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NEET WAVES — PYQS

Max. Marks: 232 **Questions:** 58

Section A (MCQ) — 58 questions

Q.1 For a travelling harmonic wave $y(x,t) = 2.0\cos 2\pi(10t - 0.0080x + 0.35)$, where x and y are in cm and t in s. The phase difference between oscillatory motion of two points separated by a distance of 0.5 m is: [NEET (UG) 2026]

(1) 0.08 π rad (2) 0.008 π rad
(3) 0.8 π rad (4) 8 π rad

Scan or tap for the full solution

Q.2 For sound waves, if the number of nodes for the 5th harmonic of an open-ended pipe is n and that for the 9th harmonic of the same pipe with one of its ends closed is m, the ratio $\frac{n}{m}$ is [RE-NEET (UG) 2026]

(1) $\frac{3}{5}$ (2) $\frac{5}{9}$ (3) $\frac{9}{5}$ (4) 1

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Q.3 A pipe open at both ends has a fundamental frequency f in air. The pipe is now dipped vertically in a water drum to half of its length. The fundamental frequency of the air column is now equal to: [NEET (UG) 2025]

(1) $\frac{3f}{2}$ (2) 2f (3) $\frac{f}{2}$ (4) f

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Q.4 The displacement of a travelling wave $y = C\sin\frac{2\pi}{\lambda}(at - x)$ where t is time, x is distance and λ is the wavelength, all in S.I. units. Then the frequency of the wave is [RE-NEET (UG) 2024]

(1) $\frac{2\pi\lambda}{a}$ (2) $\frac{2\pi a}{\lambda}$ (3) $\frac{\lambda}{a}$ (4) $\frac{a}{\lambda}$

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Q.5 The ratio of frequencies of fundamental harmonic produced by an open pipe to that of closed pipe having the same length is [NEET (UG) 2023]

(1) 2:1 (2) 1:3 (3) 3:1 (4) 1:2

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Q.6 If the initial tension on a stretched string is doubled, then the ratio of the initial and final speeds of a transverse wave along the string is [NEET (UG) 2022]

(1) 1:1 (2) $\sqrt{2}:1$
(3) $1:\sqrt{2}$ (4) 1:2

Scan or tap for the full solution

Q.7 An organ pipe filled with a gas at 27°C resonates at 400 Hz in its fundamental mode. If it is filled with the same gas at 90°C, the resonance frequency at the same mode will be [NEET (UG) 2022 (Phase 2)]

(1) 512 Hz (2) 420 Hz (3) 440 Hz (4) 484 Hz

Scan or tap for the full solution

Q.8 In a guitar, two strings A and B made of same material are slightly out of tune and produce beats of frequency 6 Hz. When tension in B is slightly decreased, the beat frequency increases. If the frequency of A is 530 Hz, the original frequency of B will be : [NEET (UG) 2020]

(1) 524 Hz (2) 536 Hz (3) 537 Hz (4) 523 Hz

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Q.9 A tuning fork is used to produce resonance in a glass tube. The length of the air column in this tube can be adjusted by a variable piston. At room temperature of 27°C two successive resonances are produced at 20 cm and 73 cm of column length. If the frequency of the tuning fork is 320 Hz, the velocity of sound in air at 27°C is [NEET 2018]

(1) 330 m s^{-1} (2) 339 m s^{-1}
(3) 350 m s^{-1} (4) 300 m s^{-1}

Scan or tap for the full solution

Q.10 The fundamental frequency in an open organ pipe is equal to the third harmonic of a closed organ pipe. If the length of the closed organ pipe is 20 cm, the length of the open organ pipe is [NEET 2018]

(1) 13.2 cm (2) 8 cm
(3) 12.5 cm (4) 16 cm

Solution

Q.11 The two nearest harmonics of a tube closed at one end and open at other end are 220 Hz and 260 Hz. What is the fundamental frequency of the system ? [NEET 2017]

(1) 20 Hz (2) 30 Hz (3) 40 Hz (4) 10 Hz

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Q.12 Two cars moving in opposite directions approach each other with speed of 22 m s^{-1} and 16.5 m s^{-1} respectively. The driver of the first car blows a horn having a frequency 400 Hz. The frequency heard by the driver of the second car is (velocity of sound is 340 m s^{-1}) [NEET 2017]

