QB365 Question Paper Software
12th Standard - Physics
Wave Optics Assertion and reason

Exam Time: 00:20 Hrs | Date: 2025-09-30
Total Marks: 10

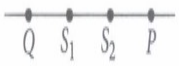
Questions:

1. **Assertion (A)** : A narrow pulse oflight is sent through a medium. The pulse will retain its shape as it travels through the medium.
   Reason (R) : A narrow pulse is made of harmonic waves with a large range of wavelengths .
   Codes:
   (a) Both A and R are true and R is the correct explanation of A
   (b) Both A and R are true but R is NOT the correct explanation of A
   (c) A is true but R is false
   (d) A is false and R is also false

2. **Assertion (A)** : In YDSE bright and dark fringe are equally spaced.
   Reason (R) : It only depends upon phase difference.
   Codes:
   (a) Both A and R are true and R is the correct explanation of A
   (b) Both A and R are true but R is NOT the correct explanation of A
   (c) A is true but R is false
   (d) A is false and R is also false

3. **Assertion (A)** : In Young's experiment the fringe width is directly proportional to wavelength of the source used.
   Reason (R) : When a thin transparent sheet is placed in front of both the slits of Young's experiment, the fringe width will increase.
   Codes:
   (a) Both A and R are true and R is the correct explanation of A
   (b) Both A and R are true but R is NOT the correct explanation of A
   (c) A is true but R is false
   (d) A is false and R is also false

4. **Assertion (A)** : Two point coherent sources oflight S_1 and S_2 are placed on a line as shown. P and Q are two points on that line. If at point P maximum intensity is observed then maximum intensity should also be observed at Q.



   Reason (R) : In the figure of assertion the distance $IS_1P - S_2PI$ is equal to distance $IS_2Q - S_1QI$.
   Codes:
   (a) Both A and R are true and R is the correct explanation of A
   (b) Both A and R are true but R is NOT the correct explanation of A
   (c) A is true but R is false
   (d) A is false and R is also false

5. **Assertion (A)** : When a light wave travels from a rarer to a denser medium, it loses speed. The reduction in speed imply a reduction in energy carried by the light wave.
Reason (R) : The energy of a wave is proportional to velocity of wave.
Codes:
(a) Both A and R are true and R is the correct explanation of A
(b) Both A and R are true but R is NOT the correct explanation of A
(c) A is true but R is false
(d) A is false and R is also false

6. **Assertion (A)** In interference and diffraction of light, light energy reduces in one region producing a dark fringe. It increases in another region and produces a bright fringe.
Reason (R) This happens because energy is not conserved in the phenomena of interference and diffraction.
(a) If both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of Assertion (A).
(b) If both Assertion (A) and Reason (R) are true but Reason (R) is not the correct explanation of Assertion (A).
(c) If Assertion (A) is true and Reason (R) is false.
(d) If both Assertion (A) and Reason (R) are false.

7. **Assertion :** According to Huygen's principle, no backward wave-front is possible.
Reason : Amplitude of secondary wavelet is proportional to $(1 + \cos\theta)$ where θ is the angle between the ray at the point of consideration and the direction of secondary wavelet.
Codes:
(a) If both Assertion and Reason are correct and the Reason is a correct explanation of the Assertion.
(b) If both Assertion and Reason are correct but Reason is not a correct explanation of the Assertion.
(c) If the Assertion is correct but Reason is incorrect.
(d) If both the Assertion and Reason are incorrect.

8. **Assertion :** It is necessary to have two waves of equal intensity to study interference pattern.
Reason : There will be an effect on clarity if the waves are of unequal intensity.
Codes:
(a) If both Assertion and Reason are correct and the Reason is a correct explanation of the Assertion.
(b) If both Assertion and Reason are correct but Reason is not a correct explanation of the Assertion.
(c) If the Assertion is correct but Reason is incorrect.
(d) If both the Assertion and Reason are incorrect.

9. **Assertion :** In YDSE number of bright fringe or dark fringe can not be unlimited
Reason : In YDSE path difference between the superposing waves can not be more than the distance between the slits.
Codes:
(a) If both Assertion and Reason are correct and the Reason is a correct explanation of the Assertion.
(b) If both Assertion and Reason are correct but Reason is not a correct explanation of the Assertion.

(c) If the Assertion is correct but Reason is incorrect.
(d) If both the Assertion and Reason are incorrect.

10. **Assertion :** Diffraction takes place for all types of waves mechanical or non-mechanical, transverse or longitudinal.
Reason : Diffraction's effect are perceptible only if wavelength of wave is comparable to dimensions of
diffracting device.
Codes:
(a) If both Assertion and Reason are correct and the Reason is a correct explanation of the Assertion.
(b) If both Assertion and Reason are correct but Reason is not a correct explanation of the Assertion.
(c) If the Assertion is correct but Reason is incorrect.
(d) If both the Assertion and Reason are incorrect.

Answers Key:

1. **(c)**: A narrow pulse is made of harmonic waves with a large range of wavelengths. As speed of propagation is different for different wavelengths, the pulse cannot retain its shape while travelling through the medium.
2. **(c)**: Fringe width is given by, $\beta = \frac{D\lambda}{d}$
where, D = distance between slit and screen,
d = distance between coherent sources of light and
λ = wavelength of incident light
3. **(c)**: Fringe width $\beta = \lambda D/d$ shall remain the same as the waves travel in air only, after passing through the thin transparent sheet. Due to introduction of thin sheet, only path difference of the wave is changed due to which there is shift of position of fringes only, Which is given As $\Delta x = \frac{D(\mu-1)t}{d}$ Where μ is refractive index of thin sheet and t is its thickness.
4. **(b)**: If maximum intensity is observed at P then for maximum intensity to be also observed at Q, S_1 and S_2 must have phase difference of 2 mπ (where m is an integer).
5. **(d)**: When a light wave travel from a rarer to a denser medium it loses speed, but energy carried by the wave does not depend on its speed. Instead, it depends on the amplitude of wave. The frequency also remain constant.
6. (c) If it reduces in one region, producing a dark fringe, it increases in another region, producing a bright fringe. There is no gain or loss of energy, which is consistent with the principle of conservation of energy.
7. (b) If both Assertion and Reason are correct but Reason is not a correct explanation of the Assertion.
8. (d) If both the Assertion and Reason are incorrect.
Explanation:
For interference, the waves may be of unequal intensities.
9. (b) If both Assertion and Reason are correct but Reason is not a correct explanation of the Assertion.
10.

(b) If both Assertion and Reason are correct but Reason is not a correct explanation of the Assertion.