**SECTION A [50 MARKS]**

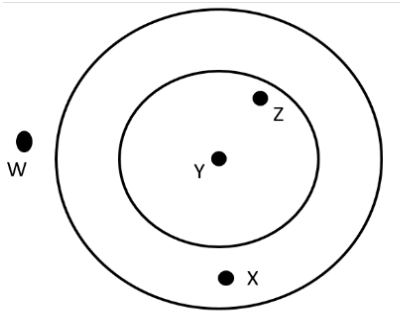
ANSWER **ALL** QUESTIONS

**Question 1**

a) **Directions: For each question, there are four alternatives A, B, C and D. Choose the correct alternative and circle it. Do not circle more than ONE alternative. If there are more than one circled, NO score will be awarded.** **[25]**

i. In the given diagram, four different points are located in and around a ring. Identify the point where the concentration of weight is more.

A W
B X
C Y
D Z




ii. The normal force that acts on a person sitting on a chair is known as

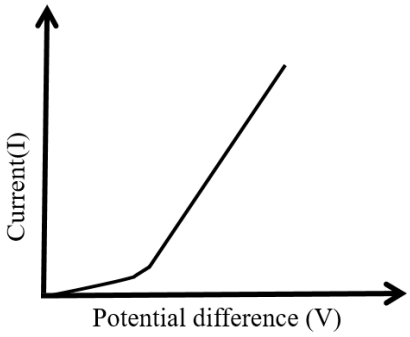
A area.
B thrust.
C upthrust.
D pressure.

iii. While loading a truck, Dorji lifted a 20 kg rice above the ground. The work done can be calculated by

A $W = F \times d.$
B $W = mgh.$
C $W = mg/h.$
D $W = F/d.$

iv. Yangzom did an experiment to study the relation of current with potential difference and obtained the graph below. Which device did she use?

A diode
B thermistor
C photo resistor
D filament bulb



v. "It is predicted that prolonged exposure to a certain wave may cause cancer and brain tumours". This statement best describes

A microwaves.
B radio waves.
C infrared rays.
D ultraviolet rays.

vi. Which is **TRUE** about the law of universal gravitation?

I Force is inversely proportional to mass of the object.
II Force is directly proportional to the product of masses.
III Force is directly proportional to the square of the distance.
IV Force is inversely proportional to the square of the distance.

A I and III
B II and IV
C III and IV
D IV and I

vii. Druk house and Taag house played a game of tug of war. The force applied by Druk was $F_1$ and Taag $F_2$. To calculate resultant, force of the two houses should be

A added.
B divided.
C subtracted.
D multiplied.

viii. The magnitude of the same force acts on a circle of radius 2 m and a rectangle of dimension 2 m x 1 m. Which of the following is **CORRECT**?

A No pressure will be exerted on the circle and rectangle.
B Pressure exerted on the circle = pressure exerted on the rectangle.
C Pressure exerted on the circle > pressure exerted on the rectangle.
D Pressure exerted on the circle < pressure exerted on the rectangle.

ix. When a brake is applied suddenly to a moving car, it comes to a halt after skidding to a certain distance. Work done by the car will be

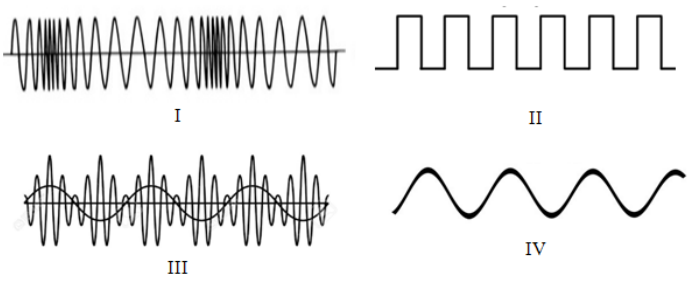
A zero.
B infinite.
C negative.
D positive.

x. Which of the following describes a step-up transformer?

