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HSSC-I NATIONAL BOOK FOUNDATION FBISE

PHYSICS TEST - CHAPTER 9: WAVES

Name:		Roll No.		Section:

Total Time: 2:30 Hour
Time Allowed: 150 Minutes

Total Marks: 150

PAPER OBJECTIVE
SECTION-A (MARKS 150)

NOTE: Section-A is compulsory. All parts of this section are to be answered on these pages and handed over to the center superintendent. Deleting / overwriting is not allowed. Do not use lead pencil.

Q.1 Fill the relevant bubble for each part. All parts carry one mark.

Questions	A	B	C	D	A B C D
1. Waves transfer	matter	energy	mass only	charge only	○●○○
2. Intensity of a wave is the energy carried per unit	area per unit time	volume	mass	length	●○○○
3. Intensity is also defined as power per unit	area	length	time	volume	●○○○
4. SI unit of intensity is	N m^{-2}	W m	J m^{-2}	W m^{-2}	○○○●
5. Intensity of a wave is proportional to the	wavelength	cube of amplitude	square of amplitude	amplitude	○○●○
6. If the amplitude of a wave is tripled, intensity becomes	9 times	27 times	6 times	3 times	●○○○
7. If the amplitude is halved, intensity becomes	double	one quarter	half	one eighth	○●○○
8. A wave delivers 200 W over an area of 4 m^2. Intensity is	0.02 W m^{-2}	800 W m^{-2}	204 W m^{-2}	50 W m^{-2}	○○○●
9. Intensity falls as a wave spreads because the same power covers a	smaller area	zero area	larger area	constant area	○○●○
10. Earthquake damage decreases with distance because intensity	increases	doubles	stays constant	decreases	○○○●
11. Wave speed v equals	λ/f	fλ	f + λ	f/λ	○●○○
12. A wave of 500 Hz and wavelength 0.68 m has speed	735 m s^{-1}	340 m s^{-1}	0.00136 m s^{-1}	170 m s^{-1}	○●○○
13. Frequency of a wave is	speed	number of waves per second	wavelength	amplitude	○●○○
14. Unit of frequency is	hertz	watt	metre	joule	●○○○

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Questions	A	B	C	D	A B C D
15. Sound waves are	surface waves only	electromagnetic waves	transverse waves	longitudinal waves	○○○●
16. Light waves are	sound waves	pressure waves	longitudinal waves	transverse waves	○○○●
17. Sound cannot travel through	water	steel	vacuum	air	○○●○
18. The Doppler effect is the apparent change in	amplitude of a source	speed of light	frequency due to relative motion	wavelength of a stationary source	○○●○
19. Doppler effect occurs when source and observer have	equal masses	relative motion	equal speeds only	no motion	○●○○
20. As a sound source approaches a stationary observer, observed frequency is	lower	same	zero	higher	○○○●
21. As a sound source recedes from a stationary observer, observed frequency is	infinite	higher	same	lower	○○○●
22. Observed frequency for a source moving towards observer is f′ =	f (v + vs) / v	f (v − vs) / v	f v / (v + vs)	f v / (v − vs)	○○○●
23. Observed frequency for a receding source is f′ =	f v / (v + vs)	f v / (v − vs)	f (v − vs) / v	f (v + vs) / v	●○○○
24. A 400 Hz source moves at 68 m s⁻¹ towards you (v = 340 m s⁻¹). You hear	320 Hz	500 Hz	333 Hz	400 Hz	○●○○
25. A 400 Hz source moves away at 68 m s⁻¹ (v = 340 m s⁻¹). You hear about	500 Hz	333 Hz	320 Hz	400 Hz	○●○○
26. Pitch of a passing ambulance siren	becomes zero	rises after it passes	stays constant	drops after it passes	○○○●
27. Radar speed traps use the	Hall effect	Compton effect	Doppler effect	photoelectric effect	○○●○
28. Doppler effect is used in	simple pendulums	thermometers	barometers	radar and sonar	○○○●
29. Doppler effect helps doctors to study	bone density only	cardiac problems	vision only	hearing loss only	○●○○
30. Doppler shift of starlight is used in	botany	geology	chemistry	astronomy	○○○●
31. Principle of superposition: resultant displacement is the	average of amplitudes	product of displacements	sum of individual displacements	difference of displacements	○○●○

