Narsee Monjee Educational Trust's
JAMNABAI NARSEE SCHOOL
Narsee Monjee Bhavan, Narsee Monjee Marg,
N.S.Road No. 7, J.V.P.D. Scheme,
Vile Parle (W), Mumbai - 400 049, India.

contactus@jns.ac.in
+91 22 2618 7575 / 2618 7676
www.jns.ac.in

SECOND PRELIMINARY EXAMINATION JANUARY 2019
PHYSICS

Class:10
Marks: 80
Time: 2 hrs
Date:03 /01/2019

This paper consists of 5 printed pages.

Answer 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.

Attempt all the questions from Section I and four questions from Section II.
The intended marks for questions or parts of questions are given in brackets [ ]

SECTION I (40 Marks)
Attempt all questions from this section

Question 1

(a) (i) Give one use of actinic rays. [2]
(ii) Name the radiations which are absorbed by greenhouse gases in the earth's atmosphere.

(b) What will an alpha particle change into when it absorbs: [2]
(i) One electron?
(ii) Two electrons?

(c) (i) With reference to their direction of action, how does a centripetal force differ from a centrifugal force? [2]
(ii) If the moment of force is assigned as a negative sign then will the turning tendency of the force be clockwise or anticlockwise?

(d) What is the main energy transformation that occurs in: [2]
(i) Photosynthesis in green leaves?
(ii) Charging of a battery?

(e) Explain, why is water considered as best liquid for quenching thirst? [2]

Question 2

(a) How long should an electric motor, of power 2 H.P. operate, so as to pump 373 kg of water from a depth of 12m. [Take g = 10 N kg^{-1}] [2]

(b) A body is acted upon by a force. State two conditions under which the work done could be zero. [2]

(c) (i) Which class of levers has a mechanical advantage always greater than one? [2]

(ii) What change can be brought about in this lever to increase its mechanical advantage?

(d) Name any four regions of electromagnetic spectrum (other than visible light) in decreasing order of wavelength. [2]

(e) The resistance of two lamps is in the ratio 4 : 5. What will be the ratio of their power? [2]

Question 3

(a) For the same angle of incidence, the angles of refraction in three different media I, II and III are 15°, 25° and 35° respectively. In which medium will the speed of light be minimum? Give a reason to justify your answer. [2]

(b) Of the three connecting wires in a household circuit [2]

(i) Which two of the three wires are at the same potential?

(ii) In which of the three wires should the switch be connected?

(c) Which of the two wires of similar dimension, copper or nichrome, would you use for the electric heater. Give a reason to justify your answer. [2]

(d) (i) Draw a graph between displacement and the time for body executing free vibrations. [2]

(ii) Where can a body execute free vibrations?

(e) State the physical quantity that measures (i) volt ampere (ii) $N \cdot A^{-1} m^{-1}$ [2]

Question 4

(a) A current 'I' passes through a circular loop C. [2]

(i) What is the polarity of the face of the loop?

(ii) What is the direction of the magnetic field at the centre of the loop?

(b) Name the waves which are used in [2]

(i) Sound navigation and ranging to find the depth of sea.

(ii) Radio detection and ranging to detect the presence of an enemy's airplane in its path.

(c) State one point of similarity and one point of difference between an AC generator and DC motor. [2]

(d) State and define the S.I. unit of electrical resistance. [2]

(e) Three resistors of 6 Ω, 3 Ω and 4 Ω are connected together so that the effective resistance is greater than 6 Ω, but less than 8 Ω. Draw a diagram to show this arrangement. [2]

SECTION II (40 Marks)

Attempt any 4 questions from this section

Question 5

(a) (i) Name the process used for producing electricity from the nuclear energy. [3]

(ii) If an elephant and a rat both run with same kinetic energy, who will win the race?

(iii) Which class of lever found in a human body is being used by a girl when she raises the weight of her body on her toes.

(b) A uniform half meter rule balances horizontally using a knife edge at 28 cm mark when a weight of 18 gf is suspended from one end. [3]

(i) Draw a diagram of the arrangement.

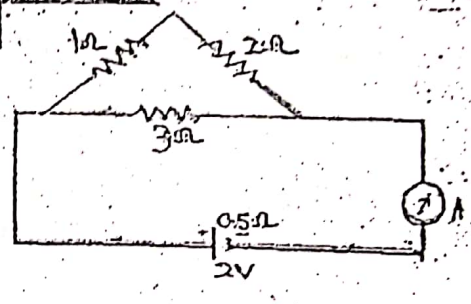
(ii) What is the weight of the half meter rule?

(c) (i) Why are infra-red radiations preferred over ultraviolet radiations while taking photographs in fog? [4]

(ii) A boy uses blue colour light to find the refractive index of glass. He then repeats the experiment using red colour light. Will the refractive index be the same or different in the two cases? Give a reason to support your answer.

Question 6

(a) Given in the circuit adjacent diagram in which three resistances 1 Ω, 2 Ω and 3 Ω are connected to a cell of emf 2 V and internal resistance 0.5 Ω. [3]

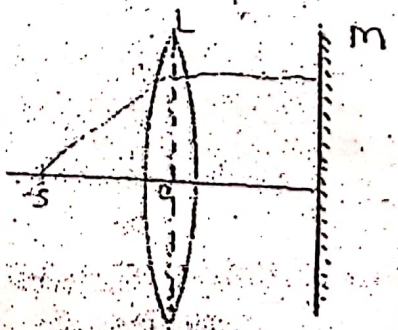


(i) Calculate the total resistance of the circuit.