A It has more number of turns in the secondary coil.
B Primary coil is thinner than the secondary coil.
C Primary coil has less current than the secondary coil.
D Voltage of primary coil is more than the secondary coil.

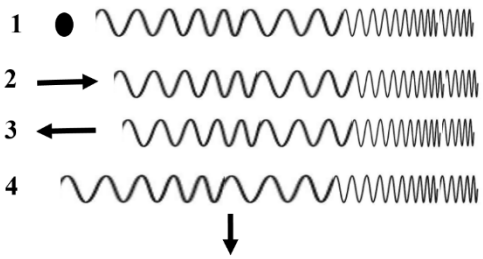
xi. Kuzoo FM operates on modulation of radio waves to broadcast their radio programs as shown below. The frequency modulation of the wave signal is illustrated by

A I.
B II.
C III.
D IV.



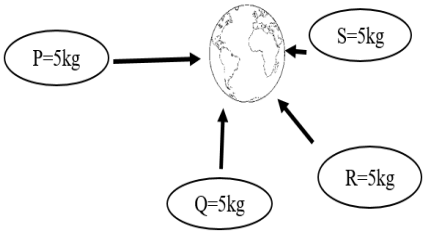

xii. Initially an object was placed at point 1. If the object follows the direction of 3, then the object is said to be

A red shifted.
B blue shifted.
C first red shifted and then blue shifted.
D first blue shifted and then red shifted.




xiii. Four objects of same masses were placed at the Earth's surface. Which object will experience a greater gravitational field?

A P
B Q
C R
D S

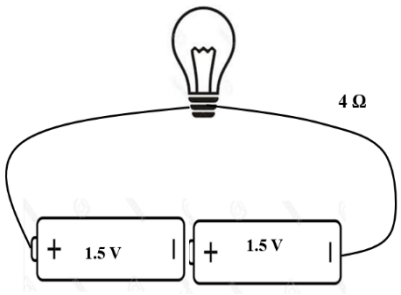



xiv. Sonam explained the concept of 1 watt to a friend. Which of the following would be the best example of 1 watt?

A $P = \frac{5Joules}{5s}$
B $P = \frac{5watt}{5s}$
C $P = 1Joules \times 1s$
D $P = 1watt \times 1s$

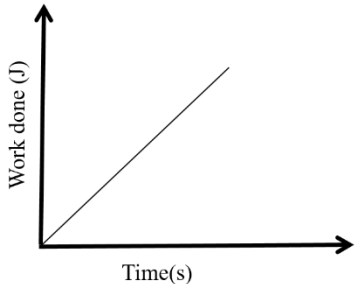
xv. The amount of current flowing through the bulb in the given circuit is

A 2.6 A.
B 1.3 A.
C 0.75 A.
D 0.375 A.




xvi. The given graph shows the relationship between work done and time taken. Which of the following shows the correct relation?

I. $P \propto w$
II. $P \propto t$
III. $P \propto \frac{1}{w}$
IV. $P \propto \frac{1}{t}$




A I and II
B II and III
C III and IV
D IV and I

xvii. Electricity from hydropower plants like Kurichu and Tala is produced by

A heating effect.
B lighting effect.
C chemical action.
D mechanical driving.

xviii. Which electromagnetic wave is used to investigate finger prints and forged documents?

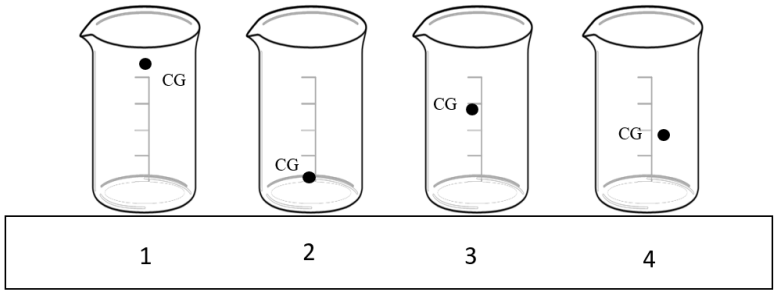
A infrared rays
B radio waves
C gamma rays
D ultraviolet rays

xix. Bhutan Broadcasting Service uses radio waves to transmit signals to cover all the Dzongkhags at the same time. This is possible because radio waves

A are reflected like any other waves.
B are reflected from the ionosphere.
C get refracted through different layers of atmosphere.
D can be easily diffracted due to its longer wave length.

