



PHYSICS CLASS - XII

Date :- 13-06-2010 **Duration : 1 Hours** **Max. Marks : 77**

Name : **Roll. No. :**

INSTRUCTIONS

Do not break the seal of the question paper booklet before instructed to do so by the invigilator

Section A contains 15 questions, Section-B contains 1 questions and Section-C contains 2 questions. Total number of pages are 8. Please ensure that the Questions paper you have received contains ALL THE QUESTIONS in each section and PAGES.

SECTION - A

- Question 1 to Question 8 has four choices (A), (B), (C), (D) out of which **only one is correct** & carry **4 marks** each. **1 mark** will be deducted for each wrong answer.
- Question 9 to Question 12 has four choices (A), (B), (C), (D) out of which **one or more than one is/are correct** and carry **5 marks** each. **2 mark** will be deducted for each wrong answer.
- Question 13 to Question 15 are based upon a **paragraph**. Each Question has 4 choices (A), (B), (C), (D) out of which **only one is correct** & carry **3 marks** each. **1 mark** will be deducted for each wrong answer.

SECTION - B

- Questions 1 is **Matrix match type** questions. **Column-I** contains Four (A,B,C,D) entries and **Column-II** contains Five (P,Q,R,S,T) entries. Entry of **Column-I** are to be matched with **one or more than one entries** of **Column-II** or **vice versa**. **2 mark** will be awarded for each part of **Column-I**. **NO NEGATIVE** marking for this section.

SECTION - C

- Questions 1 to Questions 2 are **Integer answer type questions** (whose answer are upto 4 digits) & carry **4 marks** each. **NO NEGATIVE** marking for this section.

NOTE : GENERAL INSTRUCTION FOR FILLING THE OMR ARE GIVEN BELOW.

- Use only **HB pencil** or **blue/black pen (avoid gel pen)** for darkening the bubble.
- Indicate the correct answer for each question by filling appropriate bubble in your OMR answer sheet.
- The Answer sheet will be checked through computer hence, the answer of the question must be marked by shading the circles against the question by dark **HB pencil or blue/black pen**.
- While filling the bubbles please be careful about SECTIONS [i.e. Section-A include single correct answers, multi correct answers, paragraph type), Section-B (include match the column), Section-C (include integer answer type)].

SECTION-A	SECTION-B	SECTION-C																														
<p>For example if only 'A' choice is correct then, the correct method for filling the bubble is</p> <p>A B C D E ● ○ ○ ○ ○</p> <p>For example if only 'A & C' choices are correct then, the correct method for filling the bubble is</p> <p>A B C D E ● ○ ● ○ ○</p> <p>the wrong method for filling the bubble are</p> <p>⊙ ⊗ ⊕ ⊖ ⊗</p> <p>The answer of the questions in wrong or any other manner will be treated as wrong.</p>	<p>For example If Correct match for (A) is P; for (B) is R, S; for (C) is Q; for (D) is P, Q, S then the correct method for filling the bubble is</p> <table border="0"> <tr><td>A</td><td>●</td><td>○</td><td>○</td><td>○</td><td>○</td></tr> <tr><td>B</td><td>○</td><td>○</td><td>●</td><td>●</td><td>○</td></tr> <tr><td>C</td><td>○</td><td>●</td><td>○</td><td>○</td><td>○</td></tr> <tr><td>D</td><td>●</td><td>●</td><td>○</td><td>●</td><td>○</td></tr> </table>	A	●	○	○	○	○	B	○	○	●	●	○	C	○	●	○	○	○	D	●	●	○	●	○	<p>Ensure that all columns are filled. Answers, having blank column will be treated as incorrect. Insert leading zero(s) if required :</p> <table border="0"> <tr> <td>'6' should be filled as 0006</td> <td>'86' should be filled as 0086</td> <td>'1857' should be filled as 1857</td> </tr> <tr> <td>●●●●○ ①①①①① ②②②②② ③③③③③ ④④④④④ ⑤⑤⑤⑤⑤ ⑥⑥⑥⑥● ⑦⑦⑦⑦⑦ ⑧⑧⑧⑧⑧ ⑨⑨⑨⑨⑨</td> <td>●●●○ ①①①①① ②②②②② ③③③③③ ④④④④④ ⑤⑤⑤⑤⑤ ⑥⑥⑥● ⑦⑦⑦⑦⑦ ⑧⑧●⑧⑧ ⑨⑨⑨⑨⑨</td> <td>○●○●○ ●①①①① ②②②②② ③③③③③ ④④④④④ ⑤⑤⑤⑤⑤ ⑥⑥⑥⑥⑥ ⑦⑦⑦⑦⑦ ⑧●⑧⑧⑧ ⑨⑨⑨⑨⑨</td> </tr> </table>	'6' should be filled as 0006	'86' should be filled as 0086	'1857' should be filled as 1857	●●●●○ ①①①①① ②②②②② ③③③③③ ④④④④④ ⑤⑤⑤⑤⑤ ⑥⑥⑥⑥● ⑦⑦⑦⑦⑦ ⑧⑧⑧⑧⑧ ⑨⑨⑨⑨⑨	●●●○ ①①①①① ②②②②② ③③③③③ ④④④④④ ⑤⑤⑤⑤⑤ ⑥⑥⑥● ⑦⑦⑦⑦⑦ ⑧⑧●⑧⑧ ⑨⑨⑨⑨⑨	○●○●○ ●①①①① ②②②②② ③③③③③ ④④④④④ ⑤⑤⑤⑤⑤ ⑥⑥⑥⑥⑥ ⑦⑦⑦⑦⑦ ⑧●⑧⑧⑧ ⑨⑨⑨⑨⑨
A	●	○	○	○	○																											
B	○	○	●	●	○																											
C	○	●	○	○	○																											
D	●	●	○	●	○																											
'6' should be filled as 0006	'86' should be filled as 0086	'1857' should be filled as 1857																														
●●●●○ ①①①①① ②②②②② ③③③③③ ④④④④④ ⑤⑤⑤⑤⑤ ⑥⑥⑥⑥● ⑦⑦⑦⑦⑦ ⑧⑧⑧⑧⑧ ⑨⑨⑨⑨⑨	●●●○ ①①①①① ②②②②② ③③③③③ ④④④④④ ⑤⑤⑤⑤⑤ ⑥⑥⑥● ⑦⑦⑦⑦⑦ ⑧⑧●⑧⑧ ⑨⑨⑨⑨⑨	○●○●○ ●①①①① ②②②②② ③③③③③ ④④④④④ ⑤⑤⑤⑤⑤ ⑥⑥⑥⑥⑥ ⑦⑦⑦⑦⑦ ⑧●⑧⑧⑧ ⑨⑨⑨⑨⑨																														

