ICSE Class 10 Physics Question Paper Solution 2016

PHYSICS

SCIENCE Paper – 1

I. ANALYSIS OF PERFORMANCE

Question 1

(a) (i) Give an example of a *non-contact force* which is always of attractive nature. [2]

(ii) How does the magnitude of this *non-contact force* on the two bodies depend on the distance of separation between them?

(b) A boy weighing 40kgf climbs up a stair of 30 steps each 20cm high in 4 minute and a girl weighing 30kgf does the same in 3 minutes. Compare:- [2]

(i) The work done by them.

(ii) The power developed by them.

(c) With reference to the terms Mechanical Advantage, Velocity Ratio and efficiency of a machine, name and define the term that will not change for a machine of a given design. [2]

(d) Calculate the mass of ice required to lower the temperature of 300g of water at 40°C to water at 0°C. [2]

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

(e) What do you understand by the following statements: [2]

(i) The heat capacity of the body is 60 JK^{-1}.

(ii) The specific heat capacity of lead is 130 $Jkg^{-1}K^{-1}$.

Comments of Examiners

a) Most candidates identified it correctly as gravitational force however some wrote magnetic or electrostatic force. Many identified the inverse relation between force and distance but failed to identify the square relation.

b) Most candidates failed to convert kgf to newton and from cm to m that resulted in wrong answers. Some showed the working correctly but failed to do the comparison and missed on scoring.

c) Majority of candidates failed to comprehend this question. They wrote the definitions of M.A., V.R. and efficiency without mentioning V.R. does

Suggestions for teachers

- Students must be taught in what way is the gravitational force different from other non-contact forces. There is a need to emphasize on inverse **square** relation rather than saying 'one increases and the other decreases'.
- Conversion from kgf to N should be emphasized **periodically.** Students should be made aware that when the question says compare then the answer should be in the form of ratio or greater than or less than. (not in the form of a fraction).

not change. Some They also wrote the definition of V.R. in terms of displacements without stating that these displacements are in the same time.

d) Answered correctly by most candidates. Some used the value of S.H.C. of water in a wrong unit. final answers in some cases had no mention of unit.

e) Definitions lacked a clear understanding by most candidates as the same expression was used with unit given in the question. It makes it clear that the definitions were done by rote learning.

- Explain how V.R. is the same in spite of varying M.A and efficiency for the same machine through numerous examples.
- Students should be trained to read the question carefully and to analyze accordingly.
- Students should be trained to substitute values in appropriate units and to write units appropriately.
- Proper understanding of definitions need to be emphasized.

MARKING SCHEME

Question 1.

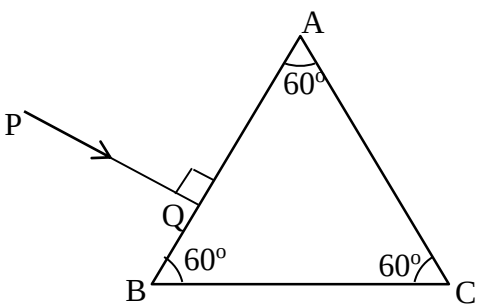
(a)	(i) Gravitational force (ii) Magnitude of non-contact forces on the two bodies is **inversely proportional** to the **Square of the distance** of separation between them.
(b)	i) Work done by the boy = 40×10×6 = 2400J Work done by the girl = 30×10×6 = 1800J Therfore, Ratio = 2400:1800 = 4:3 ii) Power of boy $= \frac{2400}{4\times60} = 10$ watt Power of girl $= \frac{1800}{3\times60} = 10$ watt Therefore Ratio = 10:10=1:1
(c)	(i) Velocity Ratio (ii) Ratio of velocity of effort to the velocity of effort Or ratio of displacement of effort to the displacement of load in the same time.
(d)	$m \times 336 = 300 \times 4.2 \times 40$ $m = \frac{300 \times 4.2 \times 40}{336}$ =150 g
(e)	(i) 60 J of heat energy is required to raise the temperature of a body by 1K. (ii) Lead requires 130 J of heat energy to raise the temperature of 1 Kg by 1K.

