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- D (5) A (4) D (3)
- C (8) D (7) A (6)
- المسألة: الخيط، الخيطية مقدار ثابت
- D (9)
- A (10)
- $X = (2m+1) \frac{\lambda}{4}$ (11)
- من أجل، الخيطية، الخيطية $m=2$
- $\Rightarrow X = 9 \frac{\lambda}{4}$ البواب (D)
- $f_2 = 2f_1 = 2 \times 20 = 40 \text{ Hz}$ البواب (D) (12)
- D (15) B (14) C (13)
- B (17) C (16)
- $L = n \frac{\lambda}{2} = 4 \frac{\lambda}{2} = 2\lambda$ البواب (C) (18)
- A (19)
- $X = (2m+1) \frac{\lambda}{4}$ (20)
- من أجل، الخيطية، الخيطية $m=1$
- $X = 3 \frac{\lambda}{4}$ البواب (A)
- $X = n \frac{\lambda}{2}$ (21)
- من أجل، الخيطية، الخيطية $m=2$
- $X = \lambda$ البواب (D)
- B (24) C (23) D (22)
- B (27) B (26) A (25)
- $L = 3 \frac{\lambda}{4} = 3 \frac{40}{4} = 30 \text{ cm}$ (28)
- البواب (B)

حل البنك المؤتمت لبحث
الأمواج المستقرة العرضية والطولية
تم الطاب لمبتدئ

- C (1)
- D (3) C (2)
- C (6) C (5) B (14)
- B (9) A (8) D (7)
- C (12) C (11) D (10)
- A (15) A (14) B (13)
- B (18) C (17) B (16)
- B (21) B (20) C (19)
- D (24) C (23) A (22)
- D (27) B (26) D (25)
- C (30) C (29) A (28)
- C (32) D (31)

المدرس فراس قلعه جيبي
إجازة في العلوم الفيزيائية والكيميائية
دبلوم في التأهيل التربوي
0988440574

تم الطاب المتوسط

- $L = (2m-1) \frac{\lambda}{4} = 1 \cdot \frac{\lambda}{4} \Rightarrow$ (1)
- $\lambda = 4L = 4 \times 0.2 = 0.8 \text{ m}$ البواب (C)
- $f = (2m-1) \frac{v}{4L} \Rightarrow 200 = 1 \frac{320}{4L}$ (2)
- $L = \frac{320}{4 \times 200} = 0.4 \text{ m} = 40 \text{ cm}$
- البواب (D)

$$\text{عدد أطوال المربع} = \frac{L}{\lambda} = \frac{L}{\frac{v}{f}} = \frac{L \times f}{v} \quad (2)$$

$$= \frac{0.5 \times 800}{100} = \frac{400}{100} = 4 \quad \text{الجواب (D)}$$

$$f_5 = 5f_1 = 5 \times 150 = 750 \text{ Hz} \quad (3)$$

الجواب (C)

$$f = \frac{v}{2L} = \frac{v}{2L} \sqrt{\frac{F_T}{\mu}} \quad (4)$$

$$f' = \frac{v}{2(3L)} \sqrt{\frac{1}{4} F_T}$$

$$f' = \frac{1}{3} \times \frac{v}{2L} \sqrt{\frac{F_T}{\mu}} = \frac{1}{6} f = \frac{1}{6} \times 120$$

$$f' = 20 \text{ Hz} \quad \text{الجواب (C)}$$

$$v = \sqrt{\frac{F_T}{\mu}} = \sqrt{\frac{F_T}{\frac{m}{L}}} = \sqrt{\frac{4}{\frac{50 \times 10^{-3}}{0.25}}} \quad (5)$$

$$v = \sqrt{\frac{4}{\frac{1}{5}}} = \sqrt{20} = 2\sqrt{5} \text{ m/s} \quad \text{الجواب (D)}$$

$$f = \frac{v}{2L} = \frac{v}{2L} \sqrt{\frac{F_T}{\mu}} = \frac{v}{2L} \sqrt{\frac{F_T}{\frac{m}{L}}} \quad (6)$$