(1) 361 Hz (2) 411 Hz (3) 448 Hz (4) 350 Hz

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Q.13 An air column, closed at one end open at the other, resonates with a tuning fork when the smallest length of the column is 50 cm. The next larger length of the column resonating with the same tuning fork is [NEET 2016 (Phase 1)]

(1) 150 cm (2) 200 cm
(3) 66.7 cm (4) 100 cm

Solution

Q.14 A uniform rope of length L and mass m_1 hangs vertically from a rigid support. A block of mass m_2 is attached to the free end of the rope. A transverse pulse of wavelength λ_1 is produced at the lower end of the rope. The wavelength of the pulse when it reaches the top of the rope is λ_2. The ratio λ_2/λ_1 is [NEET 2016 (Phase 1)]

(1) $\sqrt{\frac{m_2}{m_1}}$ (2) $\sqrt{\frac{m_1+m_2}{m_1}}$

(3) $\sqrt{\frac{m_1}{m_2}}$ (4) $\sqrt{\frac{m_1+m_2}{m_2}}$

Scan or tap for the full solution

Q.15 A siren emitting a sound of frequency 800 Hz moves away from an observer towards a cliff at a speed of 15 m s^{-1}. Then, the frequency of sound that the observer hears in the echo reflected from the cliff is
(Take velocity of sound in air = 330 m s^{-1}) [NEET 2016 (Phase 1)]

(1) 838 Hz (2) 885 Hz (3) 765 Hz (4) 800 Hz

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Q.16 The second overtone of an open organ pipe has the same frequency as the first overtone of a closed pipe L metre long. The length of the open pipe will be [NEET 2016 (Phase 2)]

(1) L (2) 2L (3) $\frac{L}{2}$ (4) 4L

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Q.17 Three sound waves of equal amplitudes have frequencies (n − 1), n, (n + 1). They superimpose to give beats. The number of beats produced per second will be [NEET 2016 (Phase 2)]

(1) 1 (2) 4 (3) 3 (4) 2

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Q.18 A string is stretched between fixed points separated by 75.0 cm. It is observed to have resonant frequencies of 420 Hz and 315 Hz. There are no other resonant frequencies between these two. The lowest resonant frequency for this string is [AIPMT 2015]

(1) 10.5 Hz (2) 105 Hz
(3) 155 Hz (4) 205 Hz

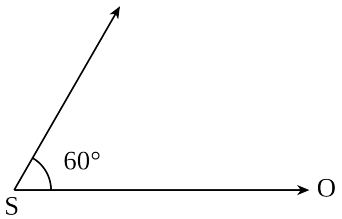
Solution

Q.19 The fundamental frequency of a closed organ pipe of length 20 cm is equal to the second overtone of an organ pipe open at both the ends. The length of organ pipe open at both the ends is [AIPMT 2015]

(1) 120 cm (2) 140 cm (3) 80 cm (4) 100 cm

Scan or tap for the full solution

Q.20 A source of sound S emitting waves of frequency 100 Hz and an observer O are located at some distance from each other. The source is moving with a speed of 19.4 m s^{-1} at an angle of 60° with the source observer line as shown in the figure. The observer is at rest. The apparent frequency observed by the observer (velocity of sound in air 330 m s^{-1}), is [AIPMT 2015]



(1) 106 Hz (2) 97 Hz (3) 100 Hz (4) 103 Hz

Scan or tap for the full solution

Q.21 If n_1, n_2 and n_3 are the fundamental frequencies of three segments into which a string is divided, then the original fundamental frequency n of the string is given by [AIPMT 2014]

(1) $\frac{1}{n} = \frac{1}{n_1} + \frac{1}{n_2} + \frac{1}{n_3}$

(2) $\frac{1}{\sqrt{n}} = \frac{1}{\sqrt{n_1}} + \frac{1}{\sqrt{n_2}} + \frac{1}{\sqrt{n_3}}$

