The Cathedral and John Connon School

Preliminary Examination

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STD : **X**

Date : **9th January, 2008**   **PHYSICS**

Marks : **80**

Time : **1½ Hrs.**

THIS PAPER CONSISTS OF FIVE PRINTED SIDES.

Section A is compulsory.

*Answer **ANY FOUR** questions from Section B.*

Take the value of $g = 10ms^{-2}$

SECTION A (40 marks)

1. (a) Two balls are dropped from the same height. Compare the ratio of the forces acting on them during their motion. Explain.   [2]

   (b) A man is pushing a box of weight along a horizontal surface. Name with reason,   [2]

       i. One force which does zero work on the box

       ii. One force which does negative work on the box.

   (c) Find the power of the pump required to lift a $200kg$ of water up to a tank $20m$ high in $10s$.   [2]

   (d) State how the following units are related to their SI unit.   [2]

       i. Electron volt

       ii. Calorie.

   (e) State two reasons why a simple machine can't be 100% efficient.   [2]

2. (a) The refractive index of diamond is 2.41 and that of water is 1.33. In which of the two will the speed of light be greater. Why?   [2]

   (b) Give reason why: [2]

       i. A calorimeter is made of a thin sheet.

       ii. A calorimeter is placed inside an enclosure.

   (c) What are complimentary colours? Give one example.   [2]

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(d) Write two differences between real and virtual images. [2]

(e) In the given diagram, M is a plane mirror and B is a lens. The image of the obect O is formed at O itself. [2]
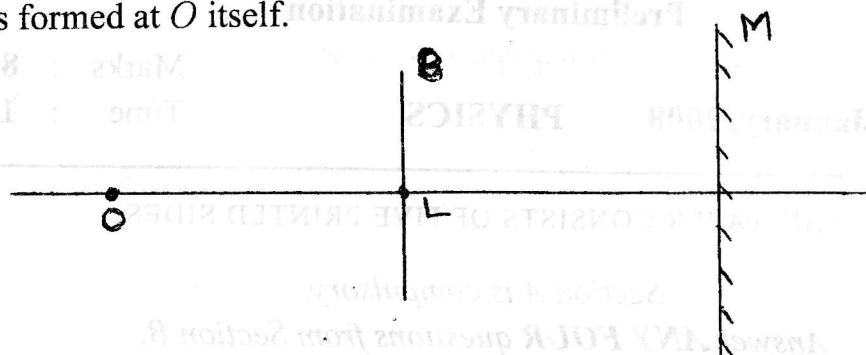
    i. Name the kind of lens used here.

    ii. What is the distance OL called?

3. (a) Sandy soil gets heated up quickly as compared to wet soil. Explain. [2]
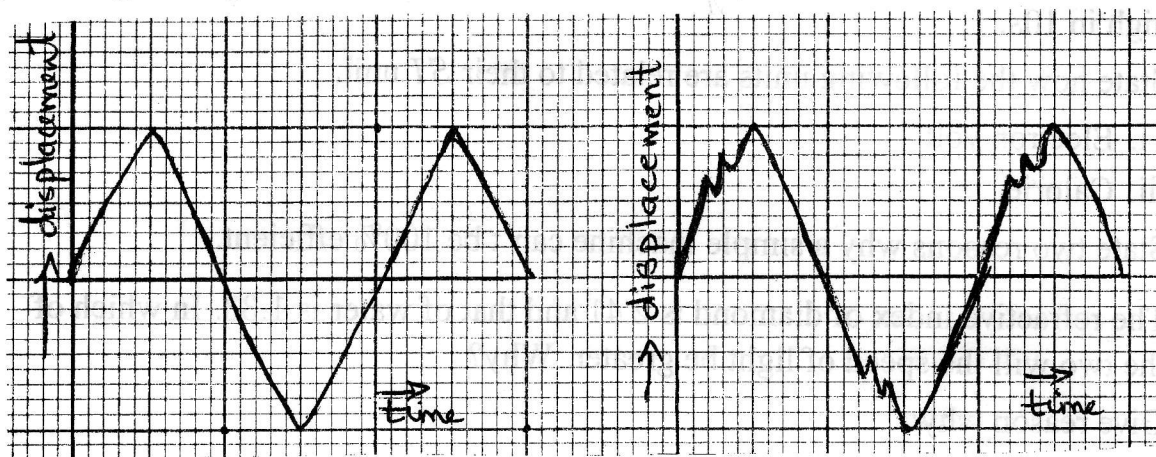
  (b) What is Newton's colour disc? [2]
What propertry of light does it demonstrate?

  (c) Name the phenomenon used by a person to tune his radio to listen to a particulr radio station. [2]
Define it.

  (d) In the given figure: [2]

    i. Name one characteristic which is the same for the sound produced by the waveforms.

    ii. Name one characteristic which is different for the the sound produced by the waveforms.

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(e) Define emf of a cell. [2]
State its SI unit.

4. (a) Give one similarity and one difference between the use of a fuse and earthing. [2]

(b) Why does the temperature of a substance remain constsnt during a change of state? [2]

(c) Name the radioactive radiation which is part of the electromagnetic spetrum. [2]
Give one of its use.

(d) Define thermionic emission. [2]
Give two examples of commonly used thermionic emitters.

