Physicsaholics

DPP – 3 (Waves)

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Q 1. Two coherent waves of amplitude 5mm and 7mm reach a point in opposite phase. What is the resultant amplitude?

(a) 2 mm (b) 12 mm

(c) $\sqrt{74}$ mm (d) $\sqrt{24}$ mm

Q 2. Two waves of same frequency but of amplitudes a and 2a respectively superimpose over each other. The resultant amplitude if the phase difference is $\frac{3\pi}{2}$, will be

(a) a (b) $\sqrt{3}a$

(c) $\sqrt{5}a$ (d) $3a$

Q 3. If the ratio in the amplitudes for two waves of equal frequencies is 1 : 3 then the ratio of the energies carried out by the waves will be

(a) 1 : 3 (b) 1 : 9

(c) 9 : 1 (d) None of these

Q 4. Two sound waves (expressed in CGS units) given by $y_1 = 0.3 \sin \frac{2\pi}{\lambda}(vt - x)$ and $y_2 = 0.4 \sin \frac{2\pi}{\lambda}(vt - x + \theta)$ interfere. The resultant amplitude at a place where phase difference is $\frac{\pi}{2}$ will be

(a) 0.7 cm (b) 0.7 cm

(c) 0.5 cm (d) $\frac{\sqrt{7}}{10}$ cm

Q 5. Phase difference between two waves having same frequency (v) and same amplitude (A) is $2\pi/3$. If these waves superimpose each other, then resultant amplitude will be–

(a) 2A (b) zero

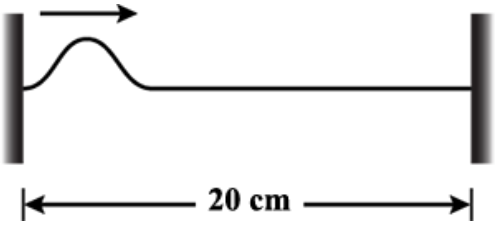
(c) A (d) A^2

Q 6. The equation of a plane progressive wave is $y = 0.9 \sin 4\pi \left[t - \frac{x}{2}\right]$. When it is reflected at a rigid support at x = 0, its amplitude becomes $\frac{2}{3}$ of its previous value. The equation of the reflected wave is

(a) $y = 0.6 \sin 4\pi \left[t + \frac{x}{2}\right]$ (b) $y = -0.6 \sin 4\pi \left[t + \frac{x}{2}\right]$

(c) $y = -0.9 \sin 4\pi \left[t - \frac{x}{2}\right]$ (d) $y = -0.9 \sin 4\pi \left[t + \frac{x}{2}\right]$

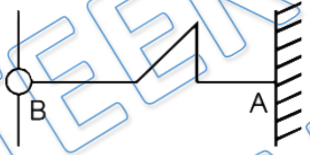
Q 7. A string of length 20 cm and linear mass density 0.4 g/cm is fixed at both ends and is kept under a tension of 16 N. A wave pulse is produced at t = 0 near an end as shown in figure which travels towards the other end. The string have the shape shown in the figure again in 2×10^{-x} sec. Find x (a) A wavelength of 0.25 m and travels in + ve x direction



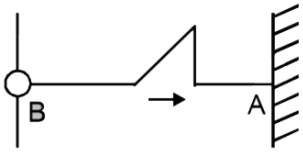
(a) 1 (b) 2
(c) 8 (d) 3

Q 8. A progressive wave gets reflected at a boundary such that the ratio of amplitudes of the reflected and incident wave is 1:2. Find the percentage of energy transmitted.
(a) 25 % (b) 44 %
(c) 67 % (d) 75 %

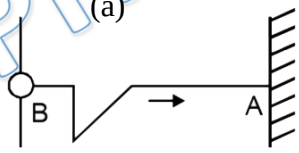
Q 9. A pulse shown here is reflected from the rigid wall A and then from free end B. The shape of the string after these 2 Reflection will be.