$$100 = \frac{1}{2(0.5)} \sqrt{\frac{10}{\frac{m}{0.5}}} \Rightarrow$$

$$10000 = \frac{10 \times 0.5}{m} \Rightarrow m = \frac{5}{10000} = 5 \times 10^{-4} \text{ kg}$$

$$m = 0.5 \text{ g} \quad \text{الجواب (A)}$$

$$L = (2m-1) \frac{\lambda}{4} = (2m-1) \frac{v}{4f} \quad (7)$$

من أجل إيجاد عدد العقد، نأخذ $m=2$

$$L = \frac{3v}{4f} = \frac{3 \times 340}{4 \times 170} = 1.5 \text{ m} \quad \text{الجواب (B)}$$

B (29) B (30) C (31)

$$x = \frac{\lambda}{2} = \frac{0.4}{2} = 0.2 \text{ m} \quad (33)$$

الجواب (A)

$$f = \frac{v}{\lambda} = \frac{330}{3} = 110 \text{ Hz} \quad (34)$$

الجواب (B)

$$\mu = \frac{m}{L} = \frac{20 \times 10^{-3}}{2} = 10^{-2} \text{ kg/m} \quad (35)$$

الجواب (B)

$$f = \frac{v}{2L} = \frac{v}{2L} \sqrt{\frac{F_T}{\mu}} = \frac{v}{2L} \sqrt{\frac{F_T \cdot L}{m}} \quad (36)$$

$$100 = \frac{2}{2(1)} \sqrt{\frac{5 \times 1}{m}} \Rightarrow 10^4 = \frac{5}{m}$$

$$m = \frac{5}{10^4} = 5 \times 10^{-4} \text{ kg} \quad \text{الجواب (B)}$$

$$x = \frac{\lambda}{4} = \frac{0.4}{4} = 0.1 \text{ m} \quad \text{الجواب (B)} \quad (36)$$

B (39) C (38)

تم الكتاب بحمد الله

$$\lambda = \frac{v}{f} = \frac{50}{250} = 0.2 \text{ m} \quad (1)$$

$$x = (2m+1) \frac{\lambda}{4}$$

من أجل إيجاد لبطن، نأخذ $m=2$

$$\Rightarrow x = 5 \frac{\lambda}{4} = \frac{5 \times 0.2}{4} = \frac{1}{4} \text{ m} \quad \text{الجواب (A)}$$

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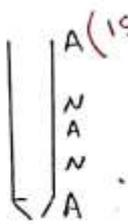
$$f_3 = 3f_1 = 3 \times 6 = 18 \text{ Hz} \quad (14)$$

الجواب (c)

$$\frac{\lambda}{2} = 40 \Rightarrow \lambda = 80 \text{ cm}$$

$$\lambda = 0.8 \text{ m} = L$$

طول الأنبوب



$$f = n \frac{v}{2L} = 2 \frac{v}{2L} = \frac{v}{L} \quad (*)$$

$$\frac{v}{v'} = \sqrt{\frac{T}{T'}} \Rightarrow \frac{v}{331} = \sqrt{\frac{819+273}{0+273}}$$

$$\frac{v}{331} = \sqrt{\frac{1092}{273}} = \sqrt{u} = 2 \Rightarrow$$

$$v = 331 \times 2 = 662 \text{ m/s}^{-1}$$

نعوضه بـ (*):

$$f = \frac{662}{0.8} = 827.5 \text{ Hz}$$

الجواب (A)

$$v = \sqrt{\frac{F_T}{\mu}} = \sqrt{\frac{F_T}{\frac{m}{L}}} = \sqrt{\frac{20 \times 10^3}{\frac{2}{1}}} \quad (16)$$

$$v = \sqrt{\frac{20000}{20}} = \sqrt{1000} = 10 \text{ m/s} \quad (17)$$

الجواب (c)

$$f = n \frac{v}{2L} = \frac{n}{2L} \sqrt{\frac{F_T}{\mu}} \quad \mu = \frac{m}{L} \quad (17)$$

