

R. I. C. S. E.

SECOND PRE-BOARD EXAMINATION 2018-2019

STD. : X

SUB. : PHYSICS

MARKS: 80

TIME: 2 HRS.

SECTION - A

Answer all questions [40 Marks]

Question I.

[5x2=10]

- a) i) Give an example of non contact force which always in attractive nature. $4f$
ii) If the moment of force is assigned a negative sign then will the turning tendency of the force be clockwise or anticlockwise?

b) The forces each of magnitude 5N are applied in opposite directions at the end of a uniform rod of length 0.5m. Draw diagram of the arrangement and find the total moment of the two forces.

c) An erect, magnified and virtual image is formed, when an object is placed between the optical centre and principal focus of a lens.

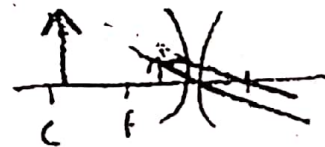
i) Draw a ray diagram to show the formation of the image with the above stated characteristics.

d) Calculate the mass of ice required to lower the temperature of 300g of water 40°C to water at 0°C .

(Specific latent of heat of ice = 336J/g , Specific heat capacity of water = $4.2\text{J/g}^{\circ}\text{C}$)

e) A body of mass 300g is moving with a speed 10 m/s. A force acts on it which makes it to move with a speed 20m/s. Find:

- i) The change in kinetic energy of a body and
ii) The work done by the force on the body.



Question II.

[5x2=10]

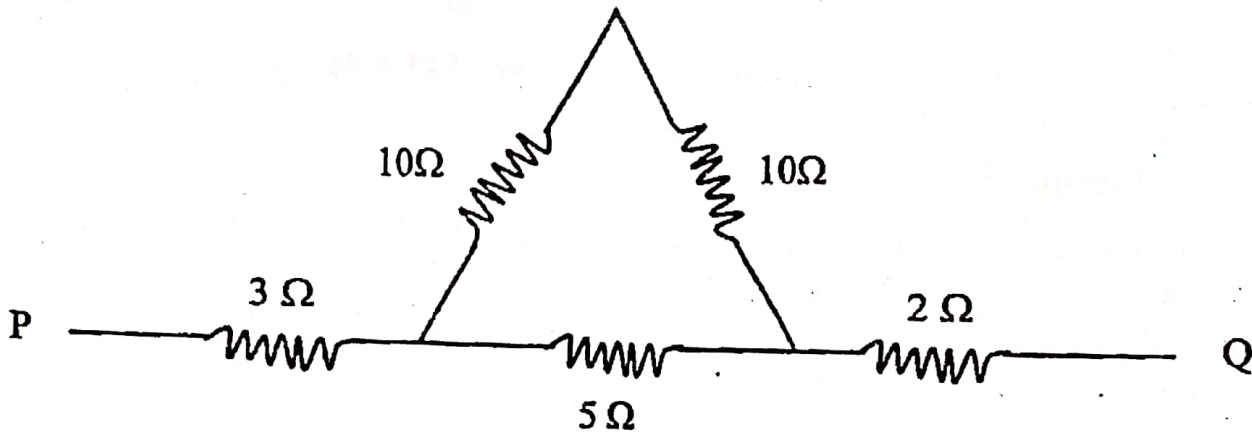
a) State the dependence of angle of deviation.

- i) On the refractive index of the material of the prism
ii) On the wavelength of the light

$$R = 8000^{\circ}\text{A}$$

$$V = 4000^{\circ}\text{A}$$

- b) Draw ray diagram to show the formation of an image by using a concave lens when an object is placed between infinity and optic centre.
- c) State the conditions required for total internal reflection.
- d) The equivalent resistance between P and Q of the following circuit diagram.



- e) i) Explain the meaning of the statement 'current rating of fuse is 5A'.
- ii) To which wire should the fuse be connected?

$1 \text{ kgf} = 10 \text{ N}$
 $50 \text{ kgf} = 500 \text{ N}$

Question III.