(e) In the equation, [2]
$$C^{14} \longrightarrow {}_7N \quad + {}_{-1}e^0$$
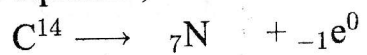
i. Fill in the blanks.

ii. What does ${}_{-1}e^0$ represent?

SECTION B (40 marks).
Answer ANY FOUR QUESTIONS.

5. (a) A ball of mass $2500kg$ is rolled down a ramp of length $2m$. If its MA is 3.5, find

i. Its kinetic energy when it touches the ground. [3]

ii. How can we insrease the MA of an inclined plane.

(b) Name the class of the lever whose MA is always less than one. [3]
Using a sketch, explain why is it so.

(c) State Newton's law of motion and write its mathematical form. [4]
Explain under waht conditions does this become $F = ma$.

6. (a) What do you mean by a pure spectrum? [3]
State two conditions for its formation.

(b) Draw a labelled sketch of a step up transformer. [4]
A tansformer can work only on an ac. Explain.

(c) What mass of steam at $100°C$ should be passed through $8.4kg$ of water at $30°C$ such that the final temperature of water is $80°C$. Given [3]
Specific heat capacity of water $= 4.2J/g°C$
Specific latent heat of vapourisation of steam $= 2250J/kg$

7. (a) In the given diagram, for an incident ray at X, the emergent ray from the glass piece at Y is along BC as shown. If the critical angle of glass is $42°$ [4]
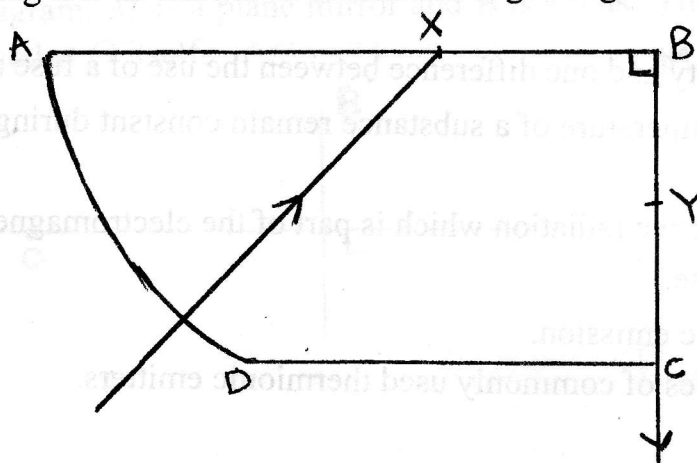
   i. What should the angle of incidence at X be?
   ii. Name the phenomenon taking place at X.
   iii. Use this idea to explain why a crack in a window pane appears silvery when viewed from one side.

(b) Considering a convex lens to be a combination of prisms, draw a diagram and explain how a convex lens convereges light rays. [3]

(c) Name two electromagnetic waves, one of longer wavelength than visible light and one of shorter wavelength than visible light. [3]
   Compare their penetrating powers.

8. (a) The bottom of a swimming pool is painted with all the different colours of the rainbow. State with reason, which colour will appear to be raised the most when filled with water. [3]

(b) A radar is able to detect the reflected waves from an enemy plane after a time interval of $0.04ms$. If the velocity of the wave is $3 \times 10^8 ms^{-1}$, find the distance of the enemy plane from the radar. [3]
   Name the phenomenon taking place here.

(c) A painting shows a garden with red background, yellow sunflowers, and green leaves.

   i. If it is illuminated with cyan light, explain what is the effect. [4]
   ii. In what coloured light will all look black. Explain your answer.

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9. (a) Define the commercial unit of electrical energy. [3]

Draw a labelled diagram of a three pin plug.

(b) The given sketches show the $V - I$ graphs of two different conductors. [3]
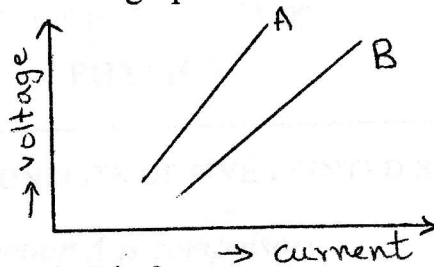
i. Are they ohmic conductors? Why?

ii. Which is a better conductor? Justify your answer.

(c) Study the given diagram and answer the questions that follow. [4]
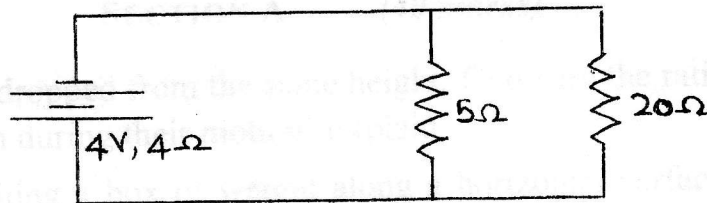
i. Find the effective external resistance.

ii. Find the total current.

iii. Find the current in the 5Ω.

iv. Copy the diagram and connect an ampere to measure the total current in the circuit.

(a) Draw a labelled circuit diagram of an electric bell. [3]

State the principle on which it works.

(b) Explain how a CRT converts an electrical signal into a visual signal. [3]

(c) In a nuclear reactor, [4]

i. What is the principle of energy production?

ii. What is function of the

A. moderator

B. control rods

iii. Name the fuel commonly used in a reactor.

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