$$f = \frac{1}{2(1)} \sqrt{\frac{16}{40 \times 10^{-3}}} = \frac{1}{2} \sqrt{\frac{1600}{4}}$$

$$f = \frac{20}{2} = 10 \text{ Hz} \quad (18)$$

الجواب (b)

$$L = n \frac{\lambda}{2} \Rightarrow 0.25 = n \frac{0.5}{2} \quad (18)$$

$$n = \frac{0.25 \times 2}{0.5} = 1 \quad \text{منزلة} \quad \text{الجواب (d)}$$

$$\frac{v_1}{v_2} = \sqrt{\frac{M_2}{M_1}} = \sqrt{\frac{32}{28}} = \sqrt{\frac{8}{7}} = 2\sqrt{\frac{2}{7}} \quad (8)$$

$$v_1 = 2\sqrt{\frac{2}{7}} v_2 \quad \text{الجواب (d)}$$

$$f = f' \quad \text{تساوي الترددات}$$

$$(2n-1) \frac{v}{4L} = n \frac{v}{2L'}$$

$$1 \frac{v}{4L} = 3 \frac{v}{2L'} \Rightarrow$$

$$L' = 6L = 6 \times 30 = 180 \text{ cm} \quad \text{الجواب (c)}$$

$$\frac{\lambda}{2} = 16 \Rightarrow \lambda = 36 \text{ cm} \quad (10)$$

$$v = \lambda \times f = 0.36 \times 100 = 36 \text{ m/s} \quad \text{الجواب (c)}$$

$$L = n \frac{\lambda}{2} = 2 \frac{\lambda}{2} = \lambda = \frac{v}{f} \quad (11)$$

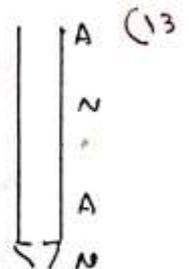
$$L = \frac{340}{170} = 2 \text{ m} \quad \text{الجواب (d)}$$

$$f = n \frac{v}{2L} \Rightarrow 680 = n \frac{340}{2(1)} \quad (12)$$

$$n = \frac{2 \times 680}{340} = 4 \quad \text{الجواب (c) المربع ربع}$$

$$L = 3 \frac{\lambda}{4} = 3 \times \frac{2}{4} = 1.5 \text{ m}$$

الجواب (c)



سؤال الطالب المستقر

$$\frac{v_1}{v_2} = \sqrt{\frac{T_1}{T_2}} \Rightarrow \frac{44}{v_2} = \sqrt{\frac{22+293}{907+293}} \quad (1)$$

$$\frac{44}{v_2} = \sqrt{\frac{295}{1180}} = \sqrt{\frac{1}{4}} = \frac{1}{2} \Rightarrow$$

$$v_2 = 44 \times 2 = 88 \text{ m.s}^{-1} \quad \text{الجواب D}$$

$$M = \rho \pi r^2 = D \times 1000 \times \pi r^2 \quad (2)$$

$$M = 10 \times 1000 \times \pi \left(\frac{0.1}{2} \times 10^{-3}\right)^2$$

$$M = \pi \times 10^4 \times \frac{1}{4} \times 10^{-8} = 0.25\pi \times 10^{-4} \text{ kg m}^{-1}$$

$$v = \sqrt{\frac{F_T}{M}} \Rightarrow 100 = \sqrt{\frac{F_T}{0.25\pi \times 10^{-4}}}$$

تربيع الطرفين:

$$10^4 = \frac{F_T}{0.25\pi \times 10^{-4}} \Rightarrow F_T = 0.25\pi \text{ N}$$