- a) Name the machine which is used to (i) multiply speed (ii) change in direction of force applied. [5x2=10]
- b) A pulley system with a velocity ratio of 4 is used to lift a load of 150 kgf through a vertical height of 20m. The effort required is 50 kgf in the downward direction. Calculate:

i) The distance moved by the effort. $150 \times \frac{0.6}{1.0000} = 90$
 ii) The work done by the effort. $90 \times 10 = 900$

- c) The power of a lens is -2D. Find its focal length and state the kind of lens.
- d) What is the effect of temperature on metals and semiconductors?
- e) What is the function of split ring (or commutator) in a d.c. motor?

Question IV.

[5x2=10]

- a) There is a sunken ship at a depth of 50m in a sea. From the surface of sea, waves are sent to locate it. Find the time when the wave after reflection will reach the surface. State whether the echo is heard or not. take speed of sound in water = 1400 m/s.

- b) Name any four regions of electromagnetic spectrum (other than visible light) in increasing order of wavelength.
- c) Draw displacement time graph for the damped vibrations.
- d) An element ${}_{Z}S^A$ decays to ${}_{85}R^{222}$ after emitting 2α particles and 1β particle. Find the atomic number and atomic mass number of the element S.

5
20
1
3
R

e) Which coil of a step up transformer is made thicker and why? $V = \frac{S \cdot F}{S \cdot F}$
 $V = S \cdot F$

SECTION - B

Answer any four questions [40 Marks]

Question V.

a) i) A spring is kept compressed by a toy cart of mass 150g. On releasing the cart, it moves with a speed of 0.2 m/s. Calculate the potential energy (elastic) of the spring. [2]

ii) Name the physical quantity which is measure in calorie. How it is related to the S.I. unit of that quantity? [2]

b) A prism deviates a monochromatic ray of light through an angle 'δ' when the angle of incidence on the surface of the prism is 'i':

i) Draw a diagram showing the variation of 'δ' with 'i'. On your graph show the angle of minimum deviation.

ii) What is the relation between the angle of incidence and the angle of emergence when the ray suffers minimum deviation? $i + e = A + \delta$ [3]

c) A block and tackle of 5 pulleys is used to raise a load of 50kgf steadily through a height of 20m. The work done against friction is 2000J. Calculate:

- i) the work done by the effort
- ii) the efficiency of the system
- iii) Mechanical advantage.

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1kgf = 10N
50 → 500
500 → 5000
[3]

Question VI.

a) i) Mention two properties of a wave: one property which varies and the other which remains constant when the wave passes from one medium to another.

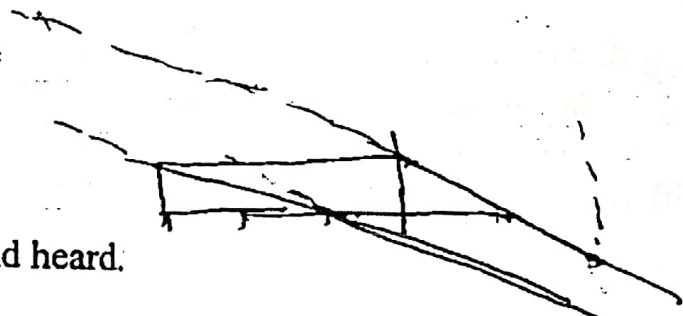
- i) Draw diagram to show lateral displacement. [4]
- b) An object of height 4.0cm is placed at a distance 24cm in front of a convex lens of focal length 8cm.
- i) Find the position and size of the image.
- ii) State one characteristic of the image. [3]
- c) i) Rock salt prism is used instead of glass prism to obtain infrared spectrum. Explain why?
- ii) Which radiations are used in sterilizing purposes. [3]

Question VII.