(ii) What is the reading of the ammeter?

(iii) What will be the ammeter reading if an exactly similar cell is connected in series with the given cell?

(b) Figure shows a point source of light S, a convex lens L and a plane mirror M. The three are placed such that rays of light from S return to it after reflection from M. Complete the ray diagram. [3]



(i) What is the distance called?

(ii) To which point (left of S, on S or right of S) will the rays return if M is moved to the left and brought in contact with L?

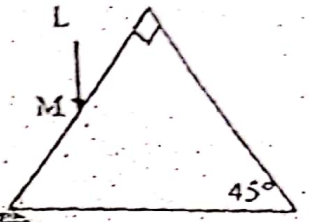
(c) (i) Water initially at 18°C at a height of 1.26 km above the ground, falls down on the ground. Taking the specific heat capacity of water to be 4.2 $Jg^{-1}K^{-1}$ find the final temperature of water on reaching the ground. Take $g=10ms^{-2}$. [4]

(ii) In what way does the temperature of water at the bottom of a waterfall differ from the temperature at the top? Explain with reasons.

Question 7

(a) Two men 13.6 m apart stand at the same distance from a vertical hillock. One of them fires a shot and other hears the echo 2 s after hearing the direct sound. Find the distance of the man from the hillock assuming the velocity of sound to be 340 m/s. [3]

(b) For the incident ray LM shown, complete the diagram to show the path of the ray into and out of the prism. Critical angle of glass is 42°. [3]



(c) (i) Why does a spear man aim at the tail of the fish during spear fishing? [4]

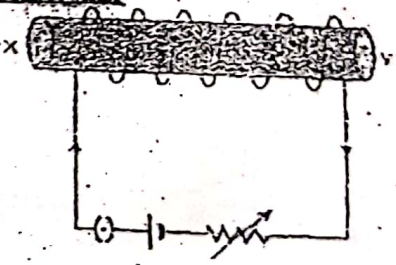
(ii) Mention any two differences between nuclear energy and chemical energy.

Question 8

(a) How many alpha and beta particles are emitted when uranium nucleus $^{238}_{92}U$ decays to $^{202}_{80}X$? [3]

(b) A lens forms the image of an object placed at a distance 20cm from it, at a distance 60 cm in front of it. Find : (i) the focal length, [3]
(ii) the magnification and the nature of image.

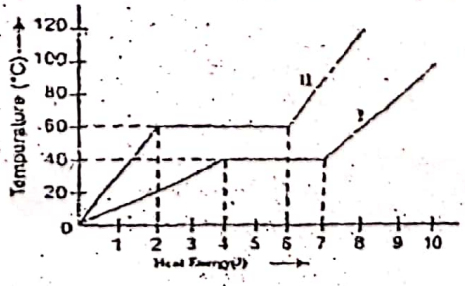
(c) The adjacent figure shows an electromagnet: [4]



(i) What will be the polarity at the end X?
(ii) Suggest a way by which the strength of the electromagnet referred to in the question may be increased.
(iii) Name the device used to increase the voltage at a generating station.
(iv) At what frequency is alternate current supplied to residential houses?

Question 9

(a) Two solid bodies each of mass m are heated at a uniform rate under identical conditions. Their change in temperature is reflected graphically in the figure. [3]



(i) What is the melting point of solid II?
(ii) What is the ratio of latent heats of solid I and solid II?
(iii) State the effect of increase in pressure on the melting of ice.

(b) (Red + Blue + Yellow) light is incident on a prism, draw the diagram by showing the refracted and emergent ray. [3]

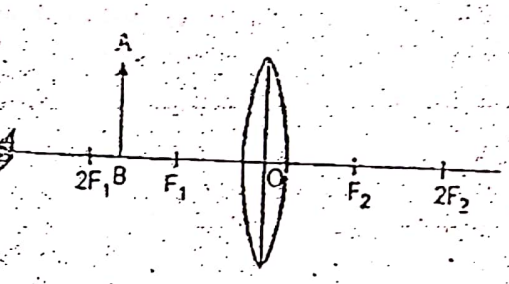
(c) A block and tackle system has VR = 5. [4]

(i) Draw a neat labelled diagram of a system indicating the direction of its load and effort.

(ii) Rohan exerts a pull of 150 kgf. What is the maximum load he can raise with this pulley system if its efficiency = 75%?

Question 10

(a) An object AB is placed between $2F_1$ and F_1 on the principal axis of a convex lens as shown in the diagram. Copy the diagram and using three rays starting from point A, obtain the image of the object formed by the lens. [3]



(b) An electrical appliance is rated 100 W, 220 V. It is appliance is connected to 220 V mains. Calculate: [3]

(i) The current drawn.

(ii) The electrical energy consumed in 60 hours

(iii) The cost of electrical energy consumed at a rate of Rs 3·50 per kWh.

(c) A metal piece of mass 20g is heated to a constant temperature of 100 °C. Then it is added in a calorimeter of mass 25 g and specific heat capacity 0.42 J $g^{-1}K^{-1}$, containing 250 g of water at 18°C. After stirring the water, the highest temperature recorded is 22.6°C. Calculate the specific heat capacity of metal. Specific heat capacity of water=4.2 J $g^{-1}K^{-1}$. [4]