THIRD PRELIMINARY EXAMINATION

SCIENCE-1

Marks : 80 / Pgs. 5

Class : X

Physics

Time : 2 Hrs.

Date : 23.01.2020

Answers to this paper must be written on the paper provided separately
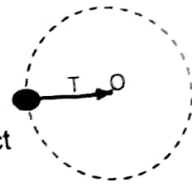*You will not be allowed to write during the first 15 minutes.*
This time is to be spent in reading the question paper.
The time given at the head of this paper is the time allowed for writing the answers.

Section A is compulsory; Attempt any four questions from Section B

SECTION A
(All questions are compulsory)

Question 1:

a) In the given diagram-tension (T) provides a <u>force</u> for the object to move in a circular path. i. Name that force. [2]
ii. State its direction.

b) A boy of mass 40 kg climbs up a flight of 30 steps, each 20 cm high, in 2 min. A girl of mass 30 kg does the same in 2.5 min.(g = 10 m/s²) [2]
Compare- i. The work done ii. The power developed by them. [2]

c) i. Define refractive Index of a medium.
ii. Can R.I of a transparent medium be <u>less than 1</u>.Why? [2]

d) i. What is a lens?
ii.When can it be called equi-concave or equi-convex? [2]

e) Write any two points of distinction between light waves and sound waves. [2]

Question 2:

a) Differentiate between heat capacity (C') and specific heat capacity (c). [2]

b) i. If 'p' is the momentum possessed by a body of mass 'm' and velocity 'v' then which physical quantity is denoted by the relation $\frac{p^2}{2m}$. [2]

ii. State the principle of conservation of energy.

c) i. Define a Prism. [2]

ii. If μ flint glass $>$ μ crown glass, then which prism of them will produce greater deviation.

d) State and define the S.I unit of current. [2]

e) What is the position of the object, when a convex lens is used in the collimator of a spectrometer? How does it help? [2]

Question 3:

a) Select and rewrite with the correct option- [2]
   i.   A _____ is a class three lever.
    1) Scissor   2) Bottle opener   3) Fire tongs
   ii.   A lever for which its M.A < 1 has _____ .

   1) Load in between fulcrum and effort.

   2) Effort in between load and fulcrum.

   3) Load and effort acting at the same point.

b) State any two natural phenomena caused due to refraction of light. [2]

c) If power of a lens is +1.0 D , then –

  i.What kind of lens is it?   ii. Calculate its focal length. [2]

d) i. If same amount of heat is supplied to two liquid substances X and Y. The substance X shows greater rise in temperature than Y. Which among the two has a higher heat capacity.
ii. Name a substance which has maximum specific heat capacity. [2]

e) A beam of red and yellow light is incident normally on an Isosceles right angled prism. Complete the ray diagram to show the refracted and the emergent rays.
[Given ic yellow = 45°] [2]
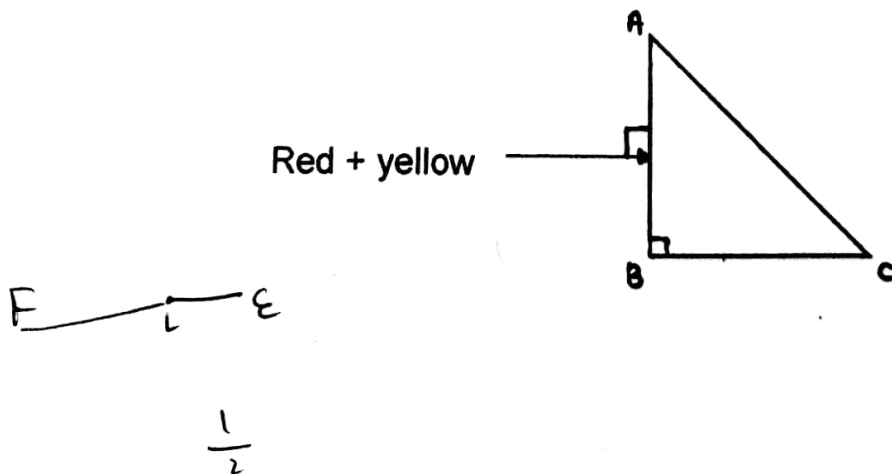
Question 4:

a) A simple pendulum, while oscillating rises to a maximum height of 5 cm from its rest position Find the velocity of its bob assuming no loss of energy due to air friction.(take g = 10 m/s^2)   [2]

b) i. Speed of light in water is 2.25 x 10^8 m/s. Find $_{air}\mu_{water}$ [2]

ii.Explain the statement-'R I of glass is 1.5 for white light'.   [2]

c) i. What are Becquerel rays?

ii.Explain Isotones with an example.   [2]

d) Observe and answer :
i.   Name the lens LL'.
ii. Describe the characteristic of
     the image so formed.   [2]
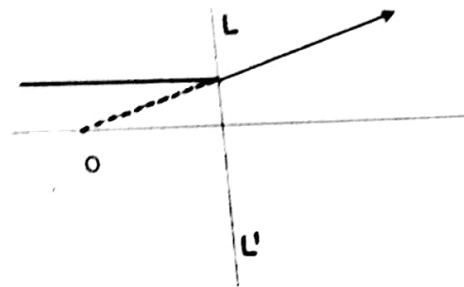
e) i. What are background radiations?