(3) $\sqrt{n} = \sqrt{n_1} + \sqrt{n_2} + \sqrt{n_3}$

(4) $n = n_1 + n_2 + n_3$

Scan or tap for the full solution

Q.22 The number of possible natural oscillations of air column in a pipe closed at one end of length 85 cm whose frequencies lie below 1250 Hz are (Velocity of sound = 340 m s^{-1}) [AIPMT 2014]

(1) 4 (2) 5 (3) 7 (4) 6

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Q.23 A speeding motorcyclist sees traffic jam ahead of him. He slows down to 36 km $hour^{-1}$. He finds that traffic has eased and a car moving ahead of him at 18 km $hour^{-1}$ is honking at a frequency of 1392 Hz. If the speed of sound is 343 m s^{-1}, the frequency of the honk as heard by him will be [AIPMT 2014]

(1) 1332 Hz (2) 1372 Hz

(3) 1412 Hz (4) 1454 Hz

Scan or tap for the full solution

Q.24 If we study the vibration of a pipe open at both ends, then the following statement is not true. [NEET 2013]

(1) All harmonics of the fundamental frequency will be generated.

(2) Pressure change will be maximum at both ends.

(3) Open end will be antinode.

(4) Odd harmonics of the fundamental frequency will be generated.

Scan or tap for the full solution

Q.25 A wave travelling in the +ve x-direction having displacement along y-direction as 1 m, wavelength 2π m and frequency of $\frac{1}{\pi}$ Hz is represented by [NEET 2013]

(1) $y = \sin(10\pi x - 20\pi t)$ (2) $y = \sin(2\pi x + 2\pi t)$

(3) $y = \sin(x - 2t)$ (4) $y = \sin(2\pi x - 2\pi t)$

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Q.26 A source of unknown frequency gives 4 beats/s when sounded with a source of known frequency 250 Hz. The second harmonic of the source of unknown frequency gives five beats per second, when sounded with a source of frequency 513 Hz. The unknown frequency is [NEET 2013]

(1) 240 Hz (2) 260 Hz (3) 254 Hz (4) 246 Hz

Scan or tap for the full solution

Q.27 The length of the wire between two ends of a sonometer is 100 cm. What should be the positions of two bridges below the wire so that the three segments of the wire have their fundamental frequencies in the ratio 1 : 3 : 5. [NEET 2013 (Karnataka)]

(1) $\frac{1500}{23}$ cm, $\frac{500}{23}$ cm (2) $\frac{1500}{23}$ cm, $\frac{300}{23}$ cm

(3) $\frac{300}{23}$ cm, $\frac{1500}{23}$ cm (4) $\frac{1500}{23}$ cm, $\frac{2000}{23}$ cm

Scan or tap for the full solution

Q.28 Two sources P and Q produce notes of frequency 660 Hz each. A listener moves from P to Q with a speed of 1 m s^{-1}. If the speed of sound is 330 m/s, then the number of beats heard by the listener per second will be [NEET 2013 (Karnataka)]

(1) 4 (2) 8 (3) 2 (4) zero

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Q.29 The equation of a simple harmonic wave is given by $y = 3\sin\frac{\pi}{2}(50t - x)$,

where x and y are in metres and t is in seconds. The ratio of maximum particle velocity to the wave velocity is [AIPMT 2012 (Mains)]

(1) 2π (2) $\frac{3}{2}\pi$ (3) 3π (4) $\frac{2}{3}\pi$

Scan or tap for the full solution

Q.30 A train moving at a speed of 220 m s^{-1} towards a stationary object, emits a sound of frequency 1000 Hz. Some of the sound reaching the object gets reflected back to the train as echo. The frequency of the echo as detected by the driver of the train is

(Speed of sound in air is 330 m s^{-1}) [AIPMT 2012 (Mains)]

(1) 3500 Hz (2) 4000 Hz

(3) 5000 Hz (4) 3000 Hz

Scan or tap for the full solution

Q.31 When a string is divided into three segments of lengths l_1, l_2 and l_3, the fundamental frequencies of these three segments are ν_1, ν_2 and ν_3 respectively. The original fundamental frequency (ν) of the string is [AIPMT 2012 (Prelims)]