Question 2

(a) State *two* factors upon which the heat absorbed by a body depends. [2]

(b) A boy uses blue colour of light to find the refractive index of glass. He then repeats the experiment using red colour of light. Will the refractive index be the same or different in the two cases? Give a reason to support your answer. [2]

(c) Copy the diagram given below and complete the path of light ray till it emerges out of the prism. The critical angle of glass is 42°. In your diagram mark the angles wherever necessary. [2]



(d) State the dependence of angle of deviation: [2]

(i) On the refractive index of the material of the prism.

(ii) On the wavelength of light.

(e) The ratio of amplitude of two waves is 3 : 4. What is the ratio of their: [2]

(i) loudness?

(ii) frequencies?

Comments of Examiners

a) Answered correctly by most candidates. However some stated only temperature instead of change in temperature; some mentioned material and specific heat capacity as two different points; some even stated factors such as surface area and black surface which are actually factors affecting the rate of heat absorption.

b) Candidates failed to write that different colours have different refractive index. They were unable to make the point clear that different colours have different speed in a different medium.

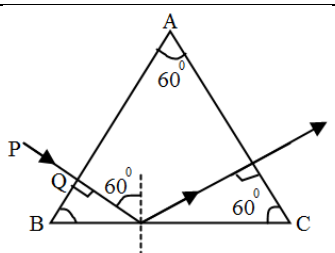
c) Most candidates drew this diagram correctly. Some however, failed to write the angle at the second and at the third surface.

d) Most candidates answered correctly.

e) Some candidates did not square the amplitude ratio; some incorrectly expressed ratio as a fraction.

Suggestions for teachers

- Ensure the difference between T and ΔT as well as the difference between heat absorbed and rate of absorption of heat is explained in detail.
- Explain the concept with difference in deviation of different colours hence refractive index is different.
- Insist on drawing arrows on rays before and after refraction or reflection, on writing necessary angles and drawing normal on ray diagram by giving more practice of ray diagrams.
- Students should be made to understand the relation between loudness and amplitude and also be instructed not to express the ratio in a fraction.

MARKING SCHEME **Question 2.**	
(a)	-Directly proportional to the mass. -Directly proportional to change in temperature. -Directly proportional to the specific heat capacity. Any two factors.
(b)	Refractive index will be different. ${}_a\mu_g = \sin i / \sin r$, different colours will have different angle of refraction even if the angle of incidence is the same therefore refractive index will be different. OR Speed of red colour and blue colour of light in air or vacuum is the same but in glass it is different. So refractive index of glass will be different as ${}_a\mu_g = \frac{c_a}{c_b}$.
(c)	
(d)	(i) $\angle$ of deviation decreases with the decrease in μ

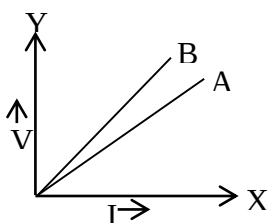
	(ii) ∠ of deviation decreases with the increase in λ
(e)	(i) 9 :16 (ii) 1:1

Question 3

(a) State *two* ways by which the frequency of transverse vibrations of a stretched string can be increased. [2]

(b) What is meant by noise pollution? Name one source of sound causing noise pollution. [2]

(c) The V-I graph for a series combination and for a parallel combination of two resistors is shown in the figure below. Which of the two A or B, represents the parallel combination? Give a reason for your answer. [2]



(d) A music system draws a current of 400 mA when connected to a 12 V battery. [2]

(i) What is the resistance of the music system?

(ii) The music system is left playing for several hours and finally the battery voltage drops and the music system stops playing when the current drops to 320 mA. At what battery voltage does the music system stop playing?

