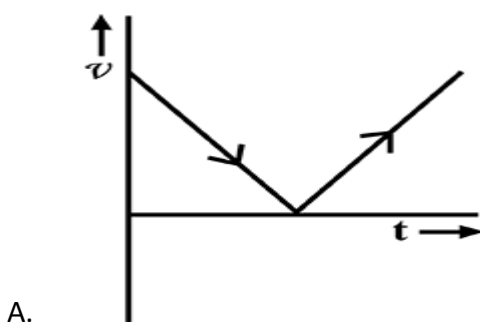
5. In which of the following mediums the speeds of sound have the largest value?
 A. Vacuum B. gas C. liquid D. solid
6. Inserting a dielectric in between two parallel plates of an isolated capacitor:
 A. Increases the capacitance of the capacitor.
 B. Decreases the charge stored on the plate.
 C. Increases the electric potential between the plates.
 D. The electric field between the plates remains the same.
7. The resistance of a conductor increases:
 A. By increasing the diameter of the wire.
 B. By increases the temperature of the wire.
 C. By decreasing the length of the wire
 D. By using wire with high conductivity.
8. Which one of the following is not the use of electromagnetic radiations?
 A. X-rays are used to take pictures of the inside a body
 B. Infrared radiation ids used in infrared cameras.
 C. Microwaves are used for cooking food.
 D. Radio waves are used for radiation therapy.
9. An object is placed at a distance of 40 cm from converging lens with a power of 5 diopter.
 The magnification of the lens is:
 A. 1.0 B. 1.5 C. 2.0 D. 2.5
10. What is the total resistance between points A and B in the circuit below?



- a) 30Ω b) 40Ω c) 50Ω d) 60Ω

11. Which of the following the following steps is in correct about scientific method?
- Question ,prediction, hypothesis, experiment, analyze, conclusion
 - Hypothesis, question, experiment, analyze, prediction, conclusion
 - Identify problem, forming hypothesis, making predictions , designing experience, analyze, draw conclusion
 - Identify problem, making predictions, forming hypothesis, analyze, draw conclusion
12. Three vectors **A**, **B** and **C**, are added using the triangle rule. The magnitudes of vectors **A** and **B** are equal, but have opposite directions. Vector **C** has a magnitude equal to the sum of the magnitude of **A** and **B** and is in the same direction as vector **A**. What can be said about the resultant vector in this case?
- The resultant vector has a magnitude equal to the sum of the magnitudes **A**,**B** and **C**
 - The resultant vector has a magnitude equal to twice the magnitude of vector **A**.
 - The resultant vector has a magnitude equal to the magnitude of vector **B**.
 - The resultant vector has a magnitude equal to zero.
13. Which of the following paired vectors are orthogonal?
- $\vec{a} = (3\hat{i} - 2\hat{j})$ units and $\vec{b} = (2\hat{i} + 3\hat{j})$ units
 - $\vec{c} = (-3\hat{i} + 2\hat{j})$ units and $\vec{d} = (2\hat{i} - 3\hat{j})$ units
 - $\vec{e} = (4\hat{i} + 5\hat{j})$ units and $\vec{f} = (-4\hat{i} + 5\hat{j})$ units
 - $\vec{g} = (6\hat{i} + 8\hat{j})$ units and $\vec{h} = (6\hat{i} - 8\hat{j})$ units
14. Which of the following statements, about average and instantaneous velocity?
- If an object is travelling with constant velocity, then its instantaneous is greater than its average velocity.
 - If an object is travelling with constant velocity, then its average velocity is larger than its instantaneous velocity
 - The velocity of an object at a point is instantaneous velocity, whereas the ratio of displacement to the time required to travel the displacement is average velocity.
 - The velocity of an object at a point is average velocity, whereas the ratio of displacement to the time required to travel the displacement is instantaneous velocity
15. An airplane moving on the runway with an initial speed of 20 m/s is accelerating at 5 m/s^2 . If the speed at take-off is 100 m/s ,what length of runway will it require?
- 96 m
 - 960m
 - 9600m
 - 1920m

16. A body is thrown vertically upwards. Which one of the following graphs correctly represents the velocity vs time?



17. A satellite is in a circular orbit around the sun. Which of the following statements is true regarding its motion?

- A. The satellite's velocity is constant throughout its motion.
- B. The satellite's acceleration is zero throughout its motion.
- C. The satellite's gravitational force is balanced by centrifugal force.
- D. The satellite's period is determined by its acceleration.

18. Which one of the following is **not** true about force?

- A. A force can be resolved into rectangular components
- B. A force preserves the state of motion of a body.
- C. A force changes the state of rest of a body.
- D. A force can be exerted at a distance.

19. A 5kg block initially at rest is pulled along a level floor by a 25 N force that makes an angle of 37° above the horizontal. If the coefficient of kinetic friction between the block and floor is 0.4, what is the speed of the block after 10second?

