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INTERMEDIATE CERTIFICATE EXAMINATION, 1936.

FULL COURSE.
SCIENCE (Syllabus A)

FRIDAY, 19th JUNE.—AFTERNOON, 4 TO 6 P.M.

[Not more than *six* questions to be attempted. All questions carry equal marks. Illustrate your answers wherever possible.]

1. State the "Law of Flotation."

A hollow glass cylinder containing some lead shot floats vertically in water, a length of 12 cm. being submerged. What length of the cylinder would be submerged (*a*) in oil of specific gravity 0.80, (*b*) in sea-water of specific gravity 1.025?

2. Describe in detail how you would set up apparatus and carry out experiments to investigate the extension produced in a spiral spring by the suspension of weights from one end.

The following results were obtained:—

Load (in grammes)	10	20	30	40	50	60	80	100
Extension (in cms.)	0.3	1.7	3.1	4.5	5.9	7.3	10.1	12.9

Express the above results in the form of a graph.

What can you deduce from the graph?

Find from the graph the load which would produce an extension of 5 cm.

3. How would you construct a mercury barometer?

Two barometers were constructed by students in the same class and at the same time. The readings were 73 cm. and 75 cm. respectively.

What, in your opinion, was the cause of the difference?

What would have been the barometric reading for class purposes?

4. A calorimeter containing hot water is placed on the laboratory bench. Explain by what means the calorimeter and its contents fall in temperature.

What would be the effect of:—

- wrapping cotton-wool around the calorimeter,
- polishing the surface of the calorimeter,
- coating the surface with soot?

5. Describe how you would determine experimentally the coefficient of expansion of air at constant pressure. (Sketch the apparatus you would use.)

If the coefficient is $\cdot 00366$, determine the increase in volume when 500 c.c. of air at 0°C is heated to 50°C , at constant pressure.

6. Define "Latent Heat of Steam."

5 gm. of steam at 100°C are passed into 250 gm. of water at 15°C . The temperature of the mixture is $27\cdot 2^{\circ}\text{C}$.

Calculate the latent heat of steam.

Sketch the apparatus you would use to pass the steam into the water.

7. If provided with solutions of caustic soda and sulphuric acid, describe how you would proceed to obtain a pure sample of a neutral salt. Name the salt.

8. Sketch and explain the apparatus you would employ to burn dry hydrogen in air, and to collect the product.

What precautions are necessary?

What product is formed, and how would you identify it?

9. What is the action of:—

(a) Sodium on water?

(b) water on quicklime?

(c) carbon dioxide on lime-water?

(d) hydrogen on hot copper oxide?

(e) sulphuric acid on sodium chloride?

Name the products in each case.

10. Describe the experiments you have performed to determine the conditions necessary for the rusting of iron.

Explain the result you found in each case.

11. What do you understand by "coefficient of friction"?

A block placed on a rough inclined plane just begins to slide when the plane is inclined at 30° to the horizontal.

Determine the coefficient of friction.

12. A uniform rod AB six feet in length hangs vertically from one end A. A string attached to B and passing over a pulley C is used to pull the rod into a horizontal position. To maintain it in this position a load of 20 lbs. has to be suspended from the free end of the string.

If the angle ABC is 135° , find

(a) the weight of the rod,

(b) the work done in bringing the rod from the vertical to the horizontal position.