AR Assertion & Reason

For AIIMS Aspirants

Read the assertion and reason carefully to mark the correct option out of the options given below:

(a) If both assertion and reason are true and the reason is the correct explanation of the assertion.
(b) If both assertion and reason are true but reason is not the correct explanation of the assertion.
(c) If assertion is true but reason is false.
(d) If the assertion and reason both are false.
(e) If assertion is false but reason is true.

1. Assertion : 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 : The energy of a wave is proportional to velocity of wave.

2. Assertion : A narrow pulse of light is sent through a medium. The pulse will retain its shape as it travels through the medium.
Reason : A narrow pulse is made of harmonic waves with a large range of wavelengths.

3. Assertion : No interference pattern is detected when two coherent sources are infinitely close to each other.
Reason : The fringe width is inversely proportional to the distance between the two slits.

4. Assertion : Newton's rings are formed in the reflected system. When the space between the lens and the glass plate is filled with a liquid of refractive index greater than that of glass, the central spot of the pattern is dark.
Reason : The reflection is Newton's ring cases will be from a denser to a rarer medium and the two interfering rays are reflected under similar conditions. **[AIIMS 1998]**

5. Assertion : The film which appears bright in reflected system will appear dark in the transmitted light and vice-versa.
Reason : The conditions for film to appear bright or dark in reflected light are just reverse to those in the transmitted light.

6. Assertion : For best contrast between maxima and minima in the interference pattern of Young's double slit experiment, the intensity of light emerging out of the two slits should be equal.
Reason : The intensity of interference pattern is proportional to square of amplitude.

7. Assertion : In Young's double slit experiment, the fringes become indistinct if one of the slits is covered with cellophane paper.
Reason : The cellophane paper decrease the wavelength of light.

8. Assertion : The unpolarised light and polarised light can be distinguished from each other by using polaroid.
Reason : A polaroid is capable of producing plane polarised beams of light.

9. Assertion : Nicol prism is used to produce and analyse plane polarised light.
Reason : Nicol prism reduces the intensity of light to zero.

10. Assertion : In everyday life the Doppler's effect is observed readily for sound waves than light waves.

Reason : Velocity of light is greater than that of sound. **[AIIMS 1995]**

11. Assertion : In Young's experiment, the fringe width for dark fringes is different from that for white fringes.

Reason : In Young's double slit experiment the fringes are performed with a source of white light, then only black and bright fringes are observed. **[AIIMS 2001]**

12. Assertion : Coloured spectrum is seen when we look through a muslin cloth.

Reason : It is due to the diffraction of white light on passing through fine slits. **[AIIMS 2002]**

13. Assertion : When a tiny circular obstacle is placed in the path of light from some distance, a bright spot is seen at the centre of shadow of the obstacle.

Reason : Destructive interference occurs at the centre of the shadow. **[AIIMS 2002]**

14. Assertion : Thin films such as soap bubble or a thin layer of oil on water show beautiful colours when illuminated by white light.

Reason : It happens due to the interference of light reflected from the upper surface of the thin film. **[AIIMS 2002]**

15. Assertion : Microwave communication is preferred over optical communication.

Reason : Microwaves provide large number of channels and band width compared to optical signals. **[AIIMS 2003]**

16. Assertion : Corpuscular theory fails in explaining the velocities of light in air and water.

Reason : According to corpuscular theory, light should travel faster in denser medium than, in rarer medium. **[AIIMS 1998]**

17. Assertion : Interference pattern is made by using blue light instead of red light, the fringes becomes narrower.

Reason : In Young's double slit experiment, fringe width is given by relation $B = \frac{\lambda D}{d}$. **[AIIMS 1999]**

18. Assertion : The cloud in sky generally appear to be whitish.

Reason : Diffraction due to clouds is efficient in equal measure at all wavelengths. **[AIIMS 2005]**

19. Assertion : Television signals are received through sky-wave propagation.

Reason : The ionosphere reflects electromagnetic waves of frequencies greater than a certain critical frequency. **[AIIMS 2005]**

20. Assertion : It is necessary to use satellites for long distance T.V. transmission.

Reason : The television signals are low frequency signals.

21. Assertion : The electrical conductivity of earth's atmosphere decrease with altitude.

Reason : The high energy particles (*i.e.* γ-rays and cosmic rays) coming from outer space and entering our earth's atmosphere causes ionisation of the atoms of the gases present there and the pressure of gases decreases with increase in altitude.

22. Assertion : Only microwaves are used in radar.

Reason : Because microwaves have very small wavelength.

23. Assertion : In Hertz experiment, the electric vector of radiation produced by the source gap is parallel to the gap.

Reason : Production of sparks between the detector gap is maximum when it is placed perpendicular to the source gap.

24. Assertion : For cooking in a microwave oven, food is always kept in metal containers.

Reason : The energy of microwave is easily transferred to the food in metal container.

25. Assertion : *X*-ray astronomy is possible only from satellites orbiting the earth.

Reason : Efficiency of *X*-rays telescope is large as compared to any other telescope.