(e) Calculate the quantity of heat produced in a 20 Ω resistor carrying 2.5A current in 5 minutes. [2]

Comments of Examiners

a) Most candidates were unable to comprehend the question and wrote incorrect answers. Some identified the factors but failed to give the correct relation of these factors with the frequency. In many cases the length was mentioned in direct proportion to the frequency. In some cases, students even related it to the overtones.

b) Most candidates were unable to score as the loudness limit 128 dB was not mentioned. Some wrote vague examples of noise pollution as car, machine etc.

c) Most candidates identified the parallel combination but could not justify in terms of the slope of the graph.

d) Many candidates were unable to score as they did not convert mA to A that led to loss of marks in the second part. Some candidates misinterpreted voltage drop as potential drop and hence scored poorly.

e) Candidates knew the formula but during substitution did not convert minutes to seconds.

Suggestions for teachers

- Explain the factors affecting frequency in a stretched string using sonometer.
- It is advisable to include following points in definition of noise pollution: - sound above 120 dB and causing any physical discomfort such as headache, ear pain etc. Students need to be absolutely clear in giving examples.
- Students should keep in mind the concept from which they are coming to the conclusion of the answer. In this question they should have given the answer in terms of slope rather saying that parallel combination reduces resistance. The decision is taken on the basis of slope.
- Necessary conversions and formulae need to be drilled by giving lots of practice of numerical. Students should also be trained to give answer with unit.

MARKING SCHEME **Question 3.**	
(a)	i) By increasing the tension in the string ii) By decreasing the length of the string. iii) By decreasing the mass per unit length of the string Any two correct points
(b)	The disturbance produced in the environment due to undesirable loud and harsh sound of level above 120 dB. Source: Honking of vehicles in traffic jams.
(c)	// combination is represented by A. As slope gives resistance and slope of A is less.
(d)	R = V / I R = 12 / 400 x 10^{-3} = 30 Ω V = I R V = (320 x 10^{-3}) x 30

	= 9.60 V
(e)	H = i^2Rt = 2.5 × 2.5 × 20 × 300 = 37500 J

Question 4

(a) State the characteristics required of a good thermion emitter. [2]

(b) An element ${}_{Z}S^{A}$ decays to ${}_{85}R^{222}$ after emitting 2 α particles and 1 β particle. Find the atomic number and atomic mass of the element S. [2]

(c) A radioactive substance is oxidized. Will there be any change in the nature of its radioactivity? Give a reason for your answer. [2]

(d) State the characteristics required in a material to be used as an effective fuse wire. [2]

(e) Which coil of a step up transformer is made thicker and why? [2]

Comments of Examiners

a) Most candidates answered this correctly. However, some answered good conductor of heat as one of the characteristics. Some related it to the factors affecting the rate of emission from the metal surface. They were confused with the d) part of the same question.

b) Most candidates answered correctly. A few however found it difficult to work backward to find the atomic number and mass number. They either made calculation errors or interchanged the atomic no. and mass no. or forgot to consider the second alpha emission.

c) Most candidates were able to answer the first part correctly, but were unable to offer reasons.

d) Answered correctly by most candidates. However, some wrote good conductor of heat instead of good resistor.

e) Some candidates identified the coil correctly but could not write the reason. Some wrote secondary coil or even wrote upper coil and lower coil. These errors showed lack of conceptual clarity on the working of a transformer.

Suggestions for teachers

- The difference between the melting point and the boiling point must be taught effectively.
- Sufficient practice to find atomic no and mass no of reactant by giving the names of radiation and giving the atomic no. and mass no. of the products must be given.
- Students should be made clear about the differences between nuclear and chemical changes.
- Students should read the question carefully. Understand the working of each component of the circuit.
- Demonstrate the working of primary and secondary coil of transformer. Should clearly explain why thicker wire is needed to carry a greater current.

MARKING SCHEME **Question 4.**	
(a)	Low work function High M.P.

(b)	A = 230 Z = 88
(c)	No change As radioactivity is a nuclear phenomenon.
(d)	High Resistance Low M.P.
(e)	Primary Coil Thicker wire reduces resistance which helps in reducing loss of energy.