الجواب (A)

$$f_1 = n \frac{v}{2L} = \frac{n}{2L} \sqrt{\frac{F_T}{M}} = \frac{n}{2L} \sqrt{\frac{F_T \cdot L}{m}} \quad (3)$$

$$f_1 = \frac{2}{2L} \sqrt{\frac{F_T \cdot L}{m}}$$

$$f_2 = \frac{4}{2L} \sqrt{\frac{F_T \cdot L}{m'}}$$

لكن، لمرات نفسها $f_1 = f_2$

$$\frac{2}{2L} \sqrt{\frac{F_T \cdot L}{m}} = \frac{4}{2L} \sqrt{\frac{F_T \cdot L}{m'}}$$

$$\sqrt{\frac{1}{m}} = 2 \sqrt{\frac{1}{m'}} \Rightarrow \frac{1}{m} = \frac{4}{m'} \Rightarrow$$

$$m' = 4m = 4 \times 20 = 80 \text{ g}$$

$$L = n \frac{\lambda}{2} \Rightarrow 1 = 2 \frac{\lambda}{2} \Rightarrow \quad (19)$$

$$\lambda = 1 \text{ m}$$

$$v = \lambda \times f = 1 \times 100 = 100 \text{ m.s}^{-1}$$

الجواب (D)

$$f = n \frac{v}{2L} = \frac{n}{2L} \sqrt{\frac{F_T}{M}} \quad (20)$$

$$f = \frac{1}{2(0.5)} \sqrt{\frac{1}{\frac{10 \times 10^{-3}}{0.5}}} = \frac{1}{1} \sqrt{\frac{0.5}{10^{-2}}}$$

$$f = \sqrt{50} = 5\sqrt{2} \text{ Hz} \quad \text{الجواب (D)}$$

(21) اعتماداً على سؤال (20)

$$f_3 = 3f_1 = 3 \times 5\sqrt{2} = 15\sqrt{2} \text{ Hz}$$

الجواب (C)

$$f = n \frac{v}{2L} \Rightarrow 100 = 2 \frac{v}{2L} \quad (22)$$

$$v = 100 \text{ m.s}^{-1} \Rightarrow \lambda = \frac{v}{f} = \frac{100}{100} = 1 \text{ m}$$

$$x = n \frac{\lambda}{2} \quad n=1 \quad \text{المعدّة:}$$

$$\Rightarrow x_2 = \frac{\lambda}{2} = \frac{1}{2} \text{ m}$$

$$x = (2n+1) \frac{\lambda}{4} \quad n=1 \quad \text{البضبة}$$

$$x = 3 \frac{\lambda}{4} = \frac{3}{4} \text{ m}$$

$$f = n \frac{v}{2L} = \frac{n}{2L} \sqrt{\frac{F_T}{M}} = \frac{n}{2L} \sqrt{\frac{F_T \cdot L}{m}} \quad (23)$$

$$f = \frac{3}{2(1.5)} \sqrt{\frac{100}{\frac{15 \times 10^{-3}}{1.5}}} = 1 \sqrt{10000}$$

$$f = 100 \text{ Hz} \quad \text{الجواب (C)}$$

$$y_{\max} = 2y_{\max} \sin \frac{2\pi}{\lambda} x$$

$$= 2 \times 3 \times 10^{-2} \sin \frac{2\pi}{0.8} \cdot 0.2$$

$$y_{\max} = 0.06 \sin \frac{\pi}{2} = 0.06 \text{ m}$$

الجواب (D)

$$f = n \frac{v}{2L} = \frac{n}{2L} \sqrt{\frac{F_T}{\mu}} \quad \mu = \frac{m}{L} \quad (8)$$

$$45 = \frac{3}{2 \times 2} \sqrt{\frac{F_T}{0.2}} \Rightarrow 60 = \sqrt{\frac{F_T}{0.1}}$$

$$3600 = \frac{F_T}{0.1} \Rightarrow F_T = 360 \text{ N}$$

الجواب (B)

$$\frac{v_1}{v_2} = \sqrt{\frac{M_2}{M_1}} \Rightarrow \frac{\lambda_1 f_1}{\lambda_2 f_2} = \sqrt{\frac{M_2}{M_1}} \quad (9)$$

