

ST. GREGORIOS HIGH SCHOOL
PRELIMINARY EXAMINATION 2007-2008

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STD. X SUBJECT : PHYSICS TIME : 1 1/2 HRS MARKS : 80

SECTION I : All Questions in this section are compulsory

- Q1.a A crowbar 1m long is pivoted about a point 0.1m from its tip. Calculate the least force which must be applied at the other end to displace a load of 110kgf. 2
- 1.b Differentiate between work and power 2
- 1.c Give one example of each of the following
- i. Electrical energy \longrightarrow Sound Energy
 - ii. Chemical Energy \longrightarrow Electrical Energy 2
- 1.d Draw a ray diagram to show how a right angled isosceles prism can be used to turn a ray through
- i. 90°
 - ii. As an erecting prism 2
- 1.e White light is incident on a yellow filter, where yellow filter, blue filter and a white screen are placed parallel to each other with some space between them. What colour patch will be observed on the screen? 2
- Q2.a To obtain a real, inverted and diminished image of an object
- i. Name the type of lens used
 - ii. The position at which the object should be placed 2
- 2.b What is the effect of the following in a photographic camera
- i. Varying the shutter speed
 - ii. Varying the aperture length 2
- 2.c State two differences between the eye and the camera. 2
- 2.d Explain the use of echo in SONAR and state the reason why only ultrasonic waves are used. 2
- 2.e Define free and forced vibrations and give one example of each. 2

Q3.a How much heat is required to raise the temperature of 150g of iron from 20°C to 25°C . (Sp heat of iron = $452\text{ J/kg}^{\circ}\text{C}$) 2

3.b Explain why bottled drinks are cooled more effectively when surrounded by lumps of ice than by cold water at 0°C . 2

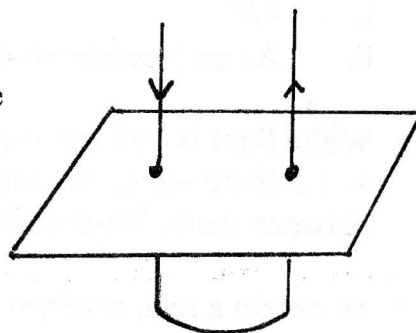
3.c An electric iron is rated at 1.4kW, 260v
i. What does the above statement mean and how many joules of energy does the iron consume in 1 hour.
ii. Calculate the current it takes and state the fuse rating that is to be used in the plug. 2

3.d Name the commercial unit of electrical energy. Define it and obtain its relation to the SI unit. 2

3.e What quantity of heat will be produced by a coil of resistance 60 ohms if a current of 3A is passed through it for 4s. 2

Q4.a State two differences between an a.c. generator and a d.c. motor 2

Q4.b.i. Sketch the magnetic field pattern around both the sections of the wire and name the polarities.
ii. What rule should be applied to get the direction of the field lines and polarity.



4.c Explain the rotation of a coil in d.c. motor. 2

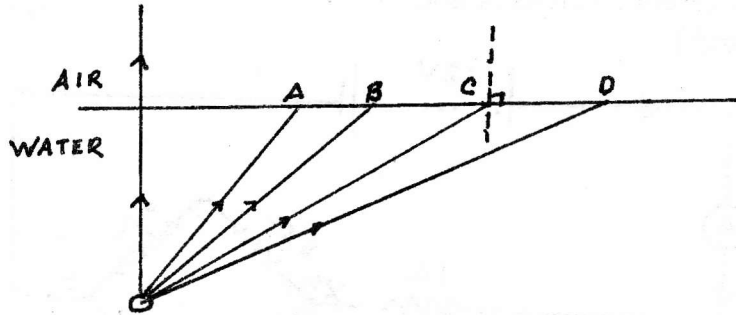
4.d A radioactive nuclide ${}_{88}^{226}\text{Ra}$ decays by emission of 2 alpha particles, 1 beta particle and gamma rays. Represent this change in a reaction form and write the resulting nuclide. 2

4.e Define thermionic emission and state two factors on which it depends. 2

SECTION II : Attempt any 4 complete questions.

Q5.a State Newton's second law of motion and derive an expression for force based on it. 4

Q5.b The figure below shows ray OA, OB, OC and OD passing from water to air. Copy the figure and draw an approximate path for each.



