

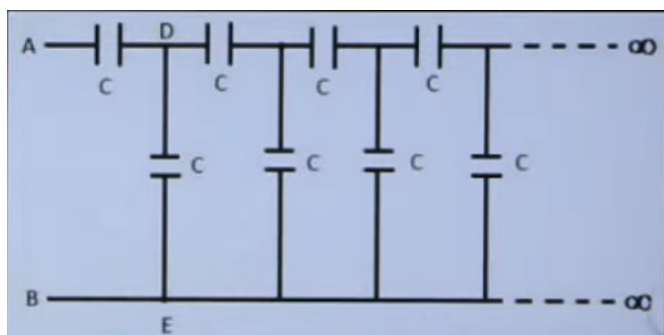


General Instructions

- (i) **Duration:** The total duration of the examination is 3 hours (180 minutes).
- (ii) **Total Marks:** The complete paper carries a maximum of 200 marks.
- (iii) **Structure:** The paper has 3 Sections:
 - **Section A:** 50 Multiple Choice Questions (Physics).
 - **Section B:** 50 Multiple Choice Questions (Chemistry).
 - **Section B:** 50 Multiple Choice Questions (Mathematics).
- (iv) **Compulsory Questions:** All 150 questions are compulsory.
- (v) Each question has four options. Only **one** option is correct.
- (vi) **Correct Answer:** +1 marks.
- (vii) **Incorrect Answer:** (No Negative marking).
- (viii) **Unanswered/Marked for Review:** 0 marks.

Mathematics

1. The capacitance of an infinite circuit formed by the repetition of the same link consisting of two identical capacitors, each with capacitance C , as shown in the figure is:



- (A) Zero
- (B) $\frac{(\sqrt{5}-1)C}{2}$
- (C) $\frac{(\sqrt{5}+1)C}{2}$
- (D) Infinite

2. A 1.5 kg block is attached to a spring with spring constant $k = 100 \text{ N m}^{-1}$ and displaced by 0.2 m. Calculate the potential energy stored in the spring.

- (A) 1 J
- (B) 2 J
- (C) 3 J
- (D) 4 J

3. What product is formed when a ketone reacts with hydrazine ($\text{NH}_2 - \text{NH}_2$)?

- (A) Alcohol
- (B) Hydrazone
- (C) Amide
- (D) Ester

4. Evaluate the definite integral:

$$\int_0^{\frac{\pi}{2}} \sin^2 x \, dx$$

(A) $\frac{\pi}{2}$

(B) $\frac{\pi}{4}$

(C) $\frac{\pi}{8}$

(D) π
