

LEAVING CERTIFICATE EXAMINATION, 1968

PHYSICS - PASS

WEDNESDAY, JUNE 19 - Morning 10 to 12.30

Six questions to be answered.

1. State Newton's laws of motion.
Define force. Is it a vector or a scalar quantity ?
A body of mass 12 lb., at rest on a smooth horizontal plane, on being acted upon by a constant horizontal force for $\frac{1}{2}$ minute acquires a velocity of 20 ft. per sec. Calculate (i) the distance travelled by the body in that time, (ii) the magnitude of the force, (iii) the work done on the body. (66 marks)
2. Give the basic assumptions of the kinetic theory of gases. How do you account for the pressure of a gas in terms of this theory ?
State Boyle's law and Charles' law and show how the two laws may be expressed in one equation.
Describe any form of gas thermometer. (66 marks)
3. State the laws of refraction of light and describe an experiment to demonstrate one of the laws.
Show, by means of a diagram, the dispersion of a beam of white light by a glass prism and explain how such dispersion occurs. (66 marks)
4. Explain what is meant by (i) the transverse nature of light waves, (ii) the interference of light waves, (iii) the wavelength of monochromatic light.
In a Young's experiment the parallel slits, 0.4 mm. apart, are illuminated by monochromatic light. If the fringe-width of the interference fringes, formed on a screen 40 cm. from the slits, is 0.6 mm. calculate the wavelength of the light. (66 marks)
5. Draw a labelled diagram of a gold-leaf electroscope and show how it may be used to find the nature of the charge on a charged body.
What is an electric condenser (capacitor) ?
Three condensers of capacity (capacitance) $1\mu\text{F}$, $2\mu\text{F}$ and $4\mu\text{F}$, respectively, are connected in series. If a potential difference of 350 volts is applied across the combination calculate the charge on the condensers. (66 marks)
6. Describe a primary cell e.g. a Daniell or Leclanché cell and explain how, by means of chemical action, it produces an electric current. In what respects does a secondary cell (accumulator) differ from a primary cell ?
What is understood by (i) an induced current, (ii) an ionisation current ? Indicate how each may be demonstrated in the laboratory. (66 marks)
7. Give an account of an experiment to compare (i) the magnetic moments of two bar magnets, (ii) the electromotive force (e.m.f.) of two cells. (67 marks)
8. Describe, with the aid of a diagram, (i) a cathode-ray tube, (ii) a photoelectric cell, (iii) a thermionic diode.
Refer to the principle involved in the operation of each and mention a practical application of any one of them. (67 marks)
9. ${}^7\text{N}^{14}$, ${}_{92}\text{U}^{238}$ and ${}_{92}\text{U}^{235}$ represent atoms of nitrogen and uranium. Write down (i) the number of protons, (ii) the number of neutrons, present in the nucleus of each atom.
Comment on the relation between the atoms of uranium.
Explain what is meant by the statements: (a) uranium is a naturally occurring radioactive element, (b) transmutation of the elements and the production of radioactive isotopes may be brought about by the use of accelerated particles.
Mention any one application of radioactive isotopes. (67 marks)
10. Write brief notes on any two of the following:-
(a) the formation of images by spherical mirrors,
(b) the measurement of the velocity of sound in air,
(c) the nature and detection of infrared and ultraviolet light,
(d) a moving-coil ammeter and the principle on which its operation depends. (67 marks)