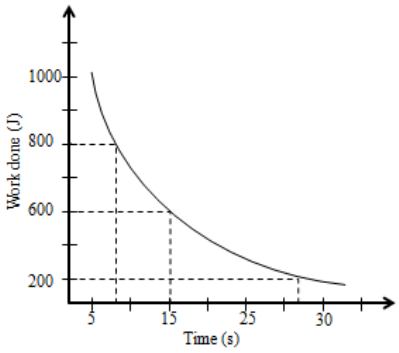
xx. For the given containers the **CORRECT** order of their stability from most to least is

A 1, 2, 3, 4.
B 4, 3, 2, 1.
C 2, 4, 3, 1.
D 1, 3, 4, 2.




xxi. The graph given below shows the work done by an engine at different time intervals. The power developed by the engine at 15 s is

A 30 W.
B 40 W.
C 50 W.
D 60 W.




xxii. The force of attraction between two bodies in the universe is $2 \times 10^2$ N. If their masses are doubled keeping the distance constant, then the new force of attraction between the bodies will be

A $4 \times 10^2$ N.
B $6 \times 10^2$ N.
C $8 \times 10^2$ N.
D $10 \times 10^2$ N.

xxiii. Four water tanks with different heights were constructed to supply water to a building as shown in the table. All the tanks were placed at the same level on the ground.

| **Tank** | T1 | T2 | T3 | T4 |
|---|---|---|---|---|
| **Height** | 2.5 m | 4 m | 3 m | 3.5 m |

Which of the water tank should be connected to the top floor to supply a continuous flow of water?

A T1
B T2
C T3
D T4

xxiv. The table below show the types of bulbs used by four people. If all of them use the bulbs for the same duration, who will get the highest electricity bill?

| **Name** | Karma | Sonam | Tshering | Sangay |
|---|---|---|---|---|
| **Types of bulb used** | 3 CFL | 3 LED | 3 Incandescent | 1 LED<br>1 CFL<br>1 Incandescent |

A Pema
B Sonam
C Sangay
D Tshering

xxv. An electric kettle has two heating coils made of the same material but one coil is shorter than the other. When the shorter coil is connected to a power source, water boils in 9 minutes. When the longer coil is connected to the same power source, water boils in 4 minutes. What could be the reason for this?

A longer coil has low resistance
B longer coil has high resistance
C longer coil has low melting point
D longer coil has high melting point

**b) Correct the following statement by changing the underlined word(s) ONLY. Re-write the correct word(s) only. DO NOT copy the whole sentence.** **[5]**

i. The turning of a steering wheel with one hand will produce moment of <u>couple.</u>

ii. The principle of Pascal's law is used in a hydraulic jack to multiply the <u>pressure.</u>

iii. The work done by a man standing with books on his head is <u>maximum.</u>

iv. The resistor which is sensitive to temperature is called p<u>hotoresistor.</u>

v. Radio waves have the longest <u>frequency.</u>

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| i. | |
| ii. | |
| iii. | |
| iv. | |
| v. | |

**c) Match each item under Column A with the item in Column B. Rewrite the correct pairs by writing the alphabet against the number in the space provided.** **[5]**

| Column A | | Column B |
|---|---|---|
| i. | Acceleration due to gravity | a. 764 watt |
| ii. | Hydraulic machines | b. heating effect |
| iii. | 1 horsepower | c. oscillating theory |
| iv. | Infrared radiation | d. Pascal's law |
| v. | Universe collapse and new Big Bang | e. 746 watt |
| | | f. free fall |
| | | g. transmission of force |
| | | h. Big crunch |

