



ཤེས་རིག་ལྷན་ཁག།
ལུ་ཏིག་ཐང་འབྲིང་རིམ་སློབ་གྲྭ་གོང་མ།



MOTITHANG HIGHER SECONDARY SCHOOL THIMPHU THROMDE

“Every child is inspired to learn and empowered with wisdom to excel in life”

Trial Examination, 2020.

PHYSICS (X)

Paper 1

Two hours and a quarter

[Total marks: 100]

(The first 15 minutes of the examination are for reading the paper only.

Candidates must **NOT** start writing during this time)

Instruction: Answer all the questions in this paper itself. For the first fifteen minutes you will read the questions.

Section: A (50 Marks)

Compulsory: Attempt All the questions

Question 1

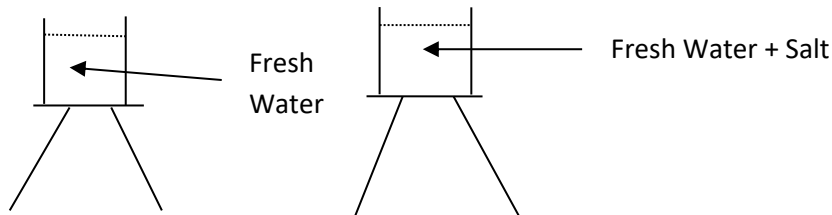
- a. Each question in this section is provided with four possible options. Choose one of the most appropriate option and circle it. [1 x 25=25]
- i. The Pascal's law explains the transmission of
- | | |
|-------------|----------|
| A. force | C. heat |
| B. pressure | D. light |
- ii. Pair of forces that causes steering wheel of a car to rotate is called
- | | |
|-------------|-----------------|
| A. Couple | C. normal force |
| B. friction | D. weight |
- iii. If a 100 N force is spread over an area of 1 m², the pressure is
- | | |
|------------|----------|
| A. 100 Pa | C. 1 Pa |
| B. 1000 Pa | D. 50 Pa |
- iv. The major impact of hydro power plant towards environment is due to the
- | |
|--|
| A. change in the timing of the flow of river |
| B. obstruction of the migration of the fishes |
| C. change in the temperature of water |
| D. occupation of large land areas by its huge structures |

- v. Machines in reality are NOT 100% efficient. This is due to
- the lost energy is converted into sound energy
 - the lost energy is converted into mechanical energy
 - the lost energy is used in overcoming the force of friction
 - the lost energy is used in heating the surrounding
- vi. A force acting on an object DOES NOT work when
- the force is directed along the motion of the object
 - the force is directed perpendicular to the motion of the object
 - a machine is used to move the object
 - the applied force overcomes the force of friction
- vii. Pema uses 1100W microwave oven to heat the food at 220V. The current flowing through the oven is
- | | |
|-------|-------|
| A. 2A | C. 4A |
| B. 3A | D. 5A |
- viii. Denka uses an electric iron to iron her kira. The resistance coil used in the iron has
- high resistance and low melting point
 - low resistance and low melting point
 - low resistance and high melting point
 - high resistance and high melting point
- ix. The device that uses microwave is
- | | |
|---------------|------------------|
| A. radar | C. mobile phones |
| B. satellites | D. CT scans |
- x. A welder uses a mask while welding metals. This is done to protect himself from the harmful effects of
- | | |
|----------------|---------------------------|
| A. radio waves | C. infrared radiations |
| B. microwaves | D. ultraviolet radiations |
- xi. The meteorology department forecasts weather by using RADAR. The waves used by RADAR is
- | | |
|----------------|------------------|
| A. sound waves | C. Infrared rays |
| B. X-rays | D. Microwaves |
- xii. When phone calls are made, the signals in the form of microwaves are
- directly send to the receiving phone from the caller's phone
 - diffracted around nearby hills and reach the receiving phone
 - of relayed through a network transmitter to the receiving phone
 - reflected from the ionosphere to the receiving phone

xiii. Pema throws a ball with a force of 70N to distance of 20m. Sonam throws the same ball with the same force, but the ball rolls to distance of only 16m. Which of the following statements are correct?