عند درجة الحرارة نفسها تنبسط طول الموجة ثابتة

$$\Rightarrow \frac{f_1}{f_2} = \sqrt{\frac{M_2}{M_1}} \Rightarrow \frac{160}{f_2} = \sqrt{\frac{1}{4}} = \frac{1}{2}$$

$$f_2 = 160 \times 2 = 320 \text{ Hz}$$

الجواب (D)

$$f = (2n-1) \frac{v}{4L} \quad (10)$$

$$f = \frac{v}{\lambda} = \frac{330}{3} = 110 \text{ Hz} \Rightarrow$$

$$110 = 1 \frac{330}{4L} \Rightarrow L = \frac{330}{4 \times 110} = \frac{3}{4} \text{ m}$$

الجواب (C)

$$\mu = \frac{m}{L} \Rightarrow L = \frac{m}{\mu} = \frac{10 \times 10^{-3}}{10^{-2}} = 1 \text{ m} \quad (11)$$

$$L = n \frac{\lambda}{2} \Rightarrow 1 = 2 \frac{\lambda}{2} \Rightarrow \lambda = 1 \text{ m}$$

الجواب (D)

$$(7) \quad \text{عدد أطوال الموجة} = \frac{L}{\lambda} = \frac{L \cdot f}{v} = \frac{0.5 \times 200}{100} = 1 \quad (4)$$

عند ما نزرار عدد أطوال الموجة للصفحة لتغيير طول الموجة

$$\text{عدد أطوال الموجة} = \frac{L}{\lambda} \Rightarrow 2 = \frac{L}{\lambda} \Rightarrow$$

$$\lambda = \frac{L}{2} = \frac{0.5}{2} = 0.25 \text{ m} \Rightarrow$$

$$\lambda = \frac{v'}{f} \Rightarrow v' = \lambda \cdot f = \frac{1}{4} \times 200 = 50 \text{ m/s}$$

$$\frac{v}{v'} = \sqrt{\frac{T}{T'}} \Rightarrow \frac{100}{50} = \sqrt{\frac{127 + 273}{T' + 273}}$$

$$2 = \sqrt{\frac{400}{T' + 273}} \Rightarrow 4 = \frac{400}{T' + 273}$$

$$400 = 4T' + 1092 \Rightarrow$$

$$T' = \frac{400 - 1092}{4} = -173^\circ \text{C}$$

الجواب (D)

$$f = n \frac{v}{2L} = 2 \frac{v}{2L}$$

$$f' = 3 \frac{v}{2L}$$

نسبة الترددات:

$$\frac{f}{f'} = \frac{2}{3} \Rightarrow f' = \frac{3}{2} f = \frac{3}{2} \times 120 = 180 \text{ Hz}$$

الجواب (A)

$$L_1 = (2n-1) \frac{\lambda}{4} = \frac{\lambda}{4} \quad (6)$$

$$L_5 = (2n-1) \frac{\lambda}{4} = 5 \frac{\lambda}{4}$$

$$\Delta L = L_5 - L_1 = 5 \frac{\lambda}{4} - \frac{\lambda}{4} = \lambda$$

$$\Delta L = 2.5 - 0.5 = 2 \Rightarrow \lambda = 2 \text{ m}$$

$$v = \lambda \cdot f = 2 \cdot f \quad \text{الجواب (A)}$$

$$20 = \sqrt{\frac{F_T \cdot 0.8}{16 \times 10^3}} \Rightarrow 400 = \frac{F_T \cdot 0.8}{16 \times 10^3}$$

$$F_T = \frac{400 \times 16 \times 10^3}{0.8} = 8N \quad \text{الجواب (C)}$$

$$f = n \frac{v}{2L} \Rightarrow \frac{\omega}{2\pi} = \frac{n}{2L} \sqrt{\frac{F_T}{\mu}} \quad (18)$$

$$\frac{1000}{2\pi} = \frac{1}{2(0.5)} \sqrt{\frac{F_T}{2 \times 10^{-3}}} \Rightarrow$$

$$\frac{10^3}{40} = \frac{F_T}{2 \times 10^{-3}} \Rightarrow F_T = \frac{2 \times 10^3 \times 10^6}{40}$$