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| i. | |
| ii. | |
| iii. | |
| iv. | |
| v. | |

**d) Fill in the blanks by writing suitable words.** **[5]**

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|---|---|---|
| i. | The pressure exerted on a body by a confined liquid is _____ . | |
| ii. | The temperature of the earth's core is 6000° C and surface is 4400° C. The geothermal gradient of the Earth is _____ | |
| iii. | EMF will be equal to terminal voltage if the internal resistance is _____ | |
| iv. | Waves that are perpendicular to wave direction describes _____waves. | |
| v. | The universe will continue to expand forever if it is _____ | |

**e) Answer the following questions.**

i. Why is it easier to open a door by holding it from its edge? **[2]**

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ii. Kinley weighing 22 kg is sitting on a chair of surface area 0.5 $m^2$. What is the pressure exerted by Kinley on the chair? **[2]**

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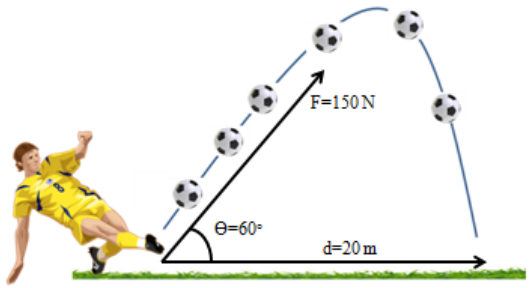
iii. The diagram shows the direction of the force applied and displacement of a ball. What is the work done? **[2]**

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iv. Draw an I-V graph of silver resistor at constant temperature and explain the resistance of the graph. **[2]**

v. List down any **TWO** roles of gravity in the universe. **[2]**

## SECTION B [50 MARKS]

ATTEMPT **ANY FIVE** QUESTIONS

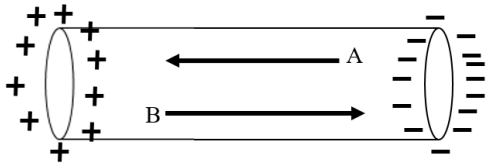
### Question 2

a) An important factor in the design of building is its stability. List **TWO** possible ways to increase the stability. **[2]**

b) Liquids A and B exert the same pressure. What would be the density of liquid A if the height of liquid B is twice the height of liquid A and density of liquid B is 250 kg/m³? **[2]**

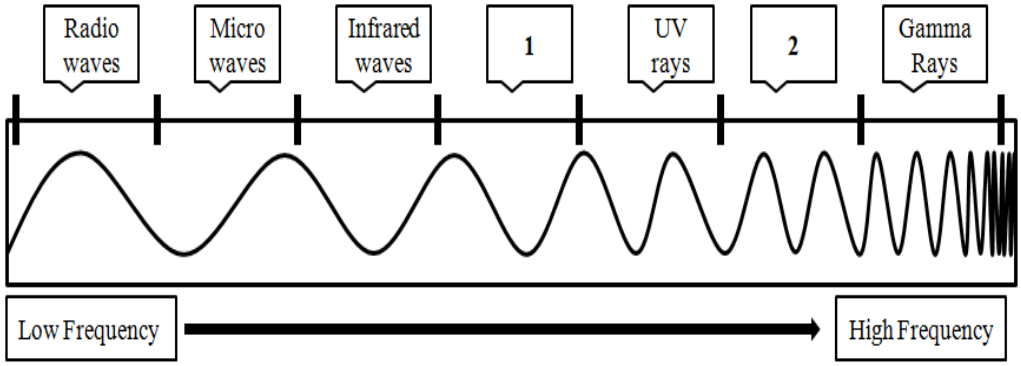
c) Is solar energy reliable and powerful enough to be used in homes or businesses? Support your answer with **TWO** reasons. **[2]**

d) Two regions of a conductor are shown in the figure given below.