- A. 12.5m/s
- B. 68 m/s
- C. 52 m/s
- D. 28 m/s

20. Which of the following statements best describes the concept of inertia as explain by Newton's law of motion?
- Inertia is the measure of an objects mass
 - Inertia is the force exerted by an object on another object.
 - Inertia is the tendency of an object to resist change in its sate of motion.
 - Inertia is the acceleration experienced by an object under the influence of gravity.
21. A body mass 50kg is pushed with constant velocity 10m up an inclined plane by a constant force applied in the direction of displacement of the box. If the angle the inclined plane makes with the horizontal is 37^0 and the coefficient of kinetic friction between the surfaces of the box and the plane is 0.25, then the work done by the applied force is:
- 3,000J
 - 1,000J
 - 8,000J
 - 4,000J
22. Which one of the following is true about energy, work and force?
- Work, energy and force have the same dimension.
 - A person carrying a100kg object moving horizontally is doing work without expending energy.
 - A force is a vector quantity and it's different in dimension from that of both work and energy.
 - The work done an object is the product of and the displacement it produces and is a vector quantity.
23. A point mass 'm' is rotating about a vertical axis with a constant angular velocity ' ω '. If the perpendicular distance from the axis center to the mass is 'r', what is angular momentum?
- $mr\omega^2$
 - $mr^2\omega$
 - $\frac{mr2\omega}{2}$
 - $\frac{mr\omega2}{2}$
24. Three uniform objects are located in x-y plane. A 10 kg load of length 30 cm has its center located at x = 50 cm. A 2 kg spherical ball metal of radius 8 cm has its center located at x = - 50 cm. A spherical valley ball of mass 1 kg and 10cm in radius has its center located at y = - 30 cm. What is the x and y coordinates of the center of mass of the three objects?
- $(\frac{4}{13}, \frac{-0.3}{13})$ m
 - $(\frac{3.26}{13}, \frac{3.13}{13})$ m
 - $(\frac{3}{3}, \frac{0.3}{13})$ m
 - $(\frac{3.13}{13}, \frac{4}{13})$ m
25. A 2 m long uniform rod of weight 255 N carries a load of 225 N at its right end and an unknown weight 'W' at 50 cm from the left end of the rod. If the beam is balanced horizontally when the fulcrum is located at 75 cm from the right end, the unknown weight 'W' is:
- 210 N
 - 140 N
 - 495 N
 - 30 N

26. Which of the following statements is true about an object in equilibrium?
- An object slightly displaced from its unstable equilibrium point experiences a restoring force that will return it to the equilibrium point.
 - If an object is in stable equilibrium, a slight displacement from this equilibrium point creates a force that derives it away from the equilibrium point.
 - A slight displacement from a neutral equilibrium point creates a restoring force that tends to return an object to its equilibrium point.
 - An object in neutral equilibrium will remain in its new equilibrium point after slightly displaced from the previous equilibrium point.
27. Hook's law states that:
- Stress is directly proportional to strain.
 - The elongation produced on an elastic material increases with the square of the applied force.
 - The elongation produced on an elastic material decreases linearly with the applied force.
 - The stress on an elastic material is independent of the applied force.
28. A horizontal pipe of 10 cm in diameter has a smooth reduction to a pipe of 5 cm in diameter. If the pressure of the water in the larger pipe is 80kPa and the pressure in the smaller pipe is 60kPa, .at what rate does the water flow through the smaller pipe?
- 1.63 m/s
 - 13.6 m/s
 - 6.53 m/s
 - 42.67 m/s
29. A 250 gram aluminum at 115°C is added to 430 gram water at 25°C . If heat lost to the environment is neglected, what the temperature of the aluminum and the water after thermal equilibrium.
- 20°C
 - 35°C
 - 30°C
 - 40°C
30. Which of the following one of the following doesn't show correct combination and their units?
- Heat----N.m
 - specific heat capacity--- $\frac{j}{kg.^{\circ}\text{C}}$
 - heat capacity --- $\frac{J}{m}$
 - latent heat --- $\frac{J}{K}$
31. Which physics concepts are essential for mechanical engineers in designing vehicles?
- Optics and wave phenomena.
 - Thermodynamics and quantum mechanics.
 - Mechanics and dynamics.
 - Electricity and magnetism.

