GUNDECHA EDUCATION ACADEMY

COMMON PRELIMINARY EXAMINATION-2018-2019

STD: X
(2 hours)

DATE: 14.01.19
Marks: 80

PHYSICS

SCIENCE PAPER -1

(Two Hours)

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.

Section I is compulsory. Attempt any 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) State two factors affecting the turning effect of a force. [2]

b) At which point is the centre of gravity situated in: [2]
(i) A triangular lamina and
(ii) A circular lamina?

c) A satellite revolves around the earth in a circular orbit. What is the work done by satellite? Give reason. [2]

d) A boy weighing 350 N climbs up the 30 steps, each 20 cm high in 1 minute. Calculate: [2]
(i) The work done and
(ii) The power spent.

e) State the energy changes in the following cases while in use: [2]
i) Microphone
ii) Bio-gas burner.

Question 2

a) A ray of light falls normally on a glass slab. Draw diagram showing the path of ray till it emerges out of the slab. What is the angle of incidence and the angle of refraction at each surface of slab? [2]

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b) How does the angle of minimum deviation produced by a prism change with increase in : [2]

(i) The wavelength of incident light and

(ii) Refracting angle of prism?

c) State the condition for each of the following: [2]

(i) A lens has both its focal lengths equal

(ii) A ray passes undeviated through the lens.

d) Name one factor on which the frequency of sound emitted due to vibrations in an air column depends. How does the frequency depend on the factor stated by you? [2]

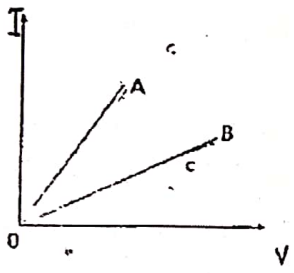
e) Complete the following sentences: [2]

(i) The pitch of sound increases if its frequency .....

(ii) If the amplitude of a sound is halved, its loudness becomes .....

Question 3

a) The following figure shows I-V graph for two conductors A and B. [2]



(i) Which of the conductors is ohmic?

(ii) Which conductor has more resistance? Give reason for your answer.

b) What resistance must be connected to a 15 Ω resistance to provide an effective resistance of 6 Ω ? [2]

c) A bulb rated 12 V, 24 W operates on a 12 V battery for 20 minutes. Calculate:

(i) The current flowing through it

(ii) The energy consumed. [2]

d) A straight wire lying in a horizontal plane carries a current from north to south.

(i) What will be the direction of magnetic field at a point just underneath it?

(ii) Name the law used to arrive at the answer in part (i) [2]

e) State two ways by which the speed of rotation of an electric motor can be increased. [2]

Question 4

a) Name the principle on which a transformer works. What is the function of a step up transformer? [2]

b) An electric heater of power 1000 W raises the temperature of 5 kg of a liquid from 25 °C to 31 °C in 2 minutes. Calculate:

(i) The heat capacity

(ii) The specific heat capacity of liquid. [2]

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c) A radioactive substance is oxidised. What changes would you expect to take place in nature of radioactivity? Explain your answer. [2]

d) State the relationship between the mechanical advantage, velocity ratio and efficiency. Name the term that will not change for a machine of a given design. [2]

e) A wave has a wavelength 10^{-3}m.
   (i) Name the wave.
   (ii) State its one property different from light. [2]

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SECTION II (40 Marks)

Attempt any four questions from this section.

Question 5

a) An object of height 4 cm is placed at a distance of 24 cm in front of a convex lens of focal length 8 cm.
   (i) Find the position and size of the image.
   (ii) State the characteristics of the image. [3]

b) Show with the aid of a ray diagram, how a right angled isosceles prism can be used to invert the rays.
   (i) How should the rays fall on the prism?
   (ii) Which phenomenon is responsible for this action of prism? [3]

c) A pulley system with a velocity ratio of 4 is used to lift a load of 150 kgf through a vertical height of 20 m. The effort required is 50 kgf in the downward direction. Calculate:
   (i) The distance moved by the effort
   (ii) The work done by the effort
   (iii) The mechanical advantage
   (iv) The % efficiency of the pulley. [4]

Question 6

a) A uniform metre rule of weight 10 gf is pivoted at its 0 mark.
   i) What moment of force depresses the rule?
   ii) How can it be made horizontal by applying a least force?
   iii) What is the direction of this force? [3]

b) A pendulum with bob of mass m is oscillating on either side from its resting position A between the extremes B and C at a vertical height h above A. What is the kinetic energy K and the potential energy U when the pendulum is at positions
   (i) A
   (ii) B and
   (iii) C [3]

c) Name a radiation which can be detected by: [2]
   (i) A thermopile
   (ii) A solution of silver chloride.