SECTION II (40 Marks)

*Attempt any **four** questions from this Section*

Question 5

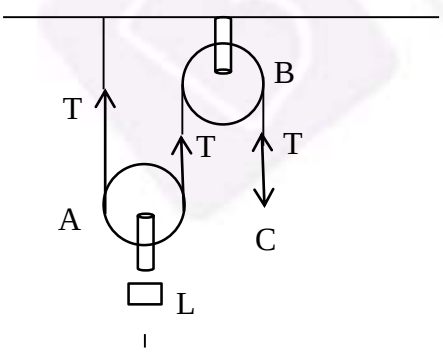
(a) A stone of mass 'm' is rotated in a circular path with a uniform speed by tying a strong string with the help of your hand. Answer the following questions: [3]

(i) Is the stone moving with a uniform or variable speed?

(ii) Is the stone moving with a uniform acceleration? In which direction does the acceleration act?

(iii) What kind of force acts on the hand and state its direction?

(b) From the diagram given below, answer the questions that follow: [3]



(i) What kind of pulleys are A and B?

(ii) State the purpose of pulley B.

(iii) What effort has to be applied at C to just raise the load L=20kgf?

(Neglect the weight of pulley A and friction).

(c) (i) An effort is applied on the bigger wheel of a gear having 32 teeth. It is used to turn a wheel of 8 teeth. Where is it used? [4]

(ii) A pulley system has three pulleys. A load of 120N is overcome by applying an effort of 50N. Calculate the Mechanical Advantage and Efficiency of this system.

Comments of Examiners

a) Answered correctly by most candidates.

b) Most candidates answered part i) correctly but some could not state the purpose of pulley B. They stated the use as to reduce the effort. Some could not do the calculation as they could not conclude the fact that ideal M.A. of this pulley is 2 as weight and friction is absent. A few lost marks due to careless errors (applied M.A.× L = E).

c) Some candidates wrote incomplete examples. They have written in cars but failed to mention to multiply speed in part i). Most answered correctly part ii) but made careless calculation error in calculating efficiency. Some candidates have even done working by assuming one fixed and several movable pulleys.

Suggestions for teachers

The concept of uniform circular motion should be made clear to students alongwith centripetal and centrifugal forces. The fact that the centrifugal force is not the reaction force to the centripetal force must be emphasized on. Basically they should be aware of the fact that the same motion can be perceived differently if the observer is in a different frame of reference.

– Students need to understand the advantages and disadvantages of fixed and movable pulley clearly. It may be effectively demonstrated by an actual arrangement of pulleys.

– Explain the functioning of gears with demo lesson with the help of video presentations. Explain students that when the type of pulley system is not mentioned then they should assume it to be block and tackle system with convenient direction.

MARKING SCHEME **Question 5.**	
(a)	(i) Uniform speed (ii) Yes, Radially inwards. (iii) Centrifugal force acting radially outward
(b)	(i) A is movable pulley and B is fixed pulley. (ii) So as to apply the effort in a convenient direction that is vertically downwards. (iii) $\text{M.A.} = 2 = \frac{20}{E}$ Therefore , $\text{E} = 10\text{kgf}$
(c)	(i) It is used to gain speed. (ii) MA = L/E = 120/50 = 2.4

	VR = 3 $\eta = \frac{MA}{VR} \times 100$ $= \frac{2.4}{3} \times 100$ = 80%

Question 6

(a) (i) What is the principle of method of mixtures? [3]

(ii) What is the other name given to it?

(iii) Name the law on which the principle is based.

(b) Some ice is heated at a constant rate, and its temperature is recorded after every few seconds, till steam is formed at 100°C. Draw a temperature time graph to represent the change. Label the two phase changes in your graph. [3]

(c) A copper vessel of mass 100 g contains 150 g of water at 50°C. How much ice is needed to cool it to 5°C? [4]

Given : Specific heat capacity of copper = 0.4 J g^{-1} $^0C^{-1}$

Specific heat capacity of water = 4.2 J g^{-1} $^0C^{-1}$

Specific latent heat of fusion of ice = 336 J g^{-1}

Comments of Examiners

a) Most candidates did not mention the boundary statement such as no heat is lost to the surrounding or in an insulated system in the principal of mixtures. No mistakes were observed in the ii and iii part of this question.