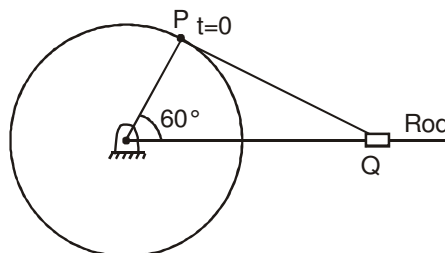
PART - II [PHYSICS]

SECTION - (A)

[STRAIGHT OBJECTIVE TYPE]

Q.1 to Q.8 has four choices (A), (B), (C), (D) out of which **ONLY ONE** is correct

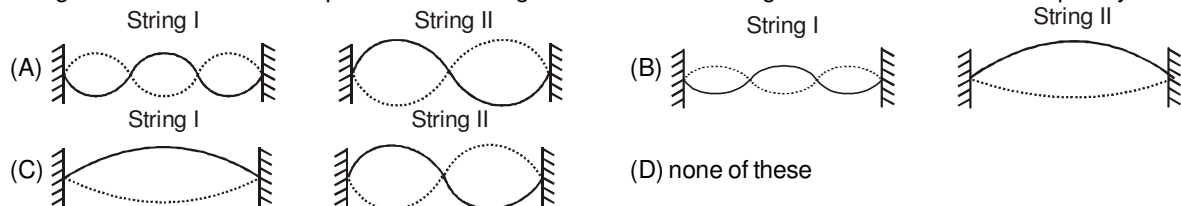
1. In this piston linkage mechanism, the wheel of radius $R = 0.5$ m rotates with a constant angular velocity $\omega = 10$ rad/s. If the piston (point Q) is constrained to move along a smooth horizontal rod. Assuming at $t = 0$, the phase of P is $\phi = 60^\circ$. Then the equation of motion of P



- (A) $x = 0.5\cos\left(10t + \frac{\pi}{3}\right)$ (B) $x = 0.5\cos\left(10t + \frac{\pi}{6}\right)$
 (C) $x = \cos\left(10t + \frac{\pi}{3}\right)$ (D) none of these

2. Two students, Alex and Brian, are in a museum watching the swinging of a pendulum with a large bob. Alex says, "I'm going to sneak past the fence and stick some chewing gum on the top of the pendulum bob to change its period of oscillation." Brian says, "That won't change the period. The period of a pendulum is independent of mass." Which student is correct?
 (A) Alex (B) Brian (C) Both (D) depend on pendulum

3. String I and II have identical lengths and linear mass densities, but string I is under greater tension than string II. The accompanying figure shows four different situations. A to D, in which standing wave patterns exist on the two strings. In which situation is it possible that strings I and II are oscillating at the same resonant frequency?