$$F_T = \frac{1000}{20} = 50N \quad \text{الجواب (D)}$$

$$f = n \frac{v}{2L} = \frac{n}{2L} \sqrt{\frac{F_T}{\mu}} \quad (19)$$

$$100 = \frac{2}{2(1)} \sqrt{\frac{5}{\mu}} \Rightarrow 10^4 = \frac{5}{\mu}$$

$$\mu = 5 \times 10^{-4} \text{ kg m}^{-1}$$

$$f = \frac{n}{2L} \sqrt{\frac{F_T}{\mu}}$$

$$100 = \frac{4}{2(1)} \sqrt{\frac{F_T}{5 \times 10^{-4}}} \Rightarrow$$

$$2500 = \frac{F_T}{5 \times 10^{-4}} \Rightarrow F_T = 1.25N$$

الجواب (D)

$$L = (2n-1) \frac{\lambda}{4} = 1 \frac{v}{4f} \quad (20)$$

$$L = \frac{324}{4 \times 162} = \frac{2}{4} = \frac{1}{2} \text{ m}$$

الجواب (C)

$$\lambda = 1 \text{ m} \quad \text{بناءً على السؤال (11)}$$

$$x = (2n+1) \frac{\lambda}{4}$$

$$n=0 \Rightarrow x_1 = \frac{\lambda}{4} = \frac{1}{4} \text{ m} \quad \text{الجواب (D)}$$

$$n=1 \Rightarrow x_2 = 3 \frac{\lambda}{4} = \frac{3}{4} \text{ m}$$

$$f = (2n-1) \frac{v}{4L} \quad (13)$$

$$160 = 1 \frac{320}{4L} \Rightarrow L = \frac{320}{4 \times 160} = \frac{2}{4}$$

$$L = \frac{1}{2} \text{ m} \quad \text{الجواب (B)}$$

$$f = n \frac{v}{2L}$$

$$160 = 1 \frac{320}{2L} \Rightarrow L = \frac{320}{160 \times 2}$$

$$L = 1 \text{ m} \quad \text{الجواب (D)}$$

$$v = \sqrt{\frac{F_T}{\mu}} \Rightarrow \lambda \cdot f = \sqrt{\frac{F_T}{\mu}} \quad (15)$$

$$0.5 \times 50 = \sqrt{\frac{F_T}{20 \times 10^{-3}}} \Rightarrow$$

$$25 = \sqrt{\frac{F_T}{10^{-2}}} \Rightarrow 625 = \frac{F_T}{10^{-2}}$$

$$F_T = 6.25N \quad \text{الجواب (C)}$$

$$L = n \frac{\lambda}{2} = n \frac{v}{2f} \quad (16)$$

$$L = 4 \frac{20}{2 \times 50} = \frac{80}{100} = 0.8 \text{ m}$$

الجواب (D)

$$\text{بناءً على السؤال (16) بناءً على:} \quad (17)$$

$$L = 0.8 \text{ m}$$

$$v = \sqrt{\frac{F_T}{\mu}} = \sqrt{\frac{F_T \cdot L}{m}}$$

$$\lambda = \frac{v}{f} = \frac{662}{1000} = 0.662 \text{ m} \quad (25)$$

$$\text{عدد أطوال الموجة} = \frac{L}{\lambda} = \frac{3.31}{0.662} = 5$$

الجواب (B)

$$f = n \frac{v}{2L} = 1 \frac{662}{2 \times 3.31} \quad (26)$$

$$f = 100 \text{ Hz} \quad \text{الجواب (C)}$$

$$\text{عدد أطوال الموجة} = \frac{L}{\lambda} = \frac{L \cdot f}{v} = \frac{3.32 \times 1024}{340} = 10$$

$$\frac{v}{v'} = \sqrt{\frac{T}{T'}} \Rightarrow \frac{340}{v'} = \sqrt{\frac{15 + 273}{879 + 273}}$$