What does the directions of A and B represent? **[2]**

e) The diagram shown below is a region of an electromagnetic spectrum. Identify regions 1 and 2. **[2]**

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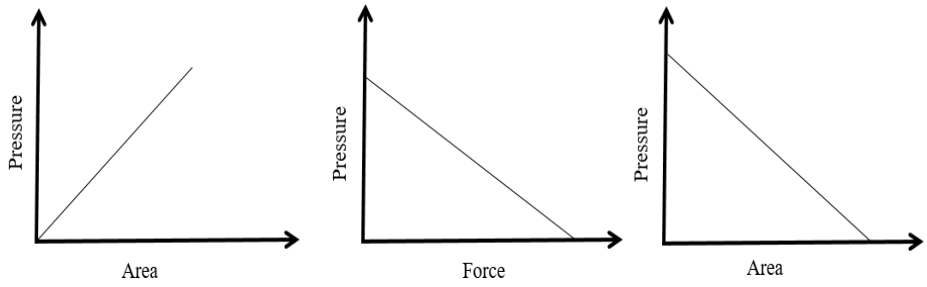
**Question 3**

a) Study the three different graphs shown below.




Which graph shows the correct relation of pressure? Explain. **[2]**

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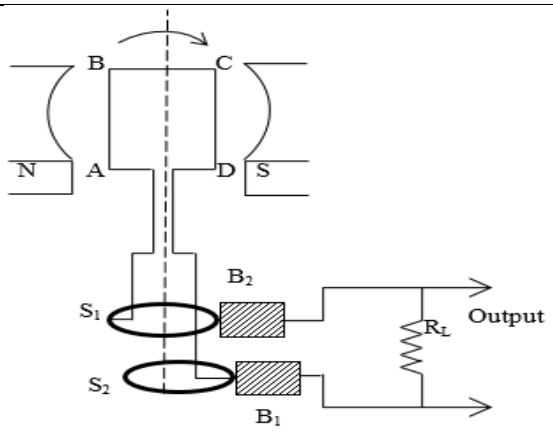
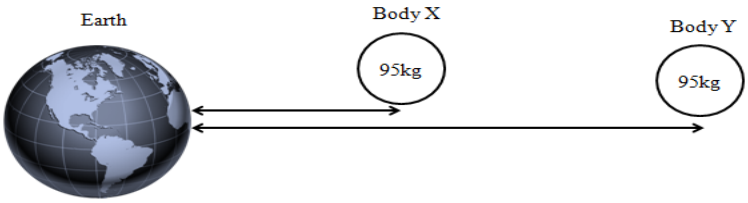
b) On the diagram show the direction of current (I) in arm AB and CD using Fleming's right hand rule for an a.c. generator. **[2]**




c) How is the frequency of electromagnetic waves and its energy related to each other? **[2]**

d) A school caretaker uses a grass cutting machine to mow the football ground. It converts chemical energy in the fuel into mechanical energy. During the operation of the machine, some energy is dissipated in the form of sound and heat energy. For every 850 J of chemical energy input only 750 J of useful output energy is produced. How much energy will be dissipated with an input energy of 1000 J? **[2]**

e) From the given diagram, which body will experience a weaker gravitational force of attraction from the Earth and why? **[2]**

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**Question 4**

a) Usually a person carrying a sack bends forward while climbing up a hill. Explain. **[1]**

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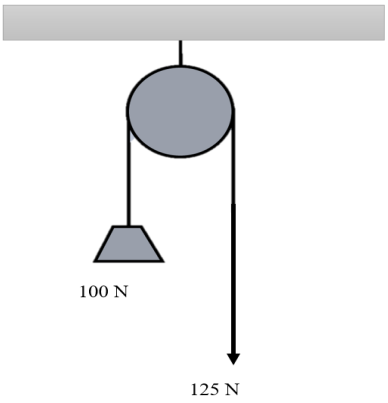
b) A load is lifted to a height of 3 m by using a single fixed pulley. Calculate the efficiency of the pulley. **[2]**

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c) We are able to hear people chatting and singing in an adjacent room without seeing them. List **ANY TWO** properties of sound waves. **[2]**

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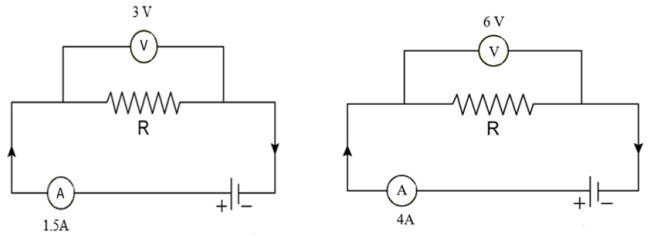
d) Study the circuit diagrams A and B and answer the questions that follow.