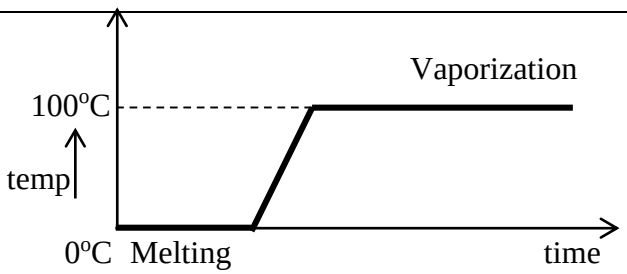
b) Following errors were observed:

- Axis were not labelled and boiling and melting temperatures were not marked.
- Graph line was drawn beyond 100^0C and below 0^0C.
- Phase change was not labelled.

c) While writing the equation many candidates did not consider increase in temperature of melted ice to 5^0C. It was also observed that candidates were unable solving numericals involving mixtures with change of state. It was also observed that they did not pay attention in writing the units correctly. For eg many places gram was written as gm instead of g.

Suggestions for teachers

- Insist students on learning the laws with limitations. Any law is obeyed under certain conditions.
- For drawing graphs the axis should be labelled. The graph line should be drawn pertaining to the information given.
- Students should be made clear that in these type of sums, equation depends on how many substances are involved in heat exchange. What is their temperature before exchange of heat and after the exchange of heat and how many of them change their state. Adequate practice must be allotted for a better understanding of this type of numerical.

MARKING SCHEME **Question 6.**	
(a)	(i) According to principle of mixtures Heat lost by a hot body is always equal to the heat gained by a cold body provided no heat is lost to the surroundings (ii) Principle of Calorimetry (iii) Law of conservation of energy
(b)	 Correct graph (Axes and Shape) Melting marked Vaporization marked
(c)	$m\,c\,\theta + m\,c\,\theta = m_I L + m_i\,c\,\theta$ $100 \times 0.4 \times 45 + 150 \times 4.2 \times 45 = m_i\,(336 + 4.2 \times 5)$ $m_i = 84.45$ g

Question 7

(a) (i) Write a relationship between angle of incidence and angle of refraction for a given pair of media. [3]

(ii) When a ray of light enters from one medium to another having different optical densities it bends. Why does this phenomenon occur?

(iii) Write one condition where it does not bend when entering a medium of different optical density.

(b) A lens produces a virtual image between the object and the lens. [3]

(i) Name the lens.

(ii) Draw a ray diagram to show the formation of this image.

(c) What do you understand by the term 'Scattering of light'? Which colour of white light is scattered the least and why? [4]

Comments of Examiners

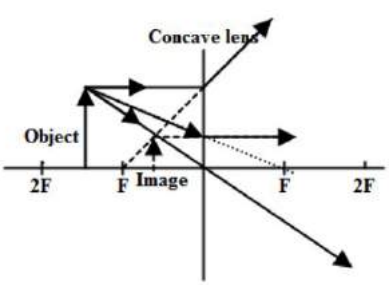
a) In part (i) majority of candidates wrote is as ratio of i to r instead of sin i to sin r. Some wrote i>r when light enters from rarer to denser medium and i<r when light enters from denser to rarer medium. In part (ii) instead of writing reason for refraction candidates wrote due to refraction. This clearly showed that they failed to understand the question. In part (iii) instead of writing i = 0^0 some wrote 90^0 which was a careless error.

b) Most candidates wrote the lens correctly as concave but some incorrectly wrote convex. Arrows were missing on the rays, image was not dotted, apparent ray was not shown to pass through the focus. These errors occurred due to lack of practice of drawing diagrams.

c) Most candidates were confused with the term 'scattering' in the definition of dispersion. Majority however answered part (ii) and (iii) correctly. However, some wrote violet due to least wavelength.