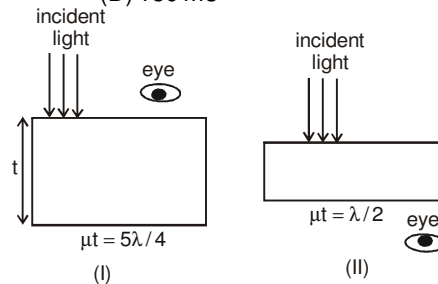


(SPACE FOR ROUGH WORK)



4. A string of length 80 cm and mass 20 g is clamped tightly at its ends. A constant tension of 6.4 N is sustained in the string. now, a series of identical pulses are produced at certain point on the length of the string at equal interval of time Δt , The minimum value of Δt which allows constructive interference between successive pulses must be
 (A) 50 ms (B) 100 ms (C) 200 ms (D) 150 ms

5. Monochromatic light strikes normally on two different thin films, which are in air, as shown. If t denotes the film thickness and λ denotes the wavelength of the light in the film, which films will produce constructive interference as seen by the observer?
 (A) I only (B) II only
 (C) I and II (D) None of the two



6. A total charge Q is broken in two parts Q_1 and Q_2 and they are placed at a distance R from each other. The maximum force of repulsion between them will occur, when

(A) $Q_2 = \frac{Q}{R}, Q_1 = Q - \frac{Q}{R}$ (B) $Q_2 = \frac{Q}{4}, Q_1 = Q - \frac{2Q}{3}$ (C) $Q_2 = \frac{Q}{4}, Q_1 = \frac{3Q}{4}$ (D) $Q_1 = \frac{Q}{2}, Q_2 = \frac{Q}{2}$

7. In Young's double slit experiment, one of the slits is wider than the other, so that the amplitude of the light from one slit is double that from the other slit. If I_m be the maximum intensity, the resultant intensity when they interfere at phase difference ϕ is given by :

(A) $\frac{I_m}{3} \left(1 + 2 \cos^2 \frac{\phi}{2} \right)$ (B) $\frac{I_m}{5} \left(1 + 4 \cos^2 \frac{\phi}{2} \right)$ (C) $\frac{I_m}{9} \left(1 + 8 \cos^2 \frac{\phi}{2} \right)$ (D) none of these

8. A point source is sinking down in a liquid of refractive index μ with a constant velocity v_0 . The rate of change of the area through which light will escape from the liquid when the source is at a depth h_0 will be :

(A) $\frac{2\pi h_0 v_0}{(\mu^2 + 1)}$ (B) $\frac{2\pi h_0 v_0}{(\mu^2 - 1)}$ (C) $\frac{2\pi h_0 v_0}{\sqrt{\mu^2 - 1}}$ (D) none of these

(SPACE FOR ROUGH WORK)



[MULTIPLE OBJECTIVE TYPE]

Q.9 to Q.12 has four choices (A), (B), (C), (D) out of which **ONE OR MORE THAN ONE** is/are correct.

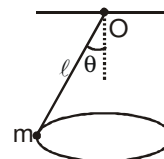
9. Two point sources P and Q are 24 cm apart. Where should a convex lens of focal length 9 cm be placed in between them so that the images of both sources are formed at the same place ?
 (A) 6 cm from P (B) 9 cm from Q (C) 15 cm from P (D) 18 cm from P

10. A particle having mass m is attached to the ceiling with a string of length ℓ . It moves in a horizontal circle as shown.
 (A) Tension (T) in the string is $mg \sec \theta$

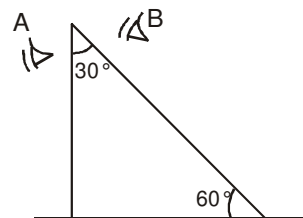
(B) Time period (P) of the motion is $2\pi \sqrt{\frac{\ell \cos \theta}{g}}$

(C) Tension (T) in the string is $mg \sin \theta$

(D) Time period (P) of the motion is $2\pi \sqrt{\frac{\ell}{g}}$



11. A right-angled prism is placed on a printed page as shown in the figure. The observer A looks through the vertical face while the observer B looks through the inclined face. Identify the correct statement.
 (A) If A is able to see the letters on the page, then B will also see the same
 (B) If B is able to see the letters, then A will also see the same
 (C) Both can see the letters if the prism is made of glass $\mu = 1.5$
 (D) Observer A is able to see the letters on the page if $\mu < \sqrt{2}$

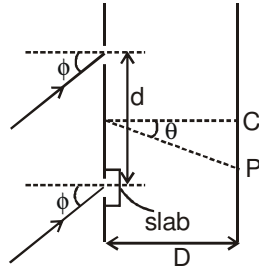


(SPACE FOR ROUGH WORK)



MOTION IIT-JEE
 (Where Faith Counts the Success)