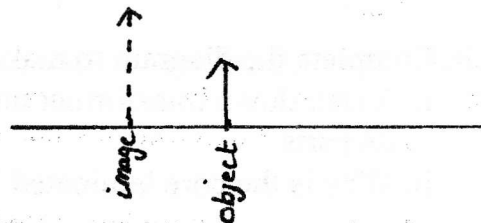
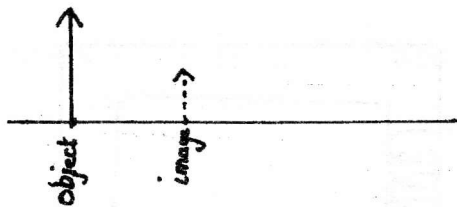
Answer the following questions :

- i. The position of O as seen from above.
- ii. Explain the phenomenon happening at C and D

4

Q5.c A man observes the bottom of a swimming pool of 3.25m depth. If the refractive index of water is 1.3 what is the apparent depth of water. 2

Q6.a Complete the ray diagrams. In each case locate the focus and state the type of lens used. Give the characteristics of each image 4



Q6.b A man standing between 2 cliffs fires a gun and hears an echo every second. The distance of the man from the nearer cliff is 180m. Calculate

- i. The speed of sound.
- ii. The distance between the cliffs.

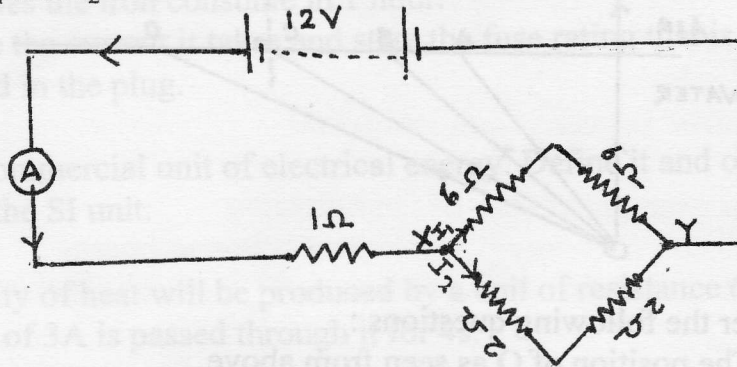
4

Q6.c The rear view mirror of a motorbike starts vibrating violently at some particular speed. Name and explain the phenomenon taking place. How could the vibrations be stopped. 2

Q7.a 10g of ice at -10°C is added to 10g of water at 85°C . Calculate the temperature of the mixture. (sp heat capacity of ice $2.1\text{J/g}^{\circ}\text{C}$, sp latent heat of fusion of ice 366J/g , sp heat capacity of water $4.2\text{J/g}^{\circ}\text{C}$) 4

7.b From the circuit diagram given below calculate

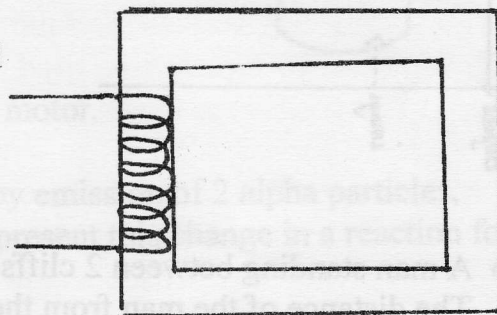
- Total resistance in the circuit.
- The current I passing through A
- Potential difference across X and Y
- Current I_1 and I_2



7.c State Ohms law and show the voltage current relationship graphically. 2

Q8.a Draw a neat labeled diagram of an a.c. generator. State the magnitude of emf induced in the coil when its plane becomes parallel to the magnetic field. 4

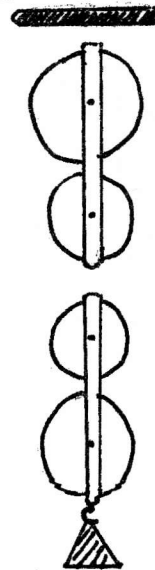
- Q8.b Complete the diagram to make it
- A step down transformer and label its parts
 - Why is the core laminated.?



Q8.c Calculate the heat energy that will be released when 5kg of steam at 100°C condenses to form water at 100°C . (sp latent heat of vaporization of steam is 2268kJ/kg). 2

Q9.a Complete and label the given diagram of a simple string pulley system.

- i. What is the velocity ratio of the system.
- ii. If the pulley system is 80% efficient and the load is 320N. Calculate
 - a. The effort applied to lift the load
 - b. Work done in lifting the load through 20m.



4

9.b In a 3 pin plug name and give the colour codes for each of the 3 wires. Also give the function of each.

3

9.c Draw an outline diagram of a photographic camera. Label the various parts and describe in short the photographic film.

3

Q10.a Draw a neat labeled diagram of a cathode ray tube.

4

10.b State any 3 safety precautions you would take while handling radioactive substances.

3

10.c State 2 differences between nuclear fission and nuclear fusion. Give one source of each.

3

GOOD LUCK