Circuit A Circuit B

i. Calculate the resistance for circuits A and B. **[1]**

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ii. Which will have a higher voltage drop and why? **[2]**

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e) Why could light not travel through the young universe? **[2]**

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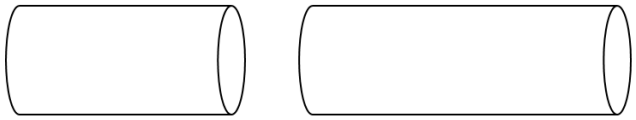
**Question 5**

a) Explain with an example to show that when the area of contact increases, the pressure decreases. **[1]**

b) Every year the number of vehicles are increasing along with the consumption of fossil fuels. It is a big concern globally and therefore, we need to focus on the twin pillars of sustainable energy. Suggest **ANY THREE** benefits of the twin pillars. **[3]**

c) Acceleration due to gravity on a planet X of radius $6.05 \times 10^6$ m is $8.87\ m/s^2$. Calculate its mass. Take G= $6.67 \times 10^{-11} Nm^2/kg^2$. **[2]**

d) Two cylinders made of the same metal and having equal cross-sectional area have different lengths. Explain the resistance offered by the cylinders. **[2]**




e) TV cable operators have made it compulsory for its clients to install Set-top box. Write down **TWO** advantages of it. **[2]**

**Question 6**

a) The diagram shown alongside is a parachutist who releases the parachute bag before reaching the ground. When the parachute bag opens, the drag force increases enabling him to land safely. What does this show and how does it affect the drag force? **[2]**

b) Renewable energy consumption has become more important in the past decade. Explain. **[2]**

c) Damchoe, weighs 470 N at Phuentsholing. What will happen to his weight if he goes to Thimphu and why? **[2]**

d) The electrical power at a station is usually generated at high voltage of 11 KV. This voltage is further increased to 132 KV using a transformer.

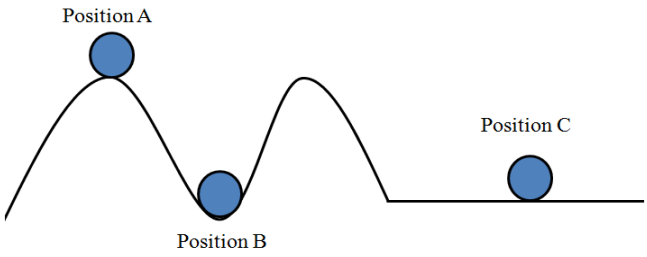
i. Name the transformer. **[1]**

ii. What type of current is preferred in the power supply system? Why? **[2]**

e) Write **TWO** common evidences for the Big Bang Theory. **[1]**

**Question 7**

a) Study the positions of a ball and complete the table. **[3]**




| | Position A | Position B | Position C | |
|---|---|---|---|---|
| Equilibrium | | | | |
| Centre of gravity | | | | |

b) Bhutan government is currently focusing more on the development of hydroelectric projects. List any **TWO** possible reasons why the government is opting for hydro-energy among other sources of energy? **[2]**

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c) A washing machine of 46 Ω draws a current of 5 A. Determine the power rating of the washing machine. **[2]**

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d) Write any **TWO** differences between a star and a planet. **[2]**

| **Star** | **Planet** | |
|---|---|---|
| 1. | | |
| 2. | | |

e) Write down **TWO** conditions required to make the resistivity and resistance of a conductor equal. **[1]**

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