12. Light of wavelength $\lambda = 500 \text{ nm}$ falls on two narrow slits placed at a distance $d = 50 \times 10^{-4} \text{ cm}$ apart, at an angle of $\phi = 30^\circ$ with respect to the slits as shown in figure. On the lower slit a transparent slab of thickness 0.1 mm and refractive index $\frac{3}{2}$ is placed. The interference pattern is observed on a screen at a distance $D = 2 \text{ m}$ from the slits. Then,



Choose the correct statement :

- (A) The position of the central maximum occurs at θ is equal to 30°
 (B) The order of minima closest to the centre C of screen 49
 (C) The position of the central maximum occurs at θ is equal to 60°
 (D) The order of minima closest to the centre C of screen 59

(SPACE FOR ROUGHWORK)

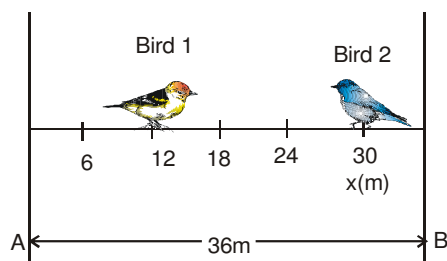


[COMPREHENSION TYPE]

Q.13 to Q.15 are based upon a **paragraph**. Each questions has four choices (A), (B), (C), (D) out of which **ONLY ONE** is correct.

Paragraph for Question Nos. 13 to 15

Two birds sit on a telephone wire, as shown in the figure below. The wire is rigidly attached to the poles at A and B. A person at pole A wishes to dislodge bird 2 without disturbing bird 1. She sets up a standing wave with a velocity of 48 m/s. Position of bird 1 is at $x = 12$ m and bird 2 is at $x = 30$ m.



13. What is the longest wavelength that will get the job done?
 (A) 24 cm (B) 26 cm (C) 22 cm (D) none of these
14. At what frequency should she shake the wire in order to make such a wave?
 (A) 1 s^{-1} (B) 3 s^{-1} (C) 2 s^{-1} (D) none of these
15. If bird 2 can hold on only if his up-and-down acceleration is less than 48 m/s^2 , what is the smallest amplitude needed to dislodge bird 2?
 (A) 0.4 m (B) 0.3 m (C) 0.5 m (D) none of these

(SPACE FOR ROUGHWORK)



SECTION - (B)

[MATRIX MATCH TYPE]

Q.1 has four choices (A), (B), (C), (D) out of which **ONE OR MORE THAN ONE** is/are correct

1. Medium of lens in (R), (S), (T) is denser than surroundings

Column I

(A) Real erect image cannot be formed

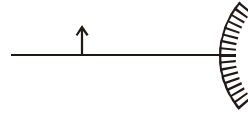
(B) Virtual erect image cannot be formed

(C) Real inverted image cannot be formed

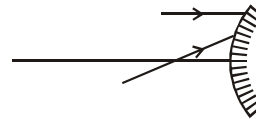
(D) Virtual inverted image cannot be formed

Column II

(P) Object placed in front of a convex mirror



(Q) Converging beam incident on a convex mirror



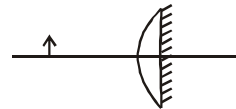
(R) Object placed in front of a lens having the shape as shown



(S) Object placed in front of a lens having the shape as shown



(T) Object placed in front of a silvered lens as shown.



(SPACE FOR ROUGHWORK)

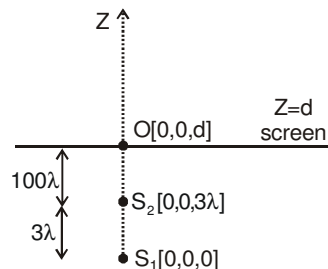


SECTION - (C)

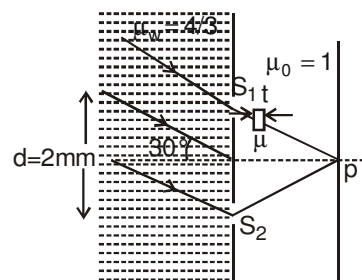
[INTEGER ANSWER TYPE]

Q.1 to Q.2 are INTEGER ANSWER TYPE questions

1. Two coherent point sources S_1 and S_2 of monochromatic light of wavelength $\lambda = 4500 \text{ \AA}$ are located as shown in the figure [$S_1 S_2 = 3 \lambda$]. A screen which can be represented by plane $z = d$. Number of dark circular fringes formed on the screen are



2. The given figure shows a YDSE apparatus. Rays are incident on slits S_1 and S_2 at an angle 30° with the horizontal. The medium on left side of the slits is water ($\mu_w = 4/3$). To obtain the central maxima at point P, a glass slab ($\mu_g = 3/2$) is introduced in front of slits S_1 . The thickness of the glass



slab required for this purpose is $\frac{x}{3}$ mm. Then find out the value of x.

(SPACE FOR ROUGH WORK)