26. Assertion : Short wave bands are used for transmission of ratio waves to a large distance

Reason : Short waves are reflected by ionosphere

[AIIMS 1994]

27. Assertion : Ultraviolet radiation are of higher frequency waves are dangerous to human being.

Reason : Ultraviolet radiation are absorbed by the atmosphere **[AIIMS 1995]**

28. Assertion : Environmental damage has increased the amount of ozone in the atmosphere.

Reason : Increase of ozone increases the amount of ultraviolet radiation on earth. **[AIIMS 1996]**

29. Assertion : Radio waves can be polarised.

Reason : Sound waves in air are longitudinal in nature.

[AIIMS 1998]

30. Assertion : The earth without atmosphere would be inhospitably cold.

Reason : All heat would escape in the absence of atmosphere.

[AIIMS 2002]

Answers

Wave Nature and Interference of Light

1	a	2	c	3	b	4	c	5	d
6	c	7	d	8	c	9	c	10	b
11	a	12	d	13	c	14	a	15	d
16	a	17	c	18	b	19	c	20	b
21	c	22	c	23	a	24	c	25	a
26	a	27	b	28	b	29	c	30	a
31	b	32	d	33	d	34	a	35	a
36	c	37	b	38	c	39	b	40	c
41	d	42	b	43	b	44	c	45	d
46	c	47	d	48	b	49	c	50	a
51	d	52	c	53	d	54	c	55	b
56	a	57	c	58	d	59	d	60	b
61	b	62	a	63	c	64	d	65	d
66	c	67	a	68	a	69	a	70	c
71	b	72	d						

Young's Double Slit Experiment

1	a	2	c	3	c	4	c	5	a
6	c	7	a	8	c	9	a	10	d
11	d	12	c	13	bd	14	b	15	c
16	c	17	a	18	a	19	a	20	b
21	a	22	c	23	d	24	c	25	d
26	a	27	b	28	c	29	d	30	d
31	d	32	a	33	b	34	b	35	a
36	b	37	b	38	d	39	b	40	a
41	b	42	d	43	d	44	a	45	b
46	d	47	d	48	b	49	b	50	a
51	bc	52	b	53	d	54	a	55	a

56	b	57	c	58	c	59	c	60	b
61	b	62	c	63	b	64	d	65	b
66	a	67	c	68	b	69	a	70	b
71	d	72	b	73	b	74	b	75	c
76	d	77	a	78	c	79	b	80	a
81	b	82	b	83	d	84	a	85	a
86	b	87	b	88	d	89	b	90	a
91	a	92	c	93	a	94	a	95	b
96	b	97	d						

Doppler's Effect of Light

1	d	2	a	3	b	4	b	5	b
6	b	7	b	8	d	9	c	10	c
11	a	12	c	13	b	14	a	15	a
16	d	17	b	18	c	19	b	20	d
21	b	22	b	23	c	24	c	25	b
26	b	27	c	28	b	29	a	30	d
31	c	32	a	33	a				

Diffraction of Light

1	c	2	a	3	b	4	c	5	c
6	a	7	a	8	a	9	c	10	b
11	a	12	b	13	a	14	d	15	a
16	b	17	a	18	a	19	a	20	d
21	a	22	a	23	c	24	b	25	d
26	a	27	d	28	d	29	b	30	d
31	d	32	d	33	b	34	a	35	c
36	c	37	a	38	c	39	a	40	b
41	c								

Polarisation of Light

1	b	2	a	3	c	4	d	5	d
6	d	7	b	8	d	9	a	10	c
11	a	12	d	13	a	14	a	15	c
16	d	17	d	18	d	19	b	20	c
21	c	22	d	23	a	24	c	25	b
26	b	27	b	28	c	29	a	30	b
31	a	32	a	33	c	34	a	35	d

EM Waves

1	a	2	d	3	b	4	d	5	b
6	b	7	a	8	d	9	c	10	a
11	a	12	c	13	a	14	b	15	b
16	d	17	b	18	d	19	a	20	c
21	a	22	d	23	c	24	b	25	a
26	a	27	c	28	c	29	a	30	b
31	c	32	a	33	d	34	a	35	d
36	c	37	b	38	a	39	a	40	d
41	a	42	b	43	b	44	c	45	a
46	b	47	a	48	c	49	c	50	a
51	c	52	c	53	d	54	d	55	b
56	b	57	a	58	d	59	b	60	c
61	a	62	c	63	b	64	a	65	c
66	d	67	c						

Critical Thinking Questions

1	d	2	a	3	b	4	c	5	a
6	ac	7	a	8	ab	9	d	10	d
11	b	12	d	13	a	14	a	15	b
16	b	17	a	18	a	19	a	20	b
21	ad	22	c	23	a	24	d	25	b
26	c	27	c	28	c	29	a	30	b
31	c	32	b	33	b	34	a	35	b
36	d	37	c	38	b	39	a	40	c
41	d	42	a	43	a	44	a	45	b
46	d	47	b	48	b	49	a	50	d
51	c	52	d	53	a	54	d	55	d
56	a	57	d	58	b	59	a	60	c
61	d	62	c	63	b				

Assertion and Reason

1	d	2	e	3	b	4	a	5	a
6	b	7	c	8	a	9	c	10	b
11	d	12	a	13	c	14	c	15	a
16	a	17	a	18	c	19	d	20	c
21	e	22	a	23	c	24	d	25	c
26	b	27	b	28	d	29	b	30	a