32. Which of the following is the correct definition of light year?
- a small part of year
 - how many earth years it takes light to reach the sun.
 - the distance that light travels while on its journey to reach the motion.
 - the distance that light travels in one year.
33. If you triple the distance to light year source, then the apparent brightness will be:
- decreases by factor of $\frac{1}{6}$
 - increased by factor of 9
 - decreases by factor of $\frac{1}{9}$
 - increased by factor of 6
34. When comparing magnetic resonance imaging (**MRI**) to computed tomography (**CT**) scans, which of the following is describing both **MRI** and CT scan?
- both method uses **x-ray**, but exposure is higher with **CT** scan.
 - both are using strong magnetic field and **3D** images
 - both method produce cross-sectional area images at specified plane through the body.
 - MRI** is the combinations of x-ray while **CT** scan uses strong magnetic field to detect images.
35. What determines the transducer frequency selection for diagnostic ultrasound?
- scattering and impedance
 - resolution and penetration
 - intensity and propagation speed
 - intensity and resolution
36. Radar is used to determine distance to various objects by measuring the round trip for an echo from the object. How far away is the planet mercury, if the echo time is 100sec?
- 3×10^{10} m
 - 1.5×10^8 m
 - 3×10^8 m
 - 1.5×10^{10} m
37. An airplane is moving with horizontal velocity of 'u'. It drops a packet of food from a height 'h'. The time taken by the packet of food in reaching the ground will be:
- $\sqrt{\frac{2g}{h}}$
 - $\sqrt{\frac{2h}{g}}$
 - $\sqrt{\frac{2U}{g}}$
 - $\sqrt{\frac{h}{2g}}$
38. The moment of inertia a system of particles is equal to:
- The product of moment of inertia of each particle.
 - The difference between the moments of inertia of each particle.
 - The average of the moments of inertia of each particle.
 - The sum of moments of inertia of each particle.

39. A rod of length 'L' fixed at the origin is placed along x-axis at $t=0$. It starts rotating about the z-axis in x-y plane anticlockwise from the positive z-axis, the angular displacement is given by $\Theta = 3t^2$. The angular acceleration of the rod is:
- A. $6 \frac{\text{rad}}{\text{s}^2}$ B. $12 \frac{\text{rad}}{\text{s}^2}$ C. $26 \frac{\text{rad}}{\text{s}^2}$ D. $3 \frac{\text{rad}}{\text{s}^2}$
40. Satellite 'A' is placed around a planet and has a period of 30 days. Satellite 'B' is also placed in orbit, but has twice the radius of satellite 'A'. What is its period of rotation of satellite 'B'?
- A. 60 days B. 84.85 days C. 240 days D. 30days
41. Two objects are attracted to each other by gravitational force 'F'. If the masses of each object is double and the distance between them is halved, what is the new gravitational force between the objects in terms of 'F'?
- A. 4 F B. $\frac{1}{4}$ F C. 16 F D. $\frac{1}{16}$ F
42. Large ocean liner floating in sea water has a volume of $240,000 \text{ m}^3$ and displaces $20,000 \text{ m}^3$ of sea water. Determine the mass of the object.
- A. $2.0 \times 10^6 \text{ kg}$ B. $2.45 \times 10^7 \text{ kg}$ C. 2.0×10^7 D. 3.24×10^6
43. Hydraulic car lifts make use of the principle of hydraulic press in which the smaller circular piston has a radius of 10 mm and the larger piston has a radius of 4 cm, then what force must be applied to the smaller piston to obtain a force of 1600 N at the larger piston?
- A. 6.25 N B. 400 N C. 25 N D. 100 N
44. Which principle explains the buoyant force of a fluid?
- A. Pascal's principle C. Bernoulli's principle
B. Archimedes' principle D. Beer lambert law
45. The application of fluid statics is:
- A. The part of fluid mechanics that deals with fluids, when there is relative motion between the fluid particles.
B. The part of the fluid mechanics that deals with fluid, when there is no relative motion between the fluid particles.
C. A branch of fluid mechanics that studies incompressible fluids at motion.
D. A branch of fluid mechanics used in calculating the force and moment of aircrafts.

46. An open manometer is used to measure the pressure of a gas in a tank. The fluid used has a specific gravity of 0.70 and the fluid column in the open arm is 45 cm above the gas connected arm. If the atmospheric pressure is 90kPa, determine the absolute pressure within the tank?
- A. 93.15kPa B. 86.85kPa C. 3.15kPa D. 9.35kPa
47. A car can accelerate from 10 m/s to 40 m/s in 4 sec. If the moment of inertia of the wheel is $2.0 \text{ kg} \cdot \text{m}^2$ and its radius is 200 cm, what is torque is exerted on the wheel?
- A. 3.75 N.m B. 15.0 N.m C. 7.5N.m D. 22.5 N
48. Which one of the following is not a high pressure system?
- A. Gas cylinder C. Pascalization
B. Pressure cooker D. tire inflator
49. What is the moment of inertia of a spinning object of radius 500cm and mass 6 kg moving at 5 m/s, if it has a total kinetic energy of 100J?
- A. $2 \text{ kg} \cdot \text{m}^2$ B. $0.5 \text{ kg} \cdot \text{m}^2$ C. $3.5 \text{ kg} \cdot \text{m}^2$ D. $9 \text{ kg} \cdot \text{m}^2$
50. Which one of the following is not true about electric field and magnetic field?
- A. Electric field is produced by static charges, but magnetic field is produced by moving charges.
B. Electric field lines are discontinuous, but magnetic field lines are continuous.
C. No electric field lines exist inside a charged body, but magnetic field lines to exist inside a magnet.
D. The unit of electric field is coulomb, but the unit of magnetic field is gauss.