$$\frac{340}{v'} = \sqrt{\frac{288}{1152}} = \sqrt{\frac{1}{4}} = \frac{1}{2} \Rightarrow$$

$$v' = 680 \text{ m s}^{-1} \Rightarrow \lambda' = \frac{v'}{f}$$

$$\lambda' = \frac{680}{1024} = 0.664 \text{ m} \Rightarrow$$

$$\text{عدد أطوال الموجة} = \frac{L}{\lambda'} = \frac{3.32}{0.664} = 5$$

عدد أطوال الموجة تنقص إلى النصف الجواب (B)

$$L = n \frac{\lambda}{2} \Rightarrow 1 = \frac{\lambda}{2} \Rightarrow \quad (28)$$

$$\lambda = 2 \text{ m}$$

$$\text{عدد أطوال الموجة} = \frac{L}{\lambda} = \frac{1}{2} \quad \text{الجواب (B)}$$

$$\Delta L = L_2 - L_1 = \frac{\lambda}{2} \quad (29)$$

$$42 - 10 = \frac{\lambda}{2} \Rightarrow \lambda = 2 \times 32 = 64 \text{ cm}$$

$$\lambda = 0.64 \text{ m} \Rightarrow f = \frac{v}{\lambda} = \frac{340}{0.64}$$

$$f = 531.25 \text{ Hz} \quad \text{الجواب (C)}$$

$$\frac{v_1}{v_2} = \sqrt{\frac{\mu_2}{\mu_1}}$$

$$\frac{\lambda_1 f_1}{\lambda_2 f_2} = \sqrt{\frac{\mu_2}{\mu_1}}$$

عندما تكون درجة الحرارة نفسها جازة: $\lambda = \text{const}$

$$\frac{162}{f_2} = \sqrt{\frac{2}{32}} = \frac{1}{4} \Rightarrow$$

$$f_2 = 162 \times 4 = 648 \text{ Hz}$$

$$\mu = \rho \pi r^2 = 10 \times 1000 \times \pi \times 1^2 \quad (22)$$

$$\mu = 5 \times 1000 \times \pi \left(\frac{0.2}{2} \times 10^{-3} \right)^2 = 5 \pi \times 10^{-5} \text{ kg m}^{-1}$$

$$v = \sqrt{\frac{F_T}{\mu}} \Rightarrow 100 = \sqrt{\frac{F_T}{5 \pi \times 10^{-5}}} \Rightarrow$$

$$10^4 = \frac{F_T}{5 \pi \times 10^{-5}} \Rightarrow F_T = 10^4 \times 5 \pi \times 10^{-5}$$

$$F_T = 0.5 \pi \text{ N} \quad \text{الجواب (A)}$$

$$\text{عدد أطوال الموجة} = \frac{L}{\lambda} \Rightarrow 10 = \frac{3.4}{\lambda} \Rightarrow \quad (23)$$

$$\lambda = \frac{3.4}{10} = 0.34 \text{ m}$$

$$f = \frac{v}{\lambda} = \frac{340}{0.34} = 1000 \text{ Hz} \quad \text{الجواب (C)}$$

$$\frac{\lambda}{2} = 0.5 \Rightarrow \lambda = 2 \times 0.5 = 1 \text{ m} \quad (24)$$

$$\frac{v}{v'} = \sqrt{\frac{T}{T'}} \Rightarrow \frac{v}{331} = \sqrt{\frac{819 + 273}{0 + 273}}$$

$$\frac{v}{331} = \sqrt{\frac{1092}{273}} = 2 \Rightarrow v = 662 \text{ m s}^{-1}$$

$$f = \frac{v}{\lambda} = \frac{662}{1} = 662 \text{ Hz}$$

الجواب (D)