ii.State any one internal source of background radiations.   [2]

SECTION B

(Attempt any four questions from this section)

Question 5:

a) A block and tackle system of two pulleys in each block with the tackle tied to the hook of the lower block is used.[Its effort being directed upwards]   [3]
   i.   Draw a neat and labelled diagram to show the above arrangement.
   ii. If effort applied is 2 kgf- Calculate the maximum load, that can be lifted by it.

b) A person standing between two vertical cliffs produces a sound. Two successive echoes are heard by him-first after 4s and then the next one 2 s later. Calculate the distance between the two cliffs.[speed of sound in air= 320 m/s]   [3]

c) A uniform meter rule of mass 100 g is balanced at a fulcrum marked 60 cm by suspending a mass 'M' at 80 cm.   [4]
   i.   Find 'M'.
   ii. If 'M' is shifted to the end of the rule at the 100 cm mark, What will be the resultant moment?
   iii. At what mark/position can a weight of of 50gf be suspended to balance the rule once again.

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Question 6:　　　　　　　　　　　　　　　　　　　　　　　　　[3]

a) Derive the relation $MA = VR \times \eta$ for an ideal machine.　[3]

b) A power circuit uses three different coloured wires-
　　1. Name the three wires used.
　　2. Between which two wires should the heating element of the geyser be connected?
　　3. To which wire should the switch and the fuse be connected?　[4]

c) Observe and answer:
Given figure shows five different modes of vibrations of a string of length 'l'

Mode	
⬭	1
⬭⬭	2
⬭⬭⬭	3
⬭⬭⬭⬭	4
⬭⬭⬭⬭⬭	5

　i. Which vibration shows the least frequency?
　ii. Which of them shows the principal note?
　iii. Which of them will produce the shrillest sound?
　iv. What is the ratio of the wavelength between fig.(4) and fig.(2).

Question 7:

a) A certain sound has a frequency of 256 Hz and wavelength of 1.3m.　[3]
　i.　Calculate the speed of sound.
　ii.　Find the frequency of another sound travelling at the same speed but with a wavelength of 0.8m.
　iii.　What will be the difference felt by a listener, when he hears both the sounds?

b) i. What is a fuse? What is it made of?　[3]

　ii.Why should it not be replaced by an ordinary copper wire?

c) Answer the following:　[4]
　　1. Name a type of single pulley with ideal M.A of 2.
　　2. Draw a neat and labelled diagram of the pulley mentioned by you.
　　3. If a block and tackle system of 5 pulleys has an efficiency of 90%, then its M.A will be _____.

Question 8:

a) i. State Faraday's Laws of electromagnetic Induction.　[3]

　ii.Give any one factor affecting the magnitude of induced emf.

b) ① What is a Radio Isotope?　[3]
　　ii.State the cause for a nucleus of an atom to become radioactive.

iii. Give one scientific use of Carbon-14.

c) Answer the following: [4]

1. At what voltage and frequency is the electric power supplied to our homes?
2. What is the use of a phase wire?
3. State the fuse rating of a company fuse?
4. What is the main difference between an ELCB and a MCB?

Question 9:

a) State the use of the following: [3]

1. Lenz's Law
2. A calorimeter.
3. Right hand thumb rule.

b) A piece of ice of mass 40g is added to 200 g of water at 50°C. Calculate the final temperature of water when all ice has melted. [S.H.C of water = 4.2 $J.g^{-1}K^{-1}$, sp. latent heat of fusion of ice = 336 $J.g^{-1}$]   [3]

c) One kg of lemon squash at 30°C is placed in a refrigerator which can remove heat at an average rate of 30 J/s. How long will it take to cool the lemon squash to 5°C? Specific heat capacity of the squash = 4200 $J.kg^{-1}K^{-1}$.   [2]

d) $^{238}U_{92}$ decays to $^{206}Pb_{82}$ after several disintegrations. Find the number of alpha and beta particles emitted during this nuclear change.   [2]

Question 10:

a) 1. Expain why fusion reaction is also called thermo-nuclear reaction.   [3]
   2. Complete the given nuclear reaction:
   $^{235}U_{92} + {}^{1}n_0 \longrightarrow \square Ba_{56} + {}^{92}Kr_{\square} + 3 {}^{1}n_0$ [3]
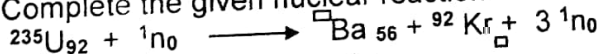
b) Complete the following sentences:
   1. When ice melts, its volume ....
   2. Boiling point of water is defined as.......
   3. Adding impurities to water....... its boiling point.   [4]

c) Observe and answer:
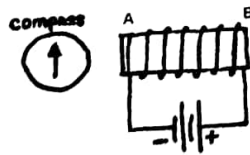
i. State the polarity of the end B.

ii. How will the needle of the compass deflect and why?

iii. Suggest a way to reverse the polarities of the ends A and B.

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