

## 参考答案

### 一、选择题

| 题号 | 1 | 2 | 3 | 4 | 5 |
|----|---|---|---|---|---|
| 答案 | A | B | A | D | B |

### 二、填空题

1.  $152\text{rad/s}$ ;  $400\text{m/s}$ ;  $16.5\text{m}$

2.  $0.3 \cos(10t - 2.5x)$

3.  $x = \pm(2k + 1)\frac{\lambda}{4}$

4. 5

5. 0.5

### 三、计算题

1.

由图可知  $A = 0.1\text{ m}$ ,  $t = 0$  时,  $y_0 = \frac{A}{2}$ ,  $v_0 < 0$ ,  $\therefore \phi_0 = \frac{\pi}{3}$ , 由题知  $\lambda = 2\text{ m}$ ,

$u = 10\text{ m} \cdot \text{s}^{-1}$ , 则  $\nu = \frac{u}{\lambda} = \frac{10}{2} = 5\text{ Hz}$

$\therefore \omega = 2\pi\nu = 10\pi$

(1)波动表达式为

$$y = 0.1 \cos[10\pi(t - \frac{x}{10}) + \frac{\pi}{3}] \text{ m}$$

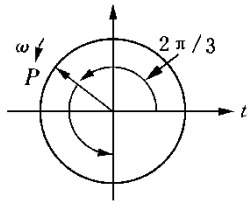
(2)由图知,  $t = 0$  时,  $y_P = -\frac{A}{2}$ ,  $v_P < 0$ ,  $\therefore \phi_P = -\frac{4\pi}{3}$  ( $P$  点的位相应落后于  $O$  点, 故取负值)

$\therefore P$  点振动表达式为  $y_P = 0.1 \cos(10\pi t - \frac{4}{3}\pi)$

(3) $\therefore 10\pi(t - \frac{x}{10}) + \frac{\pi}{3} \Big|_{t=0} = -\frac{4}{3}\pi$

$\therefore$  解得  $x = \frac{5}{3} = 1.67$

(4)根据(2)的结果可作出旋转矢量图如图, 则由  $P$  点回到平衡位置应经历的位相角



$$\Delta\phi = \frac{\pi}{3} + \frac{\pi}{2} = \frac{5}{6}\pi$$

∴ 所属最短时间为

$$\Delta t = \frac{\Delta\phi}{\omega} = \frac{5\pi/6}{10\pi} = \frac{1}{12} \text{ s}$$

2.

解答:

$$r_{BP} = \sqrt{8^2 + 15^2} m = 17m$$

$$\lambda = \frac{u}{\nu} = 0.1m$$

设 A 比 B 超前  $\phi_A - \phi_B = \pi$

$$\Delta\phi = \phi_B - \phi_A - 2\pi \frac{r_{BP} - r_{AP}}{\lambda} = -\pi - 2\pi \frac{17-8}{0.1} = -181\pi$$

反相位 (干涉相消)

振幅:  $A=0$

P 点静止