d) Why does the sun appear red at sunrise and sunset? [2]

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a) Name the characteristics of the sound affected due to a change in its [3]

(i) Amplitude
(ii) Waveform
(iii) Frequency

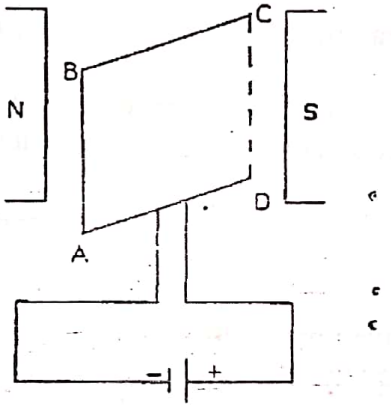
b) (i) Name two factors on which the specific resistance of a wire depends.
(ii) Two wires A and B are made of copper. The wire A is long and thin, while the wire B is short and thick. Which will have more specific resistance? [3]

c) A power circuit uses a cable having three different wires.

(i) Name the three wires of cable and state their new convention colour coding.
(ii) To which wire should the metallic case of the geyser be connected?
(iii) To which wire should the switch and fuse be connected? [4]

Question 8

a) The following figure shows a rectangular coil ABCD placed in between the pole pieces of a horse-shoe magnet with its plane perpendicular to the magnetic field. A battery is connected between the ends A and D of the coil. [3]



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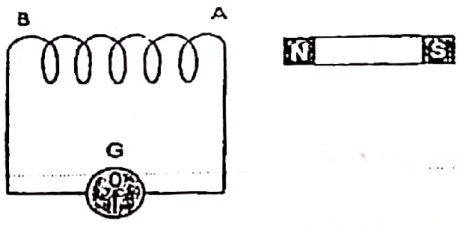
(i) What is the direction of current in the coil?
(ii) What is the direction of force on each arm of the coil?
(iii) Will the coil rotate due to the forces on its arms

b) A flat rectangular coil is rotated between the pole pieces of horse-shoe magnet. [3]

(i) In which position of coil with respect to magnetic field, will the e.m.f.
1) Maximum and
2) Zero
(ii) When does the e.m.f. change its direction?

c) The following figure shows a coil AB connected to a centre zero galvanometer G and a magnet NS. [4]



(i) What will you observe when a magnet is inserted into the coil?

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(ii) How will your observation in part (i) change, if the number of turns in the coil is increased?

(iii) State the direction of current in the coil in part (i)

(iv) State the law by which you arrived to the answer in part (iii)

Question 9

a) A metal piece of mass 20 g is heated to a constant temperature of 100 °C. Then it is added in a calorimeter of mass 50 g and specific heat capacity 0.42 $J\ g^{-1}K^{-1}$, containing 50 g of water at 20 °C. After stirring the water, the highest temperature recorded is 22 °C. Calculate the specific heat capacity of metal. Specific heat capacity of water is 4.2 $J\ g^{-1}K^{-1}$ [3]

b) (i) 1 g ice at 0 °C melts to form 1 g water at 0°C. State whether the latent heat is absorbed or given out by ice? [1]

(ii) Ice cream appears colder to the mouth than water at 0 °C. Give reason. [2]

c) What is meant by nuclear waste? State one way for the safe disposal of nuclear waste. [2]

d) What is:

(i) nuclear fission and (ii) nuclear fusion [2]

Question 10

a) A radioactive sample is kept at the centre of an evacuated spherical vessel. [3]

(i) Out of the α, β and γ radiations, name the radiations which are safe and unsafe.

(ii) Suggest two ways for more safety.

(iii) Does evacuation of vessel help in safety? State reason to support your answer.

b) A refrigerator converts 100 g of water at 20 °C to ice at −10 °C in 73.5 minutes. Calculate the average rate of heat extraction in watt. The Specific heat capacity of water is 4.2 $J\ g^{-1}K^{-1}$ and Specific latent heat of ice is 336 $J\ g^{-1}$ and Specific heat capacity of ice is 2.1 $J\ g^{-1}K^{-1}$ [3]

c) A lens forms an erect, magnified and virtual image of an object.

(i) Name the kind of lens.

(ii) Where is the object placed in relation to the lens?

(iii) Draw a diagram to show the formation of image.

(iv) Name the device which uses this principle. [4]

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