(1) $\sqrt{\nu} = \sqrt{\nu_1} + \sqrt{\nu_2} + \sqrt{\nu_3}$

(2) $\nu = \nu_1 + \nu_2 + \nu_3$

(3) $\frac{1}{\nu} = \frac{1}{\nu_1} + \frac{1}{\nu_2} + \frac{1}{\nu_3}$

(4) $\frac{1}{\sqrt{\nu}} = \frac{1}{\sqrt{\nu_1}} + \frac{1}{\sqrt{\nu_2}} + \frac{1}{\sqrt{\nu_3}}$

Scan or tap for the full solution

Q.32 Two sources of sound placed close to each other, are emitting progressive waves given by
$y_1 = 4\sin 600\pi t$ and $y_2 = 5\sin 608\pi t$
An observer located near these two sources of sound will hear [AIPMT 2012 (Prelims)]
(1) 4 beats per second with intensity ratio 25 : 16 between waxing and waning.
(2) 8 beats per second with intensity ratio 25 : 16 between waxing and waning.
(3) 8 beats per second with intensity ratio 81 : 1 between waxing and waning.
(4) 4 beats per second with intensity ratio 81 : 1 between waxing and waning.

Scan or tap for the full solution

Q.33 Two identical piano wires, kept under the same tension T have a fundamental frequency of 600 Hz. The fractional increase in the tension of one of the wires which will lead to occurrence of 6 beats/s when both the wires oscillate together would be [AIPMT 2011 (Mains)]
(1) 0.01 (2) 0.02 (3) 0.03 (4) 0.04

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Q.34 Two waves are represented by the equations
$y_1 = a\sin(\omega t + kx + 0.57)$ m and
$y_2 = a\cos(\omega t + kx)$ m, where x is in metre and t in second. The phase difference between them is [AIPMT 2011 (Prelims)]
(1) 1.0 radian (2) 1.25 radian
(3) 1.57 radian (4) 0.57 radian

Scan or tap for the full solution

Q.35 Sound waves travel at 350 m/s through warm air and at 3500 m/s through brass. The wavelength of a 700 Hz acoustic wave as it enters brass from warm air [AIPMT 2011 (Prelims)]
(1) decrease by a factor 10
(2) increase by a factor 20
(3) increase by a factor 10
(4) decrease by a factor 20

Solution

Q.36 A transverse wave is represented by $y = A\sin(\omega t - kx)$. For what value of the wavelength is the wave velocity equal to the maximum particle velocity? [AIPMT 2010 (Prelims)]
(1) $\pi A/2$ (2) πA (3) $2\pi A$ (4) A

Scan or tap for the full solution

Q.37 A tuning fork of frequency 512 Hz makes 4 beats per second with the vibrating string of a piano. The beat frequency decreases to 2 beats per sec when the tension in the piano string is slightly increased. The frequency of the piano string before increasing the tension was [AIPMT 2010 (Prelims)]
(1) 510 Hz (2) 514 Hz (3) 516 Hz (4) 508 Hz

Scan or tap for the full solution

Q.38 Each of the two strings of length 51.6 cm and 49.1 cm are tensioned separately by 20 N force. Mass per unit length of both the strings is same and equal to 1 g/m. When both the strings vibrate simultaneously the number of beats is [AIPMT 2009]
(1) 7 (2) 8 (3) 3 (4) 5

Scan or tap for the full solution

Q.39 A wave in a string has an amplitude of 2 cm. The wave travels in the +ve direction of x axis with a speed of 128 m/s and it is noted that 5 complete waves fit in 4 m length of the string. The equation describing the wave is [AIPMT 2009]
(1) y = (0.02) m sin (15.7x − 2010t)
(2) y = (0.02) m sin (15.7x + 2010t)
(3) y = (0.02) m sin (7.85x − 1005t)
(4) y = (0.02) m sin (7.85x + 1005t)

Solution

Q.40 The driver of a car travelling with speed 30 m/s towards a hill sounds a horn of frequency 600 Hz. If the velocity of sound in air is 330 m/s, the frequency of reflected sound as heard by driver is [AIPMT 2009]
(1) 555.5 Hz (2) 720 Hz
(3) 500 Hz (4) 550 Hz