Questions	A	B	C	D	A B C D
32. Interference is the effect of superposing waves from	coherent sources	one source only	any random sources	incoherent sources	●○○○
33. Coherent sources have	zero amplitude	different frequencies	constant phase difference	random phase	○○●○
34. Coherent waves have the same	frequency and constant phase difference	colour only	speed only	amplitude only	●○○○
35. Constructive interference occurs when waves meet	out of phase	at 90°	in phase	at rest	○○●○
36. Destructive interference occurs when waves meet	180° out of phase	with equal speed	in phase	at rest	●○○○
37. Constructive interference needs path difference of	nλ	λ/4 only	zero only	(n + ½)λ	●○○○
38. Destructive interference needs path difference of	zero	nλ	(n + ½)λ	2nλ	○○●○
39. Two waves of amplitudes 3 cm and 4 cm in phase give amplitude	12 cm	1 cm	5 cm	7 cm	○○○●
40. Two waves of amplitudes 3 cm and 4 cm in antiphase give amplitude	12 cm	5 cm	1 cm	7 cm	○○●○
41. Two identical waves meeting in antiphase result in	zero amplitude	double amplitude	same amplitude	four times amplitude	●○○○
42. Two waves in phase, each of intensity I, give resultant intensity	4I	I	2I	0	●○○○
43. Noise-cancelling headphones work by	destructive interference	polarization	constructive interference	diffraction	●○○○
44. Noise-cancelling headphones produce sound that is	in phase with noise	louder than noise	in antiphase to noise	of double frequency	○○●○
45. Beats are produced by two waves of	equal frequencies	very different frequencies	zero frequency	slightly different frequencies	○○○●
46. Beat frequency equals	$f_1 \times f_2$	$f_1 + f_2$	$f_1 - f_2$	f_1 / f_2	○○●○
47. Forks of 440 Hz and 436 Hz produce beats per second	4	2	876	8	●○○○
48. Forks of 512 Hz and 508 Hz sounded for 10 s give beats	4	1020	20	40	○○○●

Questions	A	B	C	D	A B C D
49. Beats are heard as periodic variation in	pitch only	loudness	wavelength	speed	○●○○
50. Musicians use beats to	tune instruments	record sound	amplify sound	measure speed	●○○○
51. Beats are an example of	refraction	polarization	reflection	interference	○○○●
52. Diffraction is the	polarization of light	change of speed only	reflection of waves	bending of waves around obstacles	○○○●
53. Diffraction is most noticeable when gap size is	comparable to wavelength	much smaller than wavelength always	much larger than wavelength	infinite	●○○○
54. Diffraction of water waves can be shown in a	ripple tank	spectrometer	cloud chamber	bubble chamber	●○○○
55. A wide gap compared with wavelength produces	great diffraction	amplification	no waves	little diffraction	○○○●
56. A stationary wave is formed by the superposition of	two different amplitudes only	two identical waves in opposite directions	two waves in same direction	two different speeds	○●○○
57. A stationary wave has points of zero amplitude called	antinodes	crests	nodes	troughs	○○●○
58. Points of maximum amplitude in a stationary wave are	antinodes	zero points	nodes	crests only	●○○○
59. Distance between two successive nodes is	λ/2	λ	2λ	λ/4	●○○○
60. Distance between adjacent node and antinode is	λ/4	2λ	λ/2	λ	●○○○
61. Stationary waves	transfer maximum energy	have no nodes	move with wave speed	do not transfer energy along the medium	○○○●
62. Stationary waves can be demonstrated using	electroscopes	magnets	thermometers	stretched strings and air columns	○○○●
63. Microwaves can also demonstrate	Boyle's law	stationary waves	radioactivity	magnetism	○●○○
64. A string fixed at both ends has a node at	no end	both ends	its centre only	one end only	○●○○
65. Fundamental frequency of a string of length L and wave speed v is	v / 4L	v / L	v / 2L	2v / L	○○●○

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Questions	A	B	C	D	A B C D
66. String 1.2 m long, wave speed 240 m s⁻¹. Fundamental frequency is	100 Hz	400 Hz	200 Hz	50 Hz	●○○○
67. For that string, the second harmonic is	300 Hz	100 Hz	50 Hz	200 Hz	○○○●
68. For that string, the third harmonic is	300 Hz	100 Hz	400 Hz	200 Hz	●○○○
69. Wavelength of fundamental on a 1.2 m string is	0.6 m	4.8 m	1.2 m	2.4 m	○○○●
70. Wavelength of second harmonic on a string of length L is	L	L/2	4L	2L	●○○○
71. Harmonics of a string are	even multiples only	non-integer multiples	integer multiples of the fundamental	odd multiples only	○○●○
72. Frequency of the nth harmonic of a string is	v / 2nL	n v / 4L	n² v / 2L	n v / 2L	○○○●
73. Doubling the tension of a string makes wave speed	stay same	increase by √2	double	halve	○●○○
74. Shortening a vibrating string raises its	mass	amplitude	frequency	wavelength	○○●○
75. Open pipe has at both ends	no vibrations	nodes	antinodes	one node one antinode	○○●○
76. Closed pipe has	antinode at closed end	node at closed end and antinode at open end	antinodes at both ends	nodes at both ends	○●○○
77. Fundamental frequency of an open pipe of length L is	v / L	2v / L	v / 2L	v / 4L	○○●○
78. Fundamental frequency of a closed pipe of length L is	2v / L	v / 2L	v / 4L	v / L	○○●○
79. Open pipe produces	no harmonics	odd harmonics only	even harmonics only	all harmonics	○○○●
80. Closed pipe produces	all harmonics	even harmonics only	no harmonics	odd harmonics only	○○○●
81. Open pipe of length 0.5 m (v = 340 m s⁻¹) has fundamental	340 Hz	85 Hz	680 Hz	170 Hz	●○○○
82. Closed pipe of length 0.5 m (v = 340 m s⁻¹) has fundamental	170 Hz	85 Hz	340 Hz	680 Hz	●○○○