(35)
$$\frac{v}{\lambda} = \frac{v}{\lambda}$$

$$m \frac{v}{\lambda} = (2n-1) \frac{v}{4L}$$

$$\frac{1}{\lambda} \sqrt{\frac{1}{n}} = \frac{v}{4L} \Rightarrow \frac{1}{\lambda} = \frac{v^2}{4}$$

$$\Rightarrow \lambda = \frac{1}{v^2} \cdot 4v^2 \quad \text{الجواب (A)}$$

(36)
$$L = \lambda_1 \cdot L_1 = \frac{\lambda}{4} \Rightarrow 4 \cdot 2 - 10 = \frac{\lambda}{4}$$

$$\lambda = 2 \times 33 = 66 \text{ cm} = 0.66 \text{ m}$$

$$v = \lambda \times f = 0.66 \times 531.25$$

$$v = 340 \text{ m/s} \quad \text{الجواب (B)}$$

(37)
$$\lambda = \frac{v}{f} \Rightarrow v = \lambda \cdot f$$

$$v = 6 \times 110 = 660 \text{ m/s}$$

$$\frac{v}{v'} = \sqrt{\frac{T}{T'}} \Rightarrow \frac{660}{330} = \sqrt{\frac{T}{0 + 293}}$$

$$\Rightarrow 4 = \frac{T}{293} \Rightarrow T = 4 \times 293 = 1092 \text{ K}$$

$$t_c(^{\circ}\text{C}) = 1092 - 273 = 819^{\circ}\text{C} \quad \text{الجواب (C)}$$

(38)
$$f' = 110 \text{ Hz}$$

$$f = (2n-1) \frac{v}{4L} = (2n-1) \frac{330}{4 \times 0.25}$$

$$f' = (2n-1) \frac{330}{11} = 1 \times 330 \text{ Hz}$$

$$\Rightarrow f' = 3f$$

تواتر البزمار مختلف بترسنته هو تواتر البزمار الثالث للبزمار مستجاب لترسنته | الجواب (C)

(30)
$$L = n \frac{\lambda}{2} \Rightarrow 1 = 1 \frac{\lambda}{2} \Rightarrow \lambda = 2 \text{ m}$$

$$v = \lambda \times f = 2 \times 150 = 300 \text{ m/s} \quad \text{الجواب (C)}$$

(31) اعتماداً على سؤال (30) جابته: $v = 300 \text{ m/s}$

$$f = (2n-1) \frac{v}{4L}$$

$$150 = 1 \frac{300}{4L} \Rightarrow$$

$$L = \frac{300}{4 \times 150} = \frac{2}{4} = \frac{1}{2} \text{ m} \quad \text{الجواب (C)}$$

(32)
$$L = (2n-1) \frac{\lambda}{4} = (2n-1) \frac{v}{4f}$$

$$L = 1 \frac{320}{4 \times 160} = \frac{2}{4} = \frac{1}{2} \text{ m} \quad \text{الجواب (C)}$$

(33)
$$f = n \frac{v}{2L}$$

$$160 = 1 \frac{320}{2L} \Rightarrow$$

$$L = \frac{320}{2 \times 160} = 1 \text{ m} \quad \text{الجواب (B)}$$

(34)
$$\frac{v_1}{v_2} = \sqrt{\frac{M_2}{M_1}} \Rightarrow \lambda_1 f_1 = \sqrt{\frac{M_2}{M_1}}$$

عند درجة الحرارة نفسها $\lambda = c \text{ m/s}$

$$\frac{f_1}{f_2} = \sqrt{\frac{M_2}{M_1}} \Rightarrow \frac{160}{f_2} = \sqrt{\frac{2}{32}} = \frac{1}{4}$$

$$f_2 = 160 \times 4 = 640 \text{ Hz} \quad \text{الجواب (B)}$$

$$f = n \frac{v}{2L} = \frac{n}{2L} \sqrt{\frac{F_t}{\mu}} \quad n = \frac{2L}{\lambda} \quad (3)$$

$$50 = \frac{n}{2 \times 1} \sqrt{\frac{25}{10 \times 10^{-3}}} \Rightarrow$$

$$100 = n \sqrt{2500} \Rightarrow 100 = n \times 50$$

$$n = \frac{100}{50} = 2 \quad \text{بواب (A) منزل}$$

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