Solution

Q.41 Two periodic waves of intensities I_1 and I_2 pass through a region at the same time in the same direction. The sum of the maximum and minimum intensities is [AIPMT 2008]
(1) $\left(\sqrt{I_1} - \sqrt{I_2}\right)^2$ (2) $2(I_1 + I_2)$
(3) $I_1 + I_2$ (4) $\left(\sqrt{I_1} + \sqrt{I_2}\right)^2$

Scan or tap for the full solution

Q.42 The wave described by y = 0.25 sin(10πx − 2πt), where x and y are in metres and t in seconds, is a wave travelling along the [AIPMT 2008]
(1) +ve x direction with frequency 1 Hz and wavelength λ = 0.2 m.

(2) −ve x direction with amplitude 0.25 m and wavelength $\lambda = 0.2$ m.

(3) −ve x direction with frequency 1 Hz.

(4) +ve x direction with frequency π Hz and wavelength $\lambda = 0.2$ m.

Scan or tap for the full solution

Q.43 Two vibrating tuning forks produce waves given by $y_1 = 4\sin 500\pi t$ and $y_2 = 2\sin 506\pi t$. Number of beats produced per minute is [AIPMT 2006]

(1) 360 (2) 180 (3) 60 (4) 3

Scan or tap for the full solution

Q.44 Two sound waves with wavelengths 5.0 m and 5.5 m respectively, each propagate in a gas with velocity 330 m/s. We expect the following number of beats per second. [AIPMT 2006]

(1) 6 (2) 12 (3) 0 (4) 1

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Q.45 The time of reverberation of a room A is one second. What will be the time (in seconds) of reverberation of a room, having all the dimensions double of those of room A? [AIPMT 2006]

(1) 1 (2) 2 (3) 4 (4) 1/2

Scan or tap for the full solution

Q.46 A transverse wave propagating along x-axis is represented by $y(x, t) = 8.0\sin(0.5\pi x - 4\pi t - \pi/4)$ where x is in metres and t is in seconds. The speed of the wave is [AIPMT 2006]

(1) 8 m/s (2) 4π m/s

(3) 0.5π m/s (4) $\pi/4$ m/s

Solution

Q.47 Which one of the following statements is true? [AIPMT 2006]

(1) Both light and sound waves can travel in vacuum

(2) Both light and sound waves in air are transverse

(3) The sound waves in air are longitudinal while the light waves are transverse

(4) Both light and sound waves in air are longitudinal

Scan or tap for the full solution

Q.48 A point source emits sound equally in all directions in a non-absorbing medium. Two points P and Q are at distances of 2 m and 3 m respectively from the source. The ratio of the intensities of the waves at P and Q is [AIPMT 2005]

(1) 3 : 2 (2) 2 : 3 (3) 9 : 4 (4) 4 : 9

Scan or tap for the full solution

Q.49 The phase difference between two waves represented by

$y_1 = 10^{-6}\sin[100t + (x/50) + 0.5]$ m

$y_2 = 10^{-6}\cos[100t + (x/50)]$ m,

where x is expressed in metres and t is expressed in seconds, is approximately [AIPMT 2004]

(1) 1.07 radians (2) 2.07 radians

(3) 0.5 radians (4) 1.5 radians

Scan or tap for the full solution

Q.50 A car is moving towards a high cliff. The driver sounds a horn of frequency f. The reflected sound heard by the driver has frequency 2f. If v is the velocity of sound, then the velocity of the car, in the same velocity units, will be [AIPMT 2004]

(1) $v/\sqrt{2}$ (2) v/3 (3) v/4 (4) v/2

Scan or tap for the full solution

Q.51 An observer moves towards a stationary source of sound with a speed $1/5^{th}$ of the speed of sound. The wavelength and frequency of the source emitted are λ and f respectively. The apparent frequency and wavelength recorded by the observer are respectively [AIPMT 2003]