- A. Work done by Sonam and Pema are equal.
- B. Neither of them does any work.
- C. Pema does less work.
- D. Sonam does less work.

xiv. Subash did an experiment in one of his class to demonstrate the pressure in liquid. He set up simple experiment below to show;



- A. Fresh water exerts high pressure
- B. He added salt to reduce the density of fresh water
- C. He added salt to give taste to fresh water
- D. He added salt to increase the density of fresh water, higher is the magnitude of pressure on the body

xv. A 50kg box is initially at rest on a smooth horizontal surface. Karma pushes the box with a force of 200 N through a distance of 3m in 20 seconds. The power developed by Karma is

- A. 10W
- B. 20W
- C. 30W
- D. 40W

xvi. Work done is said to be negative if the

- A. displacement of a body is in the direction of the force applied.
- B. displacement of a body is in opposite direction to the force applied.
- C. displacement of a body is 90° to the direction of force applied.
- D. Displacement of a body is 0° to the direction of force applied.

xvii. Radio waves are used to broadcast television and radio programs. A radio program receiver need **NOT** be in line with the transmitter because radio waves are

- A. diffracted
- B. refracted
- C. reflected
- D. absorbed

xviii. When a radio signal undergoes refraction through different layers of the atmosphere, the signal becomes

- A. shorter
- B. longer
- C. weaker
- D. stronger

- xix. A transmitter produces a wave of 10^{20} Hz. The type of wave produced is
 A. Infrared radiations C. Gamma rays
 B. Ultraviolet radiations D. X-rays
- xx. An a.c generator produces alternating voltage due to the rotation of armature coil in a strong magnetic field. The magnitude of induced voltage is maximum when the plane of the armature coil is making an angle of
 A. 180^0 with the magnetic field
 B. 90^0 with the magnetic field
 C. 0^0 with the magnetic field
 D. Any magnitude with the magnetic field
- xxi. When a current I flows through a resistance R for time t, the electrical energy spent is given by:
 A. IRt C. IR^2t
 B. I^2Rt D. I^2R/t
- xxii. Which of the following is out of list for the advantage of hydropower generation in Bhutan?
 A. clean C. reliable
 B. efficient D. emit greenhouse gases
- xxiii. Which of the following is NOT the efficient ways to use energy?
 A. using new sources of energy
 B. using energy- efficient appliances
 C. insulation
 D. technology
- xxiv. Which of the following is the correct relationship between pressure, force, and area?
 A. $P = F \times A$ C. $F = P / A$
 B. $A = F \times P$ D. $A = F / P$
- xxv. A force of 4 N applied by Dorji brings about 24Nm moment of force. At what distance from the pivot is Dorji applying the effort?
 A. 48m. C. 18m.
 B. 6m. D. 32m

b. Match each item under Column A with the most appropriate item in Column B. Rewrite the correct matching pair in the space provided below. [1×5=5]

Column A	Column B
1. Seven-star fridge	a. Milkyway galaxy
2. Microwaves	b. Energy efficient
3. Plumb line	c. RADAR
4. Earth	d. Cancer treatment
5. Stars	e. Infrared radiation
	f. Light
	g. Line of centre of gravity
	h. Supernovae

Column A	Column B
1.	
2.	
3.	
4.	
5.	

c. Fill in the blanks by writing suitable words(s). [1×5=5]

- i. All the objects have mass and attract each other with certain amount of force called
- ii. Hair dryers, geysers, and electric heaters have resistance coil in them.
- iii. A body is said to be in equilibrium if the resultant forces acting on the body is -----
- iv. The increase in up-thrust due to liquid will decrease the.....weight of a body.
- v. Work done against gravity is equal to the.....energy of the body.

d. State whether the following statements are ‘True’ or ‘False’ and correct the false statement: [1×5=5]

- i. Electromagnetic waves can travel through vacuum.
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- ii. Step up transformer converts high voltage to low voltage.
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- iii. Bioenergy is the energy derived from humans.
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- iv. The body at terminal velocity will have less weight than the drag force.
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- v. If the area of an object is more, then the pressure acting on that object will be more
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e. Answer the following questions:

- i. Which galaxy does our universe belong to? [1]

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- ii. A tank is filled with water to a height of 2m. Calculate the pressure exerted at the bottom of the tank by the water. (where $g = 9.8\text{m/s}^2$, Density of water = 1000kgm^{-3}) [3]

- iii. State the value of gravitational constant and its unit [1]

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- iv. Why must a liquid and not a gas be used as 'fluid' in a hydraulic machine? [1]

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- v. Is it easier to swim in sea water or in river water? Give reason. [2]

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- vi. Calculate the force of attraction between 3kg ball and 5kg rice kept at a distance of 10m. [2]