Suggestions for teachers

- Snell's law should be clearly explained with an emphasis on guiding students to interpret the question correctly and accordingly write the correct answer with the conditions attached.
- While practicing diagram stress on the following points.
  - Arrows to be drawn on the ray before and after the refraction.
  - Real image should be drawn by continuous line but virtual should be shown by dotted lines.
  - Diagram should be labelled neatly.
- Emphasize the difference between the definition of scattering and definition. Comparison can be done on the basis of blue sky and rainbow.

MARKING SCHEME **Question 7.**	
(a)	(i) sin (angle of incidence) / sin (angle of refraction) = Refractive Index. (ii) The ray bends from its original path due to change in the speed. (iii) The ray does not bend when incident normally at the surface of the second medium.
(b)	(i) Concave lens. (ii)  Any two rays correctly drawn location of dotted image
(c)	Absorption and reemission of light without the change in the wavelength. Red As its λ is high.

Question 8

(a) (i) Name the waves used for echo depth sounding. [3]

(ii) Give one reason for their use for the above purpose.

(iii) Why are the waves mentioned by you not audible to us?

(b) (i) What is an echo? [3]

(ii) State two conditions for an echo to take place.

(c) (i) Name the phenomenon involved in tuning a radio set to a particular station. [4]

(ii) Define the phenomenon named by you in part (i) above.

(iii) What do you understand by loudness of sound?

(iv) In which units is the loudness of sound measured?

Comments of Examiners

a) Common errors observed were that candidates wrote SONAR, RADAR, echo waves, radio waves and Ultraviolet in part (i). In part (ii) answers were not related to least refraction, narrow beam and high energy possessed. Some were confused to make decision whether to write the use or property. In part (ii)i comparison with limit of audibility was not clear. It was just written beyond limit of audibility which does not make it clear whether beyond 20 Hz or beyond 20000 Hz.

b) Candidates lost marks as they missed the keywords in writing the definition or a complete definition.

Keyword such as **minimum** for time and distance

was missing. Some wrote time and distance as two different points which actually means the same.

c) Instead of resonance some candidates wrote SONAR that also was misspelt. In the definition of resonance some made no mention about increase in the amplitude and misspelt the unit of loudness.

Suggestions for teachers

– To avoid confusion in the understanding of ultrasound and ultraviolet due to the common term "ultra" make the students aware about this possible error and clearly explain the difference between these two waves.

– Bring out the difference between ordinary reflection of sound and echo to students. They should also be taught to explain that the minimum distance required for echo is the same as the minimum time for reflection.

– Insist on writing the complete definition and correct spellings of scientific terms and units.

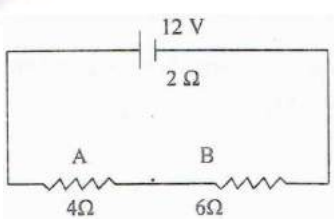
MARKING SCHEME **Question 8.**	
(a)	(i) Ultrasonic waves. (ii) They can travel un-deviated through long distances. (iii) Frequency of ultrasonic waves is above 20000Hz and audible range of frequency is 20Hz to 20000Hz.
(b)	Clear and distinct sound heard after its reflection from a rigid surface is called an echo. The reflecting surface should be present at least 16 to 18 m from the source of sound OR the sound should be reflected back after 0.1 s. The size of the reflecting surface should be greater than the wavelength of sound wave.
(c)	(i) Resonance (ii) Resonance is a particular case of forced vibration in which the frequency of forced vibrations is equal to the natural frequency of the body and the body begins to vibrate with increased amplitude. (iii) Loudness as magnitude of the auditory sensation (iv) bel / dB / phon (any one)

Question 9

(a) (i) Which particles are responsible for current in conductors? [3]
(ii) To which wire of a cable in a power circuit should the metal case of a geyser be connected?
(iii) To which wire should the fuse be connected?

