# KERALA BOARD CLASS 12
# PHYSICS MARCH 2017 QUESTION PAPER

Reg. No. :

Name : ....

**Code No. 5015**

Time : 2 Hours
Cool-off time : 15 Minutes

**Second Year – March 2017**

Part – III

**PHYSICS**

Maximum : 60 Scores

## *General Instructions to Candidates:*

- There is a cool-off time of 15 minutes in addition to the writing time
- Use the cool-time to get familiar with the questions and to plan your answers
- Read the questions carefully before answering
- Read the instructions carefully
- Calculations, figures, graphs should be shown in the answer sheet itself
- Give equations wherever necessary
- Electronic devices except non-programmable calculators are not allowed in the examination hall

**1.** A Concave lens always produces _____images

(i) real (ii) virtual (iii) magnified (iv) none of these (score:1)

**2.** A zener diode is always operated in _____ bias (score:1)

**3.** Momentum of a photon with wavelength λ is _____

(i)hλ (ii) $\frac{h}{\gamma}$ (iii) $\frac{\gamma}{h}$ (iv) h + $\gamma$ (score 1)

**4.** Write down the truth table of a NOR Gate (score:2)

**5.** (a) How many electrons constitute an electric charge of -16$\mu C$?

(i) $10^{13}$ (ii) $10^{14}$ (iii) $10^{15}$ (iv) $10^{12}$

(b) An electric dipole is a pair of equal and opposite point charges +q and –q separated by a distance r. Write an expression for its dipole moment (score:1)

(c) When an electric dipole is subjected to a uniform electric field, what will happen? (Score: 1)

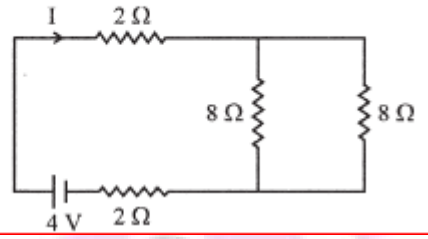
**6.** A message signal of frequency 10 kHz and peak voltage 10 V is used to modulate a carrier of frequency 1 MHz and peak voltage 20 V. Find the modulation index. **(Scores : 2)**

**7.** (a) Resistivity of a conductor depends upon

(i) its material (ii) its cross-sectional area

(iii) its length (iv) All of the above **(Score : 1)**

(b) Calculate the current flowing through the following circuit :




(score:2)

(c) A potentiometer is a device to measure emf of a cell. Explain how the emfs of two cells can be compared using a potentiometer. **(Scores : 3)**

**8.** (a) Choose the Wrong Option

(i) Volt= Weber/ second (ii)Weber= Henry x Ampere

(iii)Joule= Henry x $Ampere^2$ (iv) Volt=Weber x second (score: 1)

(b) The current in a coil of self inductacne 0.1H varies from 2A to 5A in a time of 1 ms. Find the induced emf across the coil. (score:2)

**9.** (a) Sound waves do not exhibit_____

(i) Interference (ii) Distraction (score:1)
(ii) Polarization (iv) Refraction

(b) Describe Young's double slit experiment to determine the bandwidth of the interference pattern (score: 4)

Or

(a) The intensity of the scattered light I in Rayleigh scattering is proportional to ___ (score:1)

(b) Explain the diffraction pattern obtained due to a single slit and represent graphically the variation of intensity with angle of diffraction (score:4)

**10.**

(a) Define half life period of a radioactive nucleus. Write down the relation connecting half life period and mean life. **(Scores : 2)**

(b) Define 1 amu. Calculate its energy equivalent in MeV. **(Scores : 2)**

**11.**

Photoelectric current does not depend on energy of the radiation, but on its intensity. Explain. **(Scores : 2)**

**12.**

(a) Speed of light in glass is $2 \times 10^8$ m/s. Refractive index of glass is _____. **(Score : 1)**

(b) For an equilateral prism made of a material of refractive index $\sqrt{2}$, find the angle of minimum deviation for a ray of monochromatic light. **(Scores : 2)**

(c) Draw the ray diagram of a simple microscope that uses a single convex lens. Derive an expression for its linear magnification. **(Scores : 3)**

**13.** (a) A dielectric slab is placed between the plates of a parallel plate capacitor. It's capacitance

(i) becomes zero (ii) remain the same (iii) decreases (iv) increases (score:1)

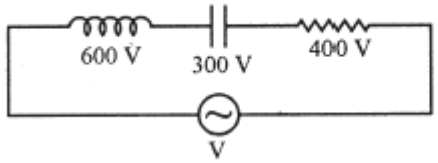
(b)Derive an expression for an energy stored in the capacitor. (score:4)

**14.** (a) At resonance in an LCR unit, the emf and current are

(i) in phase (ii) out of phase (iii) having a phase difference of $\frac{\pi}{2}$ (iv) having a phase difference of $\frac{\pi}{6}$ (score:1)

(b)

In the following circuit, find the value of V.

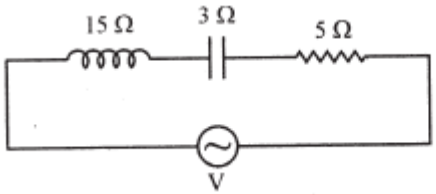



**(Scores : 2)**

Or

(a) In a circuit carrying an ideal coil with negligible resistance, the power dissipated is _____. **(Score : 1)**

(b) In the following circuit, find the impedance.




**(Scores : 2)**

**15.** Explain hysteresis and draw hysteresis curve for a ferromagnetic substance. **(Scores : 3)**

**16.** Choose the appropriate values for X- rays from the given table:

| Wave Length | Frequency |
|---|---|
| 1 mm | $3 \times 10^{17}$ Hz |
| 1 µm | $3 \times 10^{8}$ Hz |
| 1 nm | $3 \times 10^{21}$ Hz |

(score: 2)

**17.** Unit of a wave number is

(i) Hz (ii) e V (iii) m (iv) $m^{-1}$

**18.** The current amplification factor for CB configuration of a transistor is 0.9. Find out the current amplification factor for CE configuration. (score: 3)

**19. Answer the following:**

(a) An electric charge q is moving with a velocity v in the direction of a magnetic field B. The magnetic force acting on the charge is

(i) qvB (ii) zero

(iii) $\frac{q}{vB}$ (iv) $\frac{v}{qB}$ **(Score : 1)**

(b) Starting from Biot-Savart law, obtain an expression for the magnetic field at an axial point of a circular coil carrying current. **(Scores : 4)**

**OR**

(a) An ammeter is a current measuring device which is always connected in _____ in an electric circuit. **(Score : 1)**

(b) Describe a cyclotron and obtain an expression for cyclotron frequency. **(Scores : 4)**