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Questions	A	B	C	D	A B C D
83. Closed pipe of length 0.25 m ($v = 340\ m\ s^{-1}$) has fundamental	170 Hz	680 Hz	85 Hz	340 Hz	○○○●
84. Harmonics of a closed pipe are in the ratio	1 : 4 : 9	1 : 3 : 5	1 : 2 : 3	2 : 4 : 6	○●○○
85. For a closed pipe, wavelength of fundamental is	L	4L	2L	L/2	○●○○
86. For an open pipe, wavelength of fundamental is	L	4L	2L	L/2	○○●○
87. For equal length, closed pipe's fundamental is	double open pipe's	half of open pipe's	four times open pipe's	same as open pipe's	○●○○
88. Resonance in an air column occurs when its frequency matches the	pipe diameter	frequency of the source	speed of sound	air temperature	○●○○
89. Polarization is a phenomenon associated with	pressure waves	transverse waves	sound waves	longitudinal waves	○●○○
90. Sound waves cannot be polarized because they are	transverse	weak	slow	longitudinal	○○○●
91. Unpolarized light vibrates in	one direction only	many planes	no plane	a single plane	○●○○
92. Plane polarized light vibrates in	no plane	circles only	a single plane	all planes	○○●○
93. A Polaroid filter transmits light vibrating	perpendicular to its axis	parallel to its axis	in all directions	at random	○●○○
94. Two Polaroids with perpendicular axes transmit	no light	all light	half of light	one quarter of light	●○○○
95. Malus's law is	$I = I_0 \sin\theta$	$I = I_0 \cos^2\theta$	$I = I_0 \cos\theta$	$I = I_0 \tan^2\theta$	○●○○
96. In Malus's law, θ is the angle between	light and the ground	source and observer	polarizer and analyzer axes	wave and the medium	○○●○
97. Polarized light of 80 W m^{-2} passes an analyzer at 60°. Output is	60 W m^{-2}	40 W m^{-2}	80 W m^{-2}	20 W m^{-2}	○○○●
98. Polarized light of 80 W m^{-2} passes an analyzer at 45°. Output is	80 W m^{-2}	40 W m^{-2}	20 W m^{-2}	56.6 W m^{-2}	○●○○
99. Polarized light of 80 W m^{-2} passes an analyzer at 30°. Output is	40 W m^{-2}	60 W m^{-2}	80 W m^{-2}	20 W m^{-2}	○●○○

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Questions	A	B	C	D	A B C D
100. Polarized light passes an analyzer at 90°. Transmitted intensity is	half	zero	maximum	one quarter	○●○○
101. Intensity transmitted is maximum when θ is	0°	90°	60°	45°	●○○○
102. Light reflected from a lake is partially polarized	never	perpendicular to the surface	parallel to the water surface	in all planes	○○●○
103. Polaroid sunglasses reduce	sound	colour	glare	heat only	○○●○
104. Polaroid filter in sky photography makes the sky	whiter	transparent	darker	brighter	○○●○
105. Polaroids are used to analyse	density of liquids	stress in transparent plastics	speed of sound	pressure of gases	○●○○
106. Polaroids are used in the entertainment industry for	3-D movies	sound effects	lighting speed	smoke effects	●○○○
107. Gravitational waves are ripples in	the electromagnetic field	water	air	spacetime	○○○●
108. Gravitational waves are produced by	light at rest	stationary masses	accelerating masses	charged particles at rest	○○●○
109. Gravitational waves can be caused by	wind	merging black holes	tides only	falling leaves	○●○○
110. A detector of gravitational waves is	a cloud chamber	LIGO	a Geiger counter	a mass spectrometer	○●○○
111. LIGO uses	barometers	interferometers	thermometers	voltmeters	○●○○
112. Each arm of the LIGO interferometer is about	400 km long	4 m long	40 cm long	4 km long	○○○●
113. Interferometers work on the principle of	reflection only	interference of light	refraction of light	dispersion of light	○●○○
114. Interferometers can measure	very small distances	only sound speed	only large distances	only temperature	●○○○
115. Coherent light has waves of the same wavelength that are	out of phase	in phase	random	of different colours	○●○○
116. A laser is a source of	coherent light	X-rays only	unpolarized random light	sound	●○○○

