1934

Magnetism and Electricity: Technical School Examinations 1934

Department of Education: Technical Instruction Branch

AN ROINN OIDEACHAIS
(Department of Education),

BRAINSE AN CHEARD-OIDEACHAIS
(Technical Instruction Branch).

SPECIAL EXAMINATIONS FOR POST OFFICE EMPLOYEES.

1924.

MAGNETISM AND ELECTRICITY.

Tuesday, May 8th—7 *to* 10 *p.m.*

Examiner—J. D. FERGUSON, ESQ., B.SC. (Eng.), A.M.I.E.E., M.A.I.E.E., M.I.R.E.

Co-Examiner—J. P. HACKETT, ESQ., B.E., A.R.C.SC.I.

GENERAL INSTRUCTIONS.

You are carefully to enter on the Answer Book and Envelope supplied your Examination Number and the subject of examination, but you are not to write your name on either. No credit will be given for any Answer Book upon which your name is written, or upon which your Examination Number is not written.

You must not have with you any book, notes, or scribbling-paper.

You are not allowed to write or make any marks upon your paper of questions.

You must not, under any circumstances whatever, speak to or communicate with another candidate : and no explanation of the subject of the examination may be asked for or given.

You must remain seated until your answer book has been taken up, and then leave the examination-room quietly. You will not be permitted to leave before the expiration of twenty minutes from the commencement of the examination, and will not be re-admitted after having once left the room.

If you break any of these rules, or use any unfair means, you are liable to be dismissed from the examination, and your examination may be cancelled by the Department.

Three hours are allowed for this paper. Answer books, unless previously given up, will be collected at 10 *p.m.*

INSTRUCTIONS.

Read the General Instructions on Page 1.

(*a*) EIGHT questions only may be attempted. Where feasible, answers must be illustrated by simple sketches.

(*b*) Equal values are attached to the questions.

(*c*) Answers must be written in INK; diagrams may be drawn in PENCIL.

(*d*) Write the number of the question distinctly, in the margin of the paper, before the answer.

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(1) Given a bar magnet and a number of mixed pieces of chromium plated metal rod of brass, soft-iron and hard steel, state how you would apply your knowledge of magnetism to enable you to separate the pieces into groups of the same metal.

(2) State how you would determine the angle of dip at a place. Mention some of the causes of inaccuracy in such measurements and how they may be avoided.

(3) Define the following terms :—Natural Magnet, Line of Force, Consequent Poles, Magnetic Meridian. What tests would you apply to a magnet to determine if it had consequent poles ?

(4) Describe Faraday's ice-pail experiment and explain the significance of its results.

(5) What do you understand by the *electrical potential* at a point ? What is the potential at a point 4 centimetres from a conductor charged with 12 units of positive electrification and 6 centimetres from another conductor charged with 18 units of negative electrification ?

(6) A Leyden jar charged to a potential of 200 units is made to share its charge with a spherical conductor of 20 centimetres radius. The potential of this conductor is then found to be 100 units. Find the capacity of the Leyden jar.

(7) A battery of six cells, each having an electro-motive-force of 1·5 volts, and resistance of 1·2 ohms, arranged first in series, and secondly in parallel with one another, is used to send current through an external resistance of 0·5 ohm. Calaculate (*a*) the current flowing, and (*b*) the difference of potential between the battery terminals and the internal pressure drop in each case.

(8) Give a list of the well-known metals and arrange them in the order of their conductivities, indicating which has the highest value. It is said that glass, when beginning to soften by heating, becomes a conductor of electricity. State the tests you would make to ascertain the truth or falsity of this statement.

(9) Describe the construction of the Leclanche cell. What changes occur in it when its circuit is closed ?

(10) The resistance of a wire is 5 ohms and that of another is 4 ohms. Find the ratio of the heat produced in the one wire to that produced in the other when they are joined (*a*) in parallel, (*b*) in series, and a current passed through them.

(11) Describe experiments establishing the principles of electromagnetic induction, and give examples of the practical application of these principles.

(12) Describe in detail the construction of any moving coil instrument with which you are familiar. How is the instrument rendered " dead-beat " ?