(b) (i) Name the transformer used in the power transmitting station of a power plant. [3]
(ii) What type of current is transmitted from the power station?
(iii) At what voltage is this current available to our household?

(c) A battery of e.m.f. 12V and internal resistance 2 Ω is connected with two resistors A and B of resistance 4 Ω and 6 Ω respectively joined in series. [4]



Find:
(i) Current in the circuit.
(ii) The terminal voltage of the cell.
(iii) The potential difference across 6Ω Resistor.
(iv) Electrical energy spent per minute in 4Ω Resistor.

Comments of Examiners

a) In part (i) majority of candidates wrote electrons but some incorrectly wrote protons or charge carriers, cations, β particle positive charge etc. In part (ii) many wrote earth wire but some wrote neutral or live as they were confused. In part (iii) most candidates answered correctly.

b) Most candidates answered part (i) correctly as step up transformer except for a few who incorrectly wrote step down transformer. In part (ii) many candidates misinterpreted it as high or low rather than A.C. or D.C. Some wrote A.C. of D.C (very vague). Part (iii) while writing the voltage candidates wrote 20V or 330V or 290 V. Some forgot to mention the unit.

c) In part (i) , candidates appeared confused due to the internal resistance. Some did not understand the meaning of terminal voltage and made vague calculations. To calculate P.D. across 6 Ω some used P.D. as 12 V. To calculate energy in joule minutes were not converted to seconds. Some divided by 60 and converted the time in hour and wrote unit kWh without dividing by 1000.

Suggestions for teachers

- Concept of flow of electrons under potential difference should be taught to students. Video presentations may assist in clearing concepts. The working of live, neutral and earth wire should be clearly explained.
- Explain the difference between step up and step down transformer and make it clear how voltage and current are inversely proportional.
- The basic concept of series and parallel combination needs to be addressed. Students should know that in series P.D across each resistor is divided hence it is incorrect to use e.m.f. to calculate P.D. across any resistor. Units joule and kWh need to be explained clearly. Students should practice problems with internal resistance regularly.

MARKING SCHEME **Question 9.**	
(a)	(i) Electrons (ii) Earth wire (iii) Live wire
(b)	(i) Step up transformer (ii) Alternating current (iii) 220V
(c)	(i) $R = R_1 + R_2$ $= 4\ \Omega + 6\ \Omega = 10\ \Omega$ $i = E / R + r$ $= 12 / (10 + 2)$ $= 1.0$ A Current in the circuit = 1.0 A (ii) $T.V. = IR$

	$T.V. = 1 \times (6 + 4)$ $T.V. = 10\ V$ (iii) V = I R = 1 x 6 = 6.0 V (iv) $W = I^2 R t$ = 1 x 1 x 4 x 60 = 240 J

Question 10

(a) Arrange α, β and γ rays in ascending order with respect to their [3]

(i) Penetrating power.

(ii) Ionising power.

(iii) Biological effect.

(b) (i) In a cathode ray tube what is the function of anode? [3]

(ii) State the energy conversion taking place in a cathode ray tube.

(iii) Write one use of cathode ray tube.

(c) (i) Represent the change in the nucleus of a radioactive element when a β particle is emitted. [4]

(ii) What is the name given to elements with same mass number and different atomic number?

(iii) Under which conditions does the nucleus of an atom tend to be radioactive?

Comments of Examiners

a) Candidates committed errors in the order of radiations. They were confused about ascending or descending and also in mathematical signs i.e. > or < used by them.

b) Part (i) was answered correctly by most candidates except for a few who wrote irrelevant answers that reflected lack of understanding and preparation. Many lost marks in part (ii) as they were not sure about energy change in CRT. Following incomplete answers were written electrical to heat, electrical to visual, electrical energy to visual pattern, electrical to visual signal, heat to light etc.

