**DEMONSTRATION MULTIPURPOSE SCHOOL, MYSORE**

PREPARATORY EXAMINATION 2013

Sub: Physics (Theory)

CLASS XII Maximum Marks 70

Time 3 hours

**General Instructions**

1. All the questions are compulsory
2. There is no overall choice. However, an internal choice has been provided in five marks questions
3. Questions 1 to 8 are very short answer type and carry one mark each
4. Questions 9 to 16 are short answer type and carry two marks each
5. Questions 17 to 25 are short answer type and carry three marks each
6. Question 26 is a value based question and carry four marks
7. Questions 27 to 29 are long answer type and carry five marks each
8. You may use the following values of physical constants wherever necessary:

c = 3 x 108 ms -1

h = 6.626 x 10 -34 Js

e = 1.602 x 10 -19 C

µ0 = 4 x 10 -7 T m A -1

1. Two poloroids are placed with their optic axis are perpenticular to each other. One of them is rotated through 45°. What is the intensity of light emerging from the second poloroid?
2. Sketch the graph showing the variation of applied voltage and photoelectric current. (a) same frequency different intensities. (b) same intensity two different frequency.
3. A heavy nucleus split in to two daughter nuclei. Which one of the two-parent or daughter nuclei have more binding energy per nucleon. Why?
4. What happens to the width of the depletion layer of a p-n junction diode when it is (a) forward biased and (b) reverse biased
5. What is band pass filter?
6. Light is incident at 60° on a glass slab. If reflected and refracted rays are perpendicular to each other. Then what is the refractive index of glass?
7. How does magnifying power of a microscope change on decreasing the aperture of its objective?
8. Define the term dielectric constant of a medium in terms of capacitance of a capacitor.
9. Derive the expression for torque acting on a dipole placed in an uniform electric field.
10. You are given three capacitors of value 2µF,3µF,6µF.With suitable diagram explain how will you connect them to resultant capacity 4µF.
11. Draw a labelled circuit diagram of n-p-n transistor amplifier in CE configuration.
12. What is SI unit of radioactivity? Express curie in SI unit. The mean life of radioactive substance is 2400years. What is its half life?
13. A message signal of frequency 10 KHz and peak voltage 10 volt are used to modulate a carrier wave of frequency 1 MHz and peak voltage of 20 volt. Determine (a) the modulation index and (b) side band produced
14. Kinetic energy of alpha particle and proton are equal. Which of them has higher value of De brogglie wave length?
15. Draw the out wave form at X using the given inputs A and B for the given logic circuit shown below. Also identify the logic operation performed by this circuit.
16. How are infrared waves produced? Why are these referred as heat waves? Write their one important use.
17. Derive Snells law on the basis of Hugens wave theory.
18. Name the series of hydrogen spectrum which does not lie in the visible region. The wave length of first member of Lymen series is 1216Å. Calculate the wave length of the third member of Lymen series.
19. Using Gausss law obtain the expression for electric field due to uniformly charged thin spherical shell of radius R at a point outside the shell. Draw graph showing the variation of electric field with r, for r>R and r<R.
20. Describe briefly with the help of a suitable diagram, how the transverse nature of light can be demonstrated by the phenomenon of polarization. When polarized light passes from air to transparent medium under what condition does the reflected light get polarized?
21. Define the terms (a) drift velocity (b) relaxation time
22. A conductor of length L is connected to dc source of emf E. If this conductor is replaced by another conductor of same material, the same area of cross section but of length 3L. How will the drift velocity changes?
23. A parallel plate 100µF capacitor is charged to 500 v. If the distance between the plate is halved, what will be the new potential difference between the plates and what will be change in the stored energy?
24. An electron after been accelerated through a potential difference of 100 v enters a uniform magnetic field of .004 T perpendicular to its direction of motion. Calculate the radius of the path described by the electron.
25. Draw a labelled diagram of an A.C. Generator. Explain briefly its working and principle.
26. One day Rahul and Rama were enjoying with their friends at home. Suddenly their ceiling fan stopped working. Rahul switched of the power supply of the fan and opened the cap of the fan to check the problem. The moment he touched interior part of the fan, he fell down because of electric shock. What has happened as the power supply was already switched off?
27. What could be the possible cause of the electric shock?
28. Write the expression of the current and emf of the component used in fan with phase difference.
29. State Biot-Savart law, giving the mathematical expression for it. Use this law to derive the expression for the magnetic field due to a circular coil carrying current at a point along its axis. How does a circular loop carrying current behave as a magnet?

OR

Draw a labelled diagram of a moving coil galvanometer. State the principle on which it works. Deduce an expression for the torque acting on a rectangular current carrying loop kept in a uniform magnetic field. Write two factors on which the current sensitivity of a moving coil galvanometer depend.

1. Define the term ‘depletion layer’ and ‘barrier potential’ for a P-N junction diode. How does an increase in the doping concentration affect the width of the depletion region? Draw a circuit of a full wave rectifier. Explain its working.
2. Using the relation for the refraction at a single spherical refracting surface, derive lens makers formula for thin convex lens. The radius of curvature of either face of a convex lens is equal to focal length. What is the refractive index of the material?

OR

1. Derive the relation between object distance, image distance and focal length for a mirror. What is the

corresponding formula for thin lens?

1. Two lenses of power + 15 D and - 5 D are in contact with each other, forming a combination lens. What is the focal length of this combination?
2. An object of size 3 cm is placed at 30 cm from this combination of lenses. Calculate the position and size of the image formed.