(1) 1.2f, 1.2λ (2) 1.2f, λ

(3) f, 1.2λ (4) 0.8f, 0.8λ

Scan or tap for the full solution

Q.52 A wave travelling in positive X-direction with a = 0.2 m, velocity = 360 m s^{-1} and λ = 60 m, then correct expression for the wave is [AIPMT 2002]

(1) $y = 0.2\sin\left[2\pi\left(6t + \frac{x}{60}\right)\right]$

(2) $y = 0.2\sin\left[\pi\left(6t + \frac{x}{60}\right)\right]$

(3) $y = 0.2\sin\left[2\pi\left(6t - \frac{x}{60}\right)\right]$

(4) $y = 0.2\sin\left[\pi\left(6t - \frac{x}{60}\right)\right]$

Scan or tap for the full solution

Q.53 A whistle revolves in a circle with angular speed ω = 20 rad/s using a string of length 50 cm. If the frequency of sound from the whistle is 385 Hz, then what is the minimum frequency heard by an observer which is far away from the centre (velocity of sound = 340 m/s) [AIPMT 2002]

(1) 385 Hz (2) 374 Hz (3) 394 Hz (4) 333 Hz

Scan or tap for the full solution

Q.54 The equation of a wave is represented by $y = 10^{-4}\sin\left(100t - \frac{x}{10}\right)$ m, then the velocity of wave will be [AIPMT 2001]

(1) 100 m/s (2) 4 m/s
(3) 1000 m/s (4) 10 m/s

Solution

Q.55 Two waves having equation $x_1 = a\sin(\omega t - kx + \phi_1)$, $x_2 = a\sin(\omega t - kx + \phi_2)$. If in the resultant wave the frequency and amplitude remain equal to amplitude of superimposing waves, the phase difference between them is [AIPMT 2001]

(1) $\frac{\pi}{6}$ (2) $\frac{2\pi}{3}$ (3) $\frac{\pi}{4}$ (4) $\frac{\pi}{3}$

Scan or tap for the full solution

Q.56 If the tension and diameter of a sonometer wire of fundamental frequency n is doubled and density is halved then its fundamental frequency will become [AIPMT 2001]

(1) $\frac{n}{4}$ (2) $\sqrt{2}n$ (3) n (4) $\frac{n}{\sqrt{2}}$

Scan or tap for the full solution

Q.57 A string is cut into three parts, having fundamental frequencies n_1, n_2, n_3 respectively. Then original fundamental frequency n related by the expression as [AIPMT 2000]

(1) $\frac{1}{n} = \frac{1}{n_1} + \frac{1}{n_2} + \frac{1}{n_3}$ (2) $n = n_1 \times n_2 \times n_3$

(3) $n = n_1 + n_2 + n_3$ (4) $n = \frac{n_1 + n_2 + n_3}{3}$

Scan or tap for the full solution

Q.58 Two stationary sources each emit waves of wavelength λ. An observer moves from one source to the other with velocity u. Then the number of beats heard by him is [AIPMT 2000]

(1) $\frac{2u}{\lambda}$ (2) $\frac{u}{\lambda}$ (3) $\sqrt{u\lambda}$ (4) $\frac{u}{2\lambda}$

Scan or tap for the full solution

ANSWER KEY

Ques.	1	2	3	4	5	6	7	8	9	10	11
Ans.	**3**	**4**	**4**	**4**	**1**	**3**	**3**	**1**	**2**	**1**	**1**
Ques.	12	13	14	15	16	17	18	19	20	21	22
Ans.	**3**	**1**	**4**	**1**	**2**	**4**	**2**	**1**	**4**	**1**	**4**
Ques.	23	24	25	26	27	28	29	30	31	32	33
Ans.	**3**	**2**	**3**	**3**	**4**	**1**	**2**	**3**	**3**	**4**	**2**
Ques.	34	35	36	37	38	39	40	41	42	43	44
Ans.	**1**	**3**	**3**	**4**	**1**	**3**	**2**	**2**	**1**	**2**	**1**
Ques.	45	46	47	48	49	50	51	52	53	54	55
Ans.	**2**	**1**	**3**	**3**	**1**	**2**	**2**	**3**	**2**	**3**	**2**
Ques.	56	57	58								
Ans.	**3**	**1**	**1**								

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