The expected answer was electrical to heat to light energy. In part (iii) candidates did not stress on the words picture tube in spite of mentioning T.V.

c) Majority of candidates explained the reaction but failed to write an equation in spite of the question stating 'Represent' in part (i). In part (ii) some candidates were not sure about the difference between isotopes and isobars. In part (iii) candidates stated only one condition in spite of the question stating 'which conditions'.

Suggestions for teachers

- Students should read the question carefully as most errors occur due to carelessness. If the meaning of ascending and descending is not understood clearly then they should write in complete sentences.
- Students need to understand when the question is asked about energy changes then visual pattern, visual terms does not mean energy. T.V. means television which is a process and one of the part is picture tube. stress on answers are to written in complete sentences.
- Make it clear to students that represent means the answer is expected in the equation form. The difference between isotopes and isobars should be explained with examples. Students are to know that what the nucleus becomes when the nucleus has excess mass, energy and when neutron proton ration becomes more than 1.3 to 1.5 .

MARKING SCHEME **Question 10.**	
(a)	(i) α<β<γ (ii) γ<β<α (iii) α<β<γ
(b)	(i) Anode accelerates electrons and collimates into a fine beam. (ii) Electric energy is converted into heat and then into light. (iii) TV picture tube; check waveform of varying electric field *(any one use).*
(c)	i) ${}^{1}_{0}n \rightarrow {}^{1}_{(+)1}P + {}^{0}_{-1}e$ ii) Isobars---------1 iii) When -neutron proton ratio becomes more than 1.3 to 1.5 -nucleus has more/excess mass. -nucleus has excess energy.

Topics / concepts found difficult:

- Students were confused in Q 4 a) and d) part as the nature of question was the same.
- Clarity was lacking in Q 6 a) i, ii, iii.
- It is also observed that in ray diagrams in spite of knowing diagrams students loose marks as they don't draw arrows on rays before and after refraction and don't draw dotted line for virtual intersection or image.
- Most of the students are confused between the concept of dispersion and scattering.
- In electricity the difference between P.D. and terminal voltage is not clear. In some cases P.D. is misunderstood as only potential drop.
- Students were also confused about the working and the characteristics of transformers.
- Due to the lack of necessary information Q 2 e) was confusing.
- Q 5 a) ii, iii was asked beyond the depth of the topic which is covered in std. 10.
- In Q10 c) students were not aware about two conditions required for a nucleus to be radioactive.
- Calorimetry numerical were found difficult.
- Q6 b) was beyond the scope of syllabus as it does not include latent heat of vaporization.
- Students were not comfortable in stating the factors affecting the frequency of stretched string.

Suggestions to the students:

- Avoid writing answers which are simply a repetition of the question. Instead be specific about the key word in that statement.
- Do not leave any topic for option. All topics are covered in section I which is compulsory.
- Avoid changing the order of sequence of questions and numbering system.
- Handwriting should be neat and legible.
- Learn the principles, laws and definitions accurately.
- Ray diagrams and the other diagrams need to be practiced periodically. While drawing them, draw arrows on the rays before and after the refraction and virtual rays or image should be drawn by dotted lines. No arrows to be drawn on virtual ray.
- While writing answers it is not only important to cover all points but also to present them in a proper sequence.

- While solving a numerical it is advisable that the formula be written in the beginning. Essential steps need to be shown and the final answer be expressed along with a proper unit.
- Avoid computation at the first step; let it be plain substitution as the marks are awarded for the correct substitution.
- It is advisable to state the meaning of the symbols if the answer is given in terms of any formula. Do not use any abbreviations which are not standard.
- The answer need to be given in SI units unless it is asked otherwise.
- In numerical as far as possible avoid mental calculation at the first stage, let it be direct substitution.
- Advisable to present the final answer in the decimal form. Answer in fraction is treated as incomplete calculation.
- It is advisable to solve previous year's papers in writing.
- More emphasis should be given on writing rather than memorising.
- Units should be written without spelling errors.