

Date: 03/12/2018

**KENDRIYA VIDYALAYA SANGATHAN, BENGALURU REGION**

**I PRE- BOARD EXAMINATION (2018-19)**

Class XII

Max. Marks: 70

Physics (Theory)

Time allowed: 3 hours.

**General Instructions:**

1. All questions are compulsory. There are 27 questions in all.
2. This question paper has four sections: Section A, Section B, Section C and Section D.
3. Section A contains five questions of one mark each, Section B contains seven questions of two marks each, Section C contains twelve questions of three marks each, and Section D contains three questions of five marks each.
4. There is no overall choice. However, internal choices have been provided in two questions of one mark, two questions of two marks, four questions of three marks and three questions of five marks weightage. You have to attempt only one of the choices in such questions.
5. You may use the following values of physical constants wherever necessary.

$$c = 3 \times 10^8 \text{ m/s}$$

$$h = 6.63 \times 10^{-34} \text{ Js}$$

$$e = 1.6 \times 10^{-19} \text{ C}$$

$$\mu_0 = 4 \times 10^{-7} \text{ T m A}^{-1}$$

$$\epsilon_0 = 8.854 \times 10^{-12} \text{ C}^2 \text{ N}^{-1} \text{ m}^{-2}$$

$$\frac{1}{4\pi\epsilon_0} = 9 \times 10^9 \text{ N m}^2 \text{ C}^{-2}$$

$$m_e = 9.1 \times 10^{-31} \text{ kg}$$

$$\text{mass of neutron} = 1.675 \times 10^{-27} \text{ kg}$$

$$\text{mass of proton} = 1.673 \times 10^{-27} \text{ kg}$$

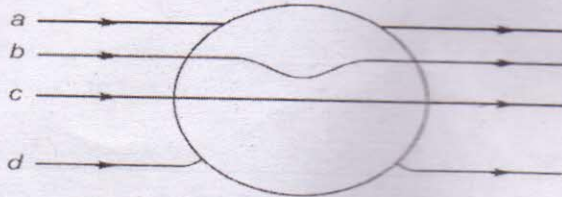
$$\text{Avogadro's number} = 6.023 \times 10^{23} \text{ per gram mole}$$

$$\text{Boltzmann constant} = 1.38 \times 10^{-23} \text{ JK}^{-1}$$



## SECTION A

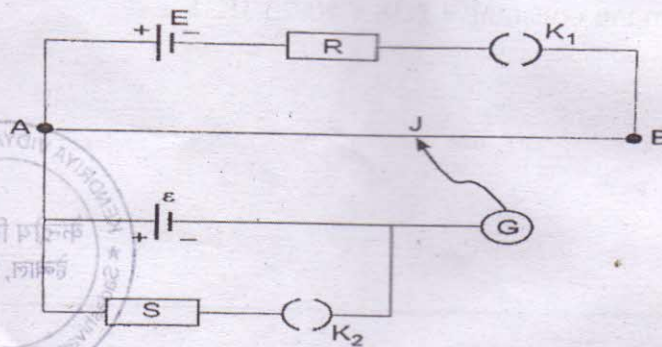
1. A metallic sphere is placed in a uniform electric field. Which one of the paths a, b, c and d shown in the figure will be followed by the field lines and why? 1

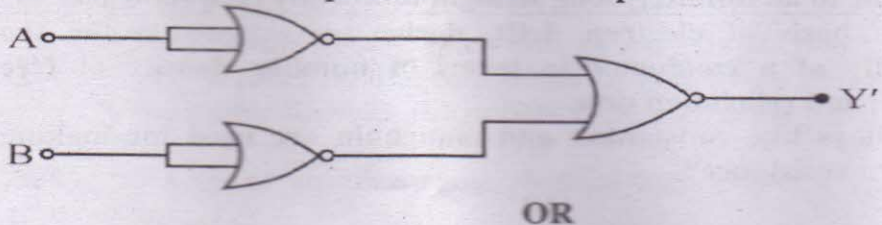
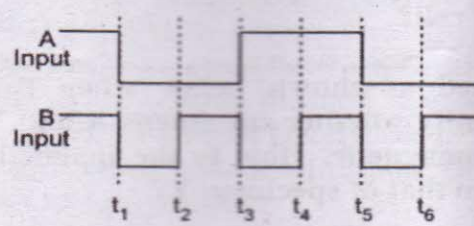
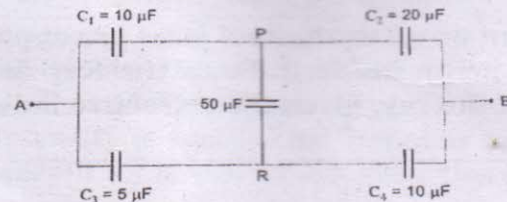


2. What is the advantage of using thick metallic strips in a metre bridge?  
OR  
Draw a graph to show a variation of resistance of a metal wire as a function of its diameter keeping its length and material constant. 1
3. Name the physical quantity which remains constant for microwaves of wavelength 1mm and UV radiation of  $1600 \text{ \AA}$  in vacuum. 1  
OR  
Why microwaves are considered suitable for RADAR systems used in aircraft navigation?
4. State the essential condition for diffraction of light to take place. 1
5. What is the stopping potential of a photoelectric cell in which electrons with the maximum kinetic energy of 6eV are emitted? 1

## SECTION B

6. a. A steady current flows in a metallic conductor of non-uniform cross section. Find which of these quantities is constant along the conductor: current, Current density, Electric field and drift speed. 2  
b. Is Ohm's law is universally applicable for all conducting elements? If not, give example of elements which do not obey Ohm's law.
7. Two students, X and Y perform an experiment on potentiometer separately using the circuit given. Keeping the other parameters unchanged how will the position of the null point be affected if 2  
i. X increases the value of resistance R in the setup by keeping the key  $K_1$  closed and key  $K_2$  open?  
ii. Y decreases the value of resistance S in the setup, while keeping the key  $K_2$  remain open and key  $K_1$  closed? Justify your answer in each case.



8.	<p>Identify the logic gate equivalent to the circuit shown in the figure. Draw the truth table for all possible values of inputs A and B.</p>  <p style="text-align: center;">OR</p> <p>The given inputs A, B are fed to a 2-input NAND gate. Write the truth table and Draw the output wave form of the gate.</p> 	2
9.	<p>(a) An electromagnetic wave is travelling in a medium with a velocity <math>\vec{v} = v \hat{k}</math>. Draw a sketch showing the propagation of the wave, indicating the direction of oscillating electric and magnetic fields.</p> <p>(b) How are the magnitudes of the electric and magnetic fields related to the velocity of the electromagnetic wave?</p>	2
10.	<p>The radii of curvature of both the surfaces of a lens are equal. If one of the surfaces is made plane by grinding, then calculate the new focal length and power of the lens.</p>	2
11.	<p>Write the condition under which visible light is emitted by an LED? Write two advantages of LED over the conventional incandescent low power lamps.</p> <p style="text-align: center;">OR</p> <p>a. Why photodiodes are reverse biased?</p> <p>b. Draw its V-I characteristics for two different intensities of illumination.</p>	2
12.	<p>A message signal of frequency 20 kHz and peak voltage of 20 V is used to modulate a carrier signal of frequency 2 MHz and peak voltage 40 V. Determine</p> <ol style="list-style-type: none"> <li>Modulation index</li> <li>The side bands produced.</li> </ol>	2
<b>SECTION C</b>		
13.	<p>Calculate the equivalent capacitance between points A and B in the circuit below. If a battery of 10 V is connected across A and B, calculate the charge drawn from the battery by the circuit.</p> 	3

