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PHYSICS
PAPER 1
JULY/AUG 2024
2 HOURS 30 MINUTES

ASSHU ANKOLE JOINT MOCK EXAMINATIONS

Uganda Certificate of Education

PHYSICS

PAPER 1

THEORY

2 HOURS 30 MINUTES

INSTRUCTIONS TO CANDIDATES.

- This paper consists of two sections A and B. it has seven examination items.
- Section A has three compulsory items.
- Section B has two parts; I and II. Answer one item from each part.
- Answer five items in all.

SECTION A

ITEM 1

A certain man went for tooth extraction in a clinic with his 8-year-old son. The dentist was so busy and so asked his nurse to look for an optical instrument of radius of curvature 20cm, that this would give him the best magnification.

The average length of a mature human tooth is 3cm.

To achieve the best results, the nurse was advised to have a tooth 15cm from the instrument.

As soon as they arrived home late in the evening, the 8-year-old son started narrating to his siblings and their mother and the neighbors in the next room who had closed their room to sleep heard the conversation. The neighbor felt sorry to the man.

HINT

Available optical instruments were concave mirror and convex lens of the same focal length.

Task.

As a learner of physics,

- Advise the nurse on the optical instrument that would best extract the tooth.
- Help to explain why the neighbor was able to hear the conversation from the 8-year-old boy in the other room.

ITEM 2

In a certain trading centre, the pressure of water in taps have seriously reduced and in some parts of the town, water is completely not there. This has worried locals around that town. Local authorities have been consulted to check whether there is any problem with underground water supply system in pipes before the issue is reported for further management.

Radioactive source	Radiation emitted	Half life	Solubility in water
P	α	22 hours	Low
Q	β	36days	Medium
R	β	15hours	High
S	γ	25minutes	High

Detector
Spart counter
Cloud chamber
Geiger muller tube

Counter
Scaler or rate meter

Task.

As a learner of physics;

- a) Help the local authorities to choose from the table the appropriate materials they would use to report the issue of low pressure in the taps.
- b) Sensitize locals of the town the likely method to detect the location of leakage in pipes with reasons.

ITEM 3

S.3 and S.4 students of a certain school were to have a motion (debate) about time durations of a day, night and seasons of a year which they normally experience in their lives. This motion was to be presented to parents most of whom are peasants on a visitation day.

In the debate, one presenter argued that ocean tides are the causes of these durations. Another learner supplemented that ocean tides and drought are caused by artificial satellites placed in space by powerful countries like Russia.

A parent who had attended also supplemented that seasons are brought about by the motion of the planets about the sun and this distorts climatic conditions.

The audience got confused of the arguments. A learner from the audience raised an inquiry if there can be a means of getting some information about these weather changes and planets.

Chairperson tasked each participant to make more research so that they can have clear information in the next presentation.

Task.

As a learner of physics, help the audience to;

- a) Understand about time duration of the day, night and year.
- b) Explain the occurrence of seasons and ocean tides
- c) Know what artificial satellites are and their roles in everyday life.

SECTION B. PART I

ITEM 4

A certain high way restaurant in one of the towns in Uganda is known to provide warm water to its customers for washing hands.

An attendant who works in this hotel was given two similar plastic cylindrical tanks each with a cross-sectional area of 18380cm^2 and height of 5.5m. One of the tanks is painted white and the other painted black.

Attendant is supposed to store 10m^3 of warm water in any of the tanks. She is worried on which tank she can use to keep water and accommodate all the available water.

To ensure smartness in the restaurant, each tank is supposed to be supported on plastic stands as shown in the figure,

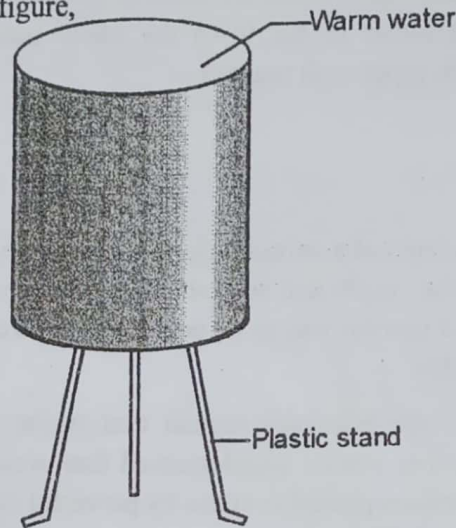


Fig. 1

Task

As a learner of physics,

- a) Help to explain to the attendant on;
 - i) The tank she would use to store the required amount of water.
 - ii) The type of tank that would keep water for customers at required temperature.
- b) If one of the tanks was to be used for hand washing and the owner of restaurant wants to put a tap on it,
 - i) Show him by letter K, the position where the tap can be put.
 - ii) Explain to the restaurant owner on the choice of position K.
- c) What advice would you give to the restaurant owner on the measures he would ensure for the tank stand to withstand weight of the tank for a long time.

ITEM 5

While driving passengers, a taxi driver got frightened when a flying bird hit the wind screen. He then suddenly applied breaks and stopped that led the car tyres to burst and the passengers were seen to jark forward and backward.