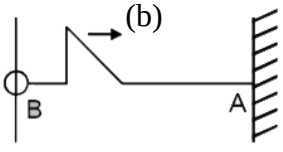
(a)



(b)



(c)



(d)

Q 10. Two waves represented by $y_1 = 10\sin(2000\pi t + 2x)$ and $y_2 = 10\sin\left(2000\pi t + 2x + \frac{\pi}{2}\right)$ are superposed at any point at a particular instant. The resultant amplitude is:
(a) 10 unit (b) 20 unit
(c) 14.1 unit (d) zero

Q 11. The refracted and the incident pulses for a wave travelling in a string have an amplitude ratio of 1:2. The ratio of their phases will be

(a) 1 : 2 (b) 2 : 1

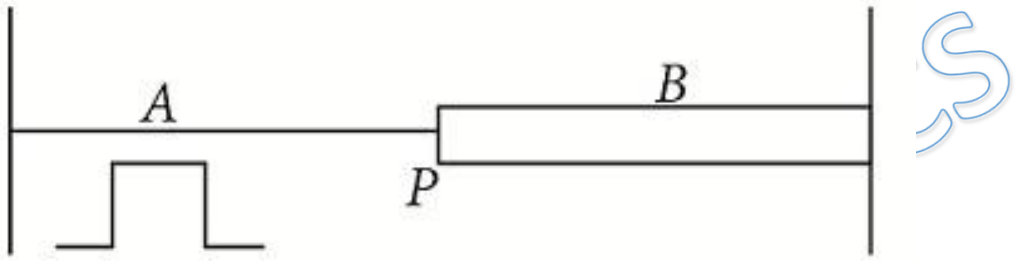
(c) 1 : 1 (d) 1 : 4

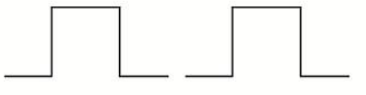
Q 12. Two wires made of the same material, one thick and the other thin, are connected to form a composite wire. The composite wire is subjected to some tension. A wave travelling along the wire crosses the junction point. The characteristic that doesn't undergoes a change at the junction point is

(a) Frequency only (b) Speed of propagation only

(c) Wavelength only (d) The speed as well as wavelength

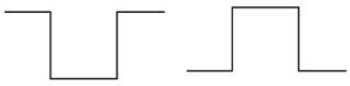
Q 13. P is the junction of two wires A and B. B is made of steel and is thicker while A is made of aluminium and is thinner as shown. If a wave pulse as shown in the figure approaches P, the reflected and transmitted waves from P are respectively:





(a)

(b)



(b)

(d)

Q 14. Two strings of linear mass densities u and 9u are stretched under same tension. A wave travelling on the lighter string towards the heavier string gets partially reflected and transmitted at the junction. Then fraction of incident wave energy getting transmitted to the heavier string is

(a) $\frac{1}{4}$ (b) $\frac{1}{2}$

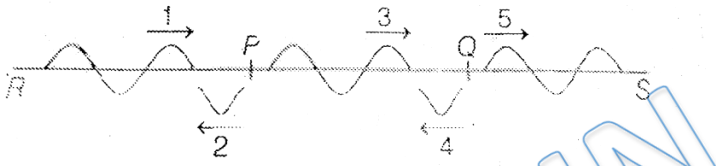
(c) $\frac{3}{4}$ (d) $\frac{9}{16}$

Q 15. A wave pulse, travelling on a two piece string, gets partially reflected and partially transmitted at the junction, The reflected wave is inverted in shape as compared to the incident one. If the incident wave has speed v and the transmitted wave v'

(a) v' > v (b) v' = v

(c) v' < v (d) nothing can be said about the relation of v and v'

Q 16. There are three strings RP, PQ and QS as shown. Their mass and length are RP = (0.1 kg , 2 m), PQ = (0.2 kg , 3 m) ,QS = (0.15 kg , 4 m) respectively. All the strings are under the same tension. Wave -1 is incident at P, it is partly reflected (wave -2) and partly transmitted (wave -3). Now wave - 3 is incident at Q, it is again partly transmitted (wave -5) and partly reflected (wave -4). phase difference between wave -1 and wave



(a) 2 is π

(b) 4 is zero

(c) Both (a) and (b) are correct

(d) Both (a) and (b) are incorrect

Answer Key

Q.1 a	**Q.2 c**	**Q.3 b**	**Q.4 c**	**Q.5 c**
Q.6 b	**Q.7 b**	**Q.8 d**	**Q.9 a**	**Q.10 c**
Q.11 c	**Q.12 a**	**Q.13 c**	**Q.14 c**	**Q.15 c**
Q.16 c				