Questions	A	B	C	D	A B C D
117. Amplitude of a wave is the	time period	maximum displacement from mean	distance between crests	number of waves per second	○●○○
118. Time period T and frequency f are related by	$T = f^2$	$T = 2f$	$T = 1/f$	$T = f$	○○●○
119. Distance between two successive crests is	one amplitude	half wavelength	one period	one wavelength	○○○●
120. Higher pitch of sound means higher	wavelength	speed	frequency	amplitude	○○●○
121. Loudness of sound depends on	wavelength	speed	amplitude	frequency only	○○●○
122. Echo is the	reflection of sound	refraction of sound	absorption of sound	diffraction of sound	●○○○
123. Sonar uses	visible light	gamma rays	radio waves	ultrasonic waves	○○○●
124. Ultrasound is used for	cooking	tanning	deep-heat treatment of muscle strains	magnetizing	○○●○
125. Speed of sound in air increases with	decreasing temperature	amplitude	temperature	loudness	○○●○
126. Speed of sound is greatest in	liquids	vacuum	gases	solids	○○○●
127. Speed of sound in vacuum is	3×10^8 m s^{-1}	1500 m s^{-1}	zero	340 m s^{-1}	○○●○
128. Speed of electromagnetic waves in vacuum is about	340 m s^{-1}	3×10^8 m s^{-1}	3×10^{10} m s^{-1}	3×10^6 m s^{-1}	○●○○
129. The principle that explains stationary waves is	Doppler effect	superposition	refraction	polarization	○●○○
130. When two waves of frequencies 100 Hz and 104 Hz interfere, beat frequency is	4 Hz	204 Hz	2 Hz	102 Hz	●○○○
131. Light from the Sun and a candle is	circularly polarized	unpolarized	fully polarized	partially polarized	○●○○
132. Beat frequency of 256 Hz and 250 Hz is	253 Hz	3 Hz	506 Hz	6 Hz	○○○●
133. Total intensity from two incoherent equal sources of intensity I is	0	2I	4I	I	○●○○

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Questions	A	B	C	D	A B C D
134. Wave speed on a stretched string depends on tension and	frequency of source	amplitude	colour	mass per unit length	○○○●
135. A sound source of 600 Hz moves toward a stationary observer. The observed frequency is	less than 600 Hz	zero	exactly 600 Hz	greater than 600 Hz	○○○●
136. If source and observer move apart, the observed frequency is	infinite	same as source frequency	higher than source frequency	lower than source frequency	○○○●
137. Resultant of two equal waves in phase has amplitude	double	same	half	zero	●○○○
138. Resultant of two equal waves in antiphase has amplitude	zero	half	same	double	●○○○
139. At a node in a stationary wave, displacement is always	maximum	infinite	zero	half maximum	○○●○
140. At an antinode in a stationary wave, displacement is	half maximum	zero	maximum	constant	○○●○
141. A string of length L vibrating in its third harmonic has	3 loops	2 loops	6 loops	1 loop	●○○○
142. The second harmonic of a string has	no nodes	one antinode at each end	two nodes in the middle	one node in the middle	○○○●
143. First overtone of an open pipe is its	second harmonic	third harmonic	fourth harmonic	first harmonic	●○○○
144. First overtone of a closed pipe is its	third harmonic	first harmonic	second harmonic	fourth harmonic	●○○○
145. Frequency of the first overtone of a string equals the	third harmonic	fundamental	second harmonic	fourth harmonic	○○●○
146. A guitar string is made to sound higher by	thickening it	loosening it	increasing its tension	lengthening it	○○●○
147. Beats can be eliminated if the two frequencies are made	equal	zero	double	different	●○○○
148. Diffraction through a slit is greatest when the slit width is	many times wavelength	zero	about equal to wavelength	infinite	○○●○
149. Light diffracts less than sound because its wavelength is	zero	much shorter	much longer	equal to sound's	○●○○
150. Transverse waves can be polarized because vibrations are	perpendicular to propagation	along propagation	circular only	zero	●○○○

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