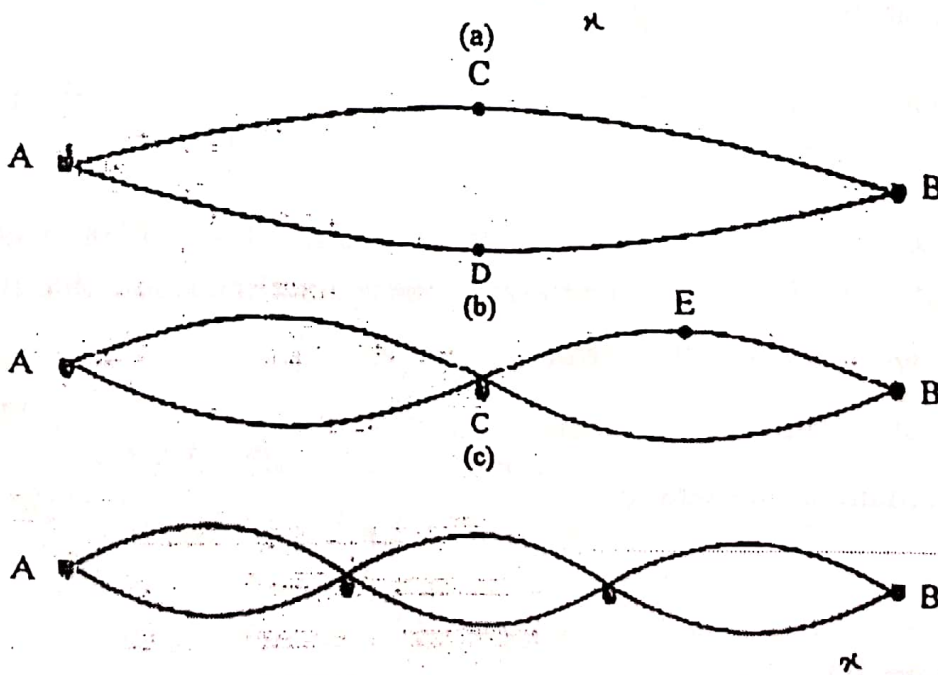
- a) i) Write the necessary conditions for hearing an echo.
- ii) A man standing 25m away from a wall produces a sound and receives the reflected sound. Calculate the time after which he receives the reflected sound if the speed of sound in air is 350m/s. [4]

b) State the factors that determine

- (i) the quality of the note
- (ii) the pitch of the note
- (iii) the loudness of the sound heard.



- c) [3]



Handwritten calculations: $\frac{350 \times 2 \times 25}{350} = 20$

- i) Which vibration will produce a louder sound and why?
- ii) Which vibration will produce sound of maximum shrillness and why?
- iii) What is the ratio of wavelength of vibrations (a) and (c)

Question VIII.

a) Define One kcal. What is the principle of method of mixtures?

Name the law on which the principle is based.

[3]

b) Why Hot water bottles are used for fomentation?

i) A certain amount of heat Q will warm 1 g of material X by 3°C and 1g of material Y by 4°C . Which material has a higher specific heat capacity? [3]

c) 40g of water at 60°C is poured into a vessel containing 50g of water at 20°C . The final temperature of mixture is 30°C . Taking the specific heat capacity of water $= 4.2\text{Jg}^{-1}\text{K}^{-1}$, calculate the heat capacity of the vessel. [4]

Question IX.