Section B (50 Marks)

Attempt only *FIVE* questions

Question 2

- a. Heating effect of current is not always useful for us. Support this statement with an example. [2]

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- b. An appliance is rated 3KV and 20 Ohm. Calculate the power of this appliance. [2]

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- c. State two differences between step-up and step-down transformer. [2]

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- d. Draw a labeled diagram of an a.c. generator. [2]

- e. Why is A.C preferred to D.C in long distance transmission of electricity? [2]

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Question 3

- a. Why is it easier to insert sharp nail than a blunt nail? [2]

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- b. Calculate the number of turns in the secondary terminal, when 300V is changed to 650V with 250 turns in primary terminal. [3]

c. Can a machine be 100% efficient? Give two reasons to support your answer. [2]

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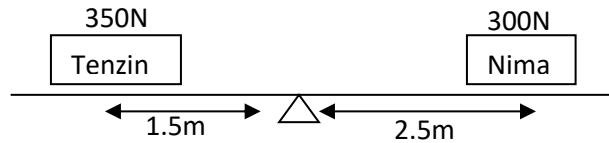
d. The America space agency, NASA, plans to send a manned mission to mars later this century. Mars has a mass 6.42×10^{23} kg and a radius 3.38×10^6 m. $G = 6.67 \times 10^{-11} \text{ Nm}^2 \text{ kg}^{-2}$.

i. The mass of a typical astronaut plus spacesuit is 80 kg. What would be the gravitational force acting on such an astronaut standing on the surface of Mars? [2]

- ii. State whether an astronaut on Mars would feel, lighter or heavier than on earth. [1]

Question 4

- a. Tenzin and Nima are playing on a seesaw. Tenzin of weight 350 N is sitting on the seesaw, 1.5 m away from the pivot and Nima of weight 300N is sitting on the right side, 2.5 m away from the pivot.



- i. Who will turn the seesaw clockwise? [1]

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- ii. What is the clockwise moment? [1]

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iii. What is the counter clockwise moment? [1]

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b. What is the S.I unit of “**Moment of couple**”? [1]

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c. Why water tanks are always placed at higher height than the building? [2]

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d. What is equilibrant? [2]

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e. Write two difference between work and power? [2]

Power	Work

Question 5

- a. Explain law of conservation of energy with an example. [2]

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- b. Which one is more efficient to send the signals to the satellites, micro waves or radio waves? why? [2]

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- c. Explain any two environmental impacts of hydropower generation in Bhutan. [2]

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- d. 5s is recorded by the time keeper at the main gate of MHSS, when Karma shouted from class 9E of MHSS. Calculate the distance between main gate and Class 9E. (Speed of sound in air is 340m/s) [3]

e. Define one joule? [1]

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Question 6

a. Is wind energy feasible for large power generation in Bhutan? Justify your answer. [3]

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b. In the main substation a transformer has 400 turns in the primary coil and 50 turns in the secondary coil. If the voltage in the secondary terminal is 5KV, Calculate the voltage in the secondary coil? [2]

c. A vacuum cleaner in your house is rated 240V, 20A. Calculate the power consumed by the appliance. [2]

d. A heat engine gives out 400 J of heat energy as the useful work. Calculate the energy given to it as input if its efficiency is 40%. [3]

Question 7

a. The world record for weight lifting is held by Serge Didyk of former U.S.S.R. He lifted 261 kg to a height of 2.3 m in 4 s. calculate

i. The weight lifted by Didyk, [1]

ii. The work done by him, and [1]

iii. The power developed by him.(take $g=10\text{m s}^{-2}$). [1]

b. Explain the term “**Work done against gravity**”. [2]

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c. A force of 20 N displaces a body through a distance of 5 m at an angle of 60° . Calculate the amount of work done. [3]

- d. How much force is required to be applied on 2m^2 area to lift a load of 300kg kept on 5m^2 ? [2]

Question 8

- a. Two forces each of 10N is applied to a car steering wheel that has a diameter of 15cm . If the two forces act tangentially to the steering wheel and in anti-parallel direction. Calculate the torque applied. [2]

- b. Calculate the power possessed by a 5000g bag of rice reaching the ground in 2s , when thrown from two storied building. Each floor's height is 10m and breadth is 15m [3]

c. State Pascal's law. [2]

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d. State four applications of Pascal's law [2]

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e. Draw a graph to represent non ohmic conductor [1]