

Higher Secondary Model Examination 2011-2012

Part III

PHYSICS

Maximum Scores : 60

Time: 2 Hours

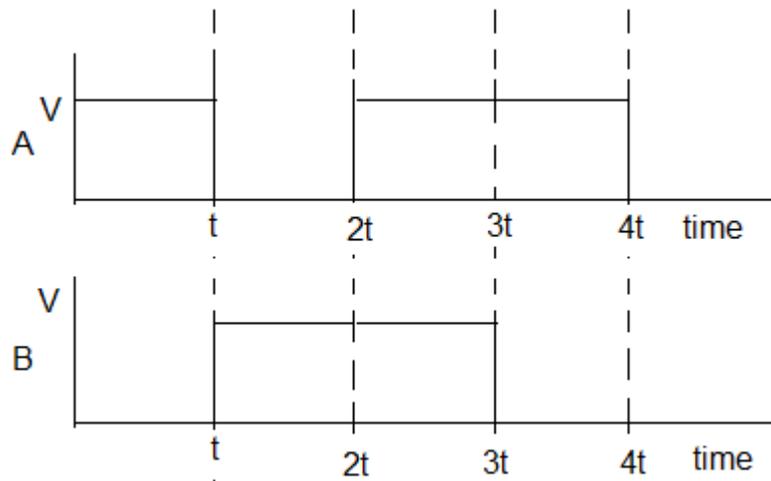
Cool off time : 15 Minutes

General Instructions to candidates :

- Read the questions carefully before answering.
- Maximum time allowed is 2 hours 15 minutes including cool - off time.
- First 15 minutes is cool - off time, during which the candidate should neither write answers nor have discussion with others.
- All the questions are compulsory and only internal choices are allowed.
- In the case of questions having internal choice only the sub-questions of the same question should be answered.
- Calculations, figures and graphs should be shown in the answer sheet itself.

1 a) Give the logic symbol of NAND gate. (1 Score)

b) Draw the output waveforms for AND gate and OR gate for input wave form A and B shown below. (3 Score)



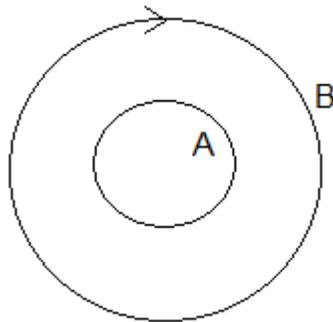
2 An unknown resistance can be measured using Meter bridge

- a) State the principle behind the working of Meter bridge. (2 Score)
- b) Plot the circuit diagram for measuring the unknown resistance using Meter bridge (2 Score)
- c) Why the meter bridge wire is made of a uniform wire. (1 Score)
- d) Potentiometer is better than voltmeter in measuring voltage. Why? (1 Score)
- e) Two 120 V light bulbs, one of 20 W and other of 200 W were connected in series across a 240 V line. One bulb burnt out almost instantaneously. Which one was burnt and why? (2 Score)

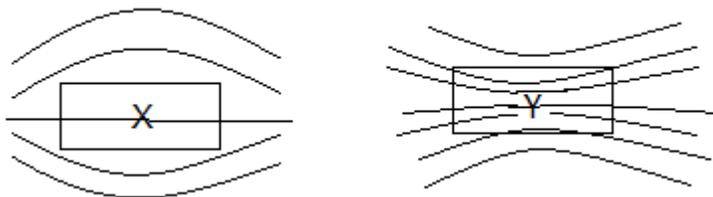
3 a) Plot the ray diagram of a compound microscope. (1 Score)

b) Define and derive an equation for its magnifying power (2 Score)

4. a) Electric field inside a dielectric decreases when it is placed in an external electric field. Comment on this statement. (1 ½ Score)
 b) Can electric potential at any point in the space be zero while the intensity of the electric field at that point is not zero? (1 ½ Score)
 c) What happens to the capacitance of a parallel plate capacitor when
 i) the distance between the plates is halved
 ii) area of the plates is doubled (2 Score)
- 5 Predict what happens in the following situations
 a) A β particle moving with a uniform velocity enter in a uniform magnetic field perpendicular to its direction of motion. (1 Score)
 b) A proton moving with a uniform velocity enter in a uniform electric field opposite to its direction of motion. (1 Score)
- 6 The magnetic field due to a current carrying element in a conductor can be determined by a law .
 a) State the law. (1 Score)
 b) How will the magnetic field intensity at the centre of a circular coil carrying current change if the current through the coil is doubled and the radius of the halved . (2 Score)
- 7 Find the direction of flow of induced current in loop A when the current through the loop B is a) increasing b) decreasing c) steady (3 Score)



- 8 A uniform magnetic field get modified as shown below when two specimens X and Y are placed in it.



- a) Identify the two specimens X and Y (1 Score)
 b) State the reason for the behavior of the field lines in X and Y. (2 Score)
 c) Give any two differences between the magnetic properties of these two specimen (2 Score)
- 9 a) What will be the effect on interference fringes in Young's double slit experiment if
 (i) Frequency is decreased (1 Score)
 (ii) Screen is moved away from the slit. Justify your answer. (1 ½ Score)
 b) Two polaroids are placed perpendicular to each other and the transmitted intensity is zero. What happens when one more Polaroid is placed between these two at an angle of 45°? (1 ½ Score)

- 10 a) The sequence is represented as $A \xrightarrow{\alpha} B \xrightarrow{\beta} C$ if the mass numbers and atomic numbers of C are 178 and respectively, what is the mass number and atomic number of A. (2 Score)
- b) What will be the ratio of radii of two nuclei of mass numbers A_1 and A_2 ? What is the ratio of their nuclear densities (2 Score)
- c) Radioactive isotope of silver has half-life of 20 minutes. What fraction of the original mass would remain after one hour? (2 Score)
- 11 a) Plot the nature of the graph showing the variation of stopping potential with frequency of radiation. How can the value of Planck's constant be determined from the graph? (3 Score)
- b) Why de Broglie wave associated with a moving cricket ball is not visible? (1 Score)
- 12 a) A message signal of frequency 10 kHz and peak voltage of 10 volts is used to modulate a carrier of frequency 1 MHz and peak voltage of 20 volts. Determine (i) modulation index, (ii) the side bands produced. (2 Score)
- b) Define the term modulation. Explain the need of modulation. Name three different types of modulation used for a message signal using a sinusoidal continuous carrier wave. (3 Score)
- c) Write any two applications of microwaves. (2 Score)
- 13 a) In the figure given below, state the type of biasing of the diode.



- (1 Score)
- b) What is potential barrier? How does the thickness of the depletion region in a p-n junction diode change, if it is forward biased? (2 Score)
- 14 a) An electrical element X, when connected to an alternating voltage source, has the current through it leading the voltage by $\pi/2$ rad. Identify X and write an expression for its reactance. (1 Score)
- b) A lamp is connected in series with a capacitor. Predict your observations for dc and ac connections. What happens in each case if the capacitance of the capacitor is reduced? (2 Score)

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