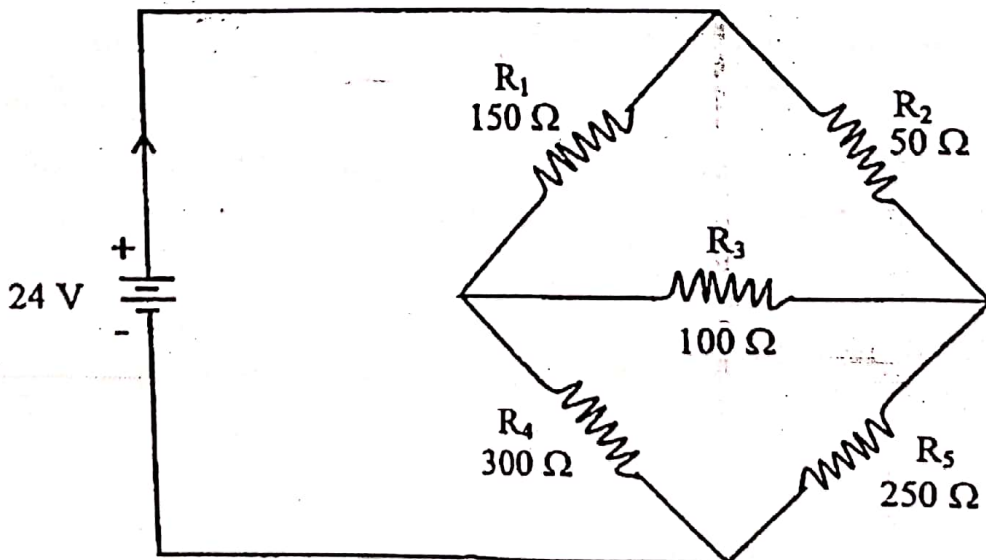
a) State Ohm's law.

ii) Two wires of the same material and same length have radii 1mm and 2mm respectively. Compare (i) their resistances (ii) specific resistance. [4]

b) An electrical gadget can give an electric shock to its user under certain circumstances. Mention any two of these circumstances.

ii) What preventive measure provided in a gadget can protect a person from an electric shock? [3]

c)



Handwritten calculations for the equivalent resistance of the circuit:

$$R_1 + R_2 = 150 + 50 = 200$$

$$R_4 + R_5 = 300 + 250 = 550$$

$$\frac{1}{R_{eq}} = \frac{1}{200} + \frac{1}{100} + \frac{1}{550}$$

$$= \frac{11}{2200} + \frac{22}{2200} + \frac{4}{1375}$$

$$= \frac{33}{1375} + \frac{4}{1375} = \frac{37}{1375}$$

$$R_{eq} = \frac{1375}{37} \approx 37.16 \Omega$$

- i) Find the total resistance
- ii) Total current through the battery
- iii) The current through 50Ω resistance.

[3]

Question X.

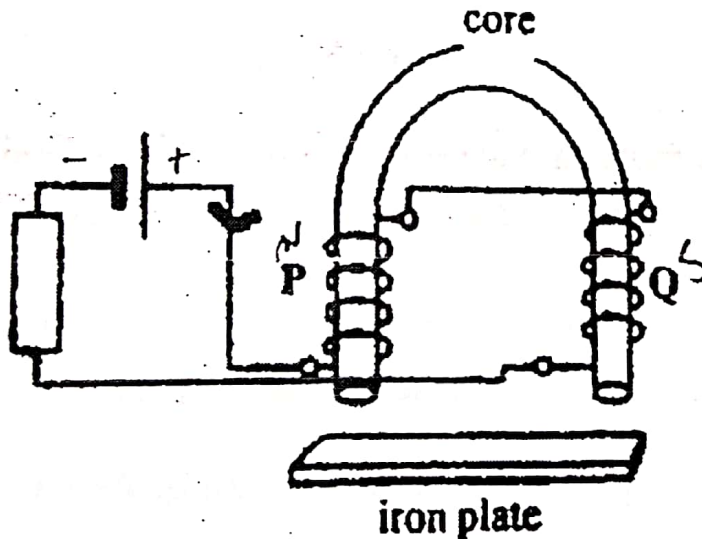
- a) i) When does the nucleus of an atom become radioactive?
- ii) Give two safety precautions while establishing the nuclear power plant.
- iii) Name the product of nuclear fission which is utilized to bring about further fission of $^{235}\text{U}_{92}$.

[3]

- b) i) State Fleming's right hand rule.

- ii) Write North and South pole of the given diagram near P and Q. And write two ways to increase the magnetic field of an electromagnet.

[4]



- c) i) Give two factors affecting the internal resistance of a cell.

[3]

- ii) A cell of e.m.f. 1.5V , internal resistance 1Ω is connected to the resistors of 4Ω and 20Ω in series. Draw circuit diagram and calculate the current in the circuit.