As soon as the driver went out of the vehicle to check what had happened, he touched on the cover of the engine part of the car (bonnet) and it was so hot. On opening the bonnet, it was not in contact with the engine yet the engine was also hot.

The figure shows the motion of the vehicle before all this happened.

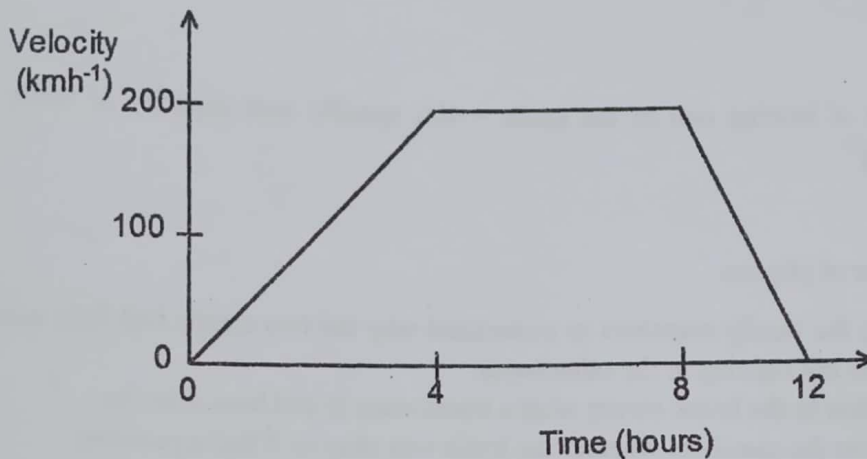


Fig.2

The taxi driver did not know the exact location he was, so that he could direct the mechanic to bring him new tyres to replace the burst tyres.

Task.

- Help to tell why passengers had to jack forward and backward when the driver suddenly braked.
- Help the driver to explain why the bonnet was so hot when he touched it.
- Advise the taxi driver to direct the mechanic the exact location he would find him so he could deliver the new tyres.

PART II

ITEM 6

A certain home has three rooms each with a bulb as shown in the figure.

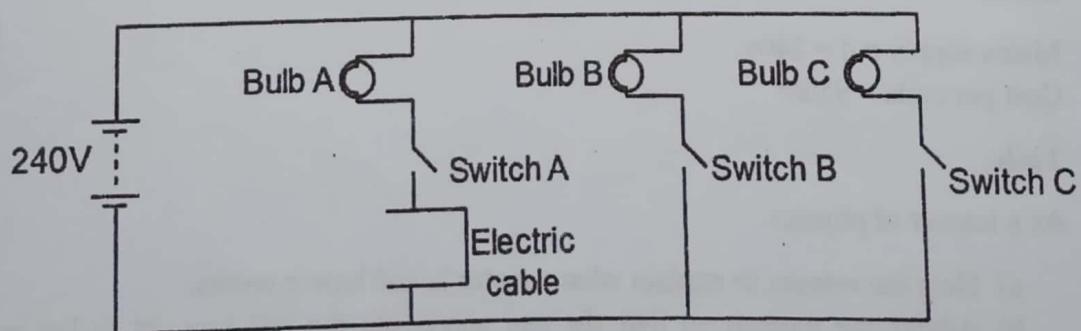


Fig.3

When all bulbs were switched on by members of the rooms at ago to have light, one bulb A did not light but the other two were found lighting brightly. Bulb A and the kettle were put in the other rooms and the bulb light brightly as other two. The kettle is considered effective if it is switched on for 4 minutes and 8 seconds.

A member argued that energy from the transformer was not enough. Other members were confused because they do not know a transformer. To ascertain all this, 1 litre of water is filled in the kettle at 15°C and heated up to 100°C .

HINT

Resistance of heating coil of the kettle = 40Ω specific heat capacity of water = $4200\text{Jk}^{-1}\text{kg}^{-1}$

Task.

As a learner of physics

- Help the family members to understand why the two rooms had light when it was not lighting in the other room.
- Explain to the home owner what a transformer is and how it works.
- Advise the members whether the kettle was okay or it had a problem.

ITEM 7

A certain woman switched on a blender to prepare passion juice but it could not work. Her friend who had experienced a similar challenge told her that it was likely to be a Dc motor with mechanical problem that needed replacement. She had no money neither did she know what a DC motor was and how it worked. Soon as she was still complaining the electricity distribution company brought her a bill of 38,950.0shs for the last month of 30days which she disagreed with that it was too high compared to what she expected to have used.

Appliance	No. of appliances	Power(w)	Time
Flat iron	1	75	1 hour
Tv	2	100	4 hours
Phone charger	2	50	55 minutes
Lighting bulbs	4	50	2 hours

HINT.

Mains supply p.d = 240v

Cost per units = 950/=

Task.

As a learner of physics.

- Help the woman to explain what a motor is and how it works.
- Advise the woman so that she can appreciate the bill brought to her by electricity distribution company.

END