Θέμα Α

Α1 –α , Α2 – β , Α3 – δ , Α4 – β , Α5 – β

Θέμα Β

Β1. Σωστή απάντηση είναι η (β).

$$\left.\begin{array}{l} x = 5t - t^2 \\ x = \upsilon_0 t - \frac{1}{2}|a|t^2 \end{array}\right\} \xrightarrow{\text{ΤΑΥΤΟΠΟΙΗΣΗ}} \upsilon_0 = 5\,m/s^2 \ \kappa\alpha\iota \ \frac{1}{2}|a| = 1 \Rightarrow |\alpha| = 2m/s^2$$

$$\upsilon = \upsilon_0 - |\alpha| t \Rightarrow \upsilon = 5 - 2\cdot 2 \Rightarrow \boxed{\upsilon = 1\,m/s}$$

$$x = \upsilon_0 t - \frac{1}{2}|a|t^2 \Rightarrow x = 5\cdot 2 - \frac{1}{2}\cdot 2\cdot 2^2 \Rightarrow \boxed{x = 6\,m}$$

Β2.

• $\upsilon = \alpha t \Rightarrow 4 = a\cdot 1 \Rightarrow \boxed{a = 4\,m/s^2}$ $\sigma\tau\alpha\theta\varepsilon\rho\acute{\eta}$

$$S = \frac{1}{2}at^2 \Rightarrow S = \frac{1}{2}4\cdot 1^2 \Rightarrow \boxed{S = 2\,m}$$

• $S = \frac{1}{2}at^2 \Rightarrow 8 = \frac{1}{2}4\cdot t^2 \Rightarrow 4\cdot t^2 = 16 \Rightarrow t^2 = 4 \Rightarrow \boxed{t = 2\,\text{sec}}$

$$\upsilon = \alpha t \Rightarrow \upsilon = 4\cdot 2 \Rightarrow \boxed{\upsilon = 8\,m/s}$$

• $\upsilon = \alpha t \Rightarrow 16 = 4\cdot t \Rightarrow \boxed{t = 4\,\text{sec}}$

$$S = \frac{1}{2}at^2 \Rightarrow S = \frac{1}{2}4\cdot 4^2 \Rightarrow \boxed{S = 32\,m}$$

Β3. i) Σωστή απάντηση είναι η (β).

$$\left.\begin{array}{l} \alpha_1 = \frac{\Delta\upsilon}{\Delta t} \Rightarrow \alpha_1 = \frac{2\upsilon_1}{t_1} \\ \alpha_2 = \frac{\Delta\upsilon}{\Delta t} \Rightarrow \alpha_2 = \frac{\upsilon_1}{t_1} \end{array}\right\} \Rightarrow \alpha_1 = 2a_2$$

ii) Σωστή απάντηση είναι η (β).

$$\left.\begin{array}{l} E_1 = S_1 = \frac{\beta\upsilon}{2} = \frac{2\upsilon_1 t_1}{2} \\ E_2 = S_2 = \frac{\beta\upsilon}{2} = \frac{\upsilon_1 t_1}{2} \end{array}\right\} \Rightarrow S_1 = 2S_2$$

Θέμα Γ

Α.

Γ1. $\upsilon = \upsilon_0 - |\alpha| t \Rightarrow 0 = 40 - 10 \cdot t \Rightarrow 10 \cdot t = 40 \Rightarrow \boxed{t = 4\sec = t_{ολ.}}$

$S_{stop} = \upsilon_0 t - \frac{1}{2}|a| t^2 \Rightarrow S_{stop} = 40 \cdot 4 - \frac{1}{2} \cdot 10 \cdot 4^2 \Rightarrow \boxed{S_{stop} = 80\, m}$

Γ2.

$\bullet \upsilon = \upsilon_0 - |\alpha| t \Rightarrow 20 = 40 - 10 \cdot t \Rightarrow 10 \cdot t = 20 \Rightarrow t = 2\sec$

$S_2 = \upsilon_0 t - \frac{1}{2}|a| t^2 \Rightarrow S_2 = 40 \cdot 2 - \frac{1}{2} \cdot 10 \cdot 2^2 \Rightarrow S_2 = 60\, m$

$\bullet \upsilon = \upsilon_0 - |\alpha| t \Rightarrow 10 = 40 - 10 \cdot t \Rightarrow 10 \cdot t = 30 \Rightarrow t = 3\sec$

$S_3 = \upsilon_0 t - \frac{1}{2}|a| t^2 \Rightarrow S_3 = 40 \cdot 3 - \frac{1}{2} \cdot 10 \cdot 3^2 \Rightarrow S_3 = 75\, m$

$S = S_3 - S_2 \Rightarrow S = 75 - 60 \Rightarrow \boxed{S = 15\, m}$

Α3. $S = \upsilon_0 t - \frac{1}{2}|a| t^2 \Rightarrow 35 = 40 \cdot t - \frac{1}{2} \cdot 10 \cdot t^2 \Rightarrow 5 \cdot t^2 - 40 \cdot t + 35 = 0$

$\Delta = \beta^2 - 4 \cdot \alpha \cdot \gamma \Rightarrow \Delta = (-40)^2 - 4 \cdot 5 \cdot 35 \Rightarrow \Delta = 1600 - 700 \Rightarrow \Delta = 900$

$$t_{1,2} = \frac{-\beta \pm \sqrt{\Delta}}{2\alpha} \Rightarrow t_{1,2} = \frac{-(-40) \pm \sqrt{900}}{2 \cdot 5} \Rightarrow t_{1,2} = \frac{+40 \pm 30}{10} \begin{cases} t_1 = \frac{+40+30}{10} \Rightarrow t_1 = 7\ \sec \\ t_2 = \frac{+40-30}{10} \Rightarrow t_2 = 1\sec \end{cases}$$

Το σώμα εκτελεί επιβραδυνόμενη κίνηση για: $t_{ολ.} = 4\sec$, οπότε γίνεται δεκτή η δεύτερη λύση: $t = 1\sec$.

$\upsilon = \upsilon_0 - |\alpha| t \Rightarrow \upsilon = 40 - 10 \cdot 1 \Rightarrow \boxed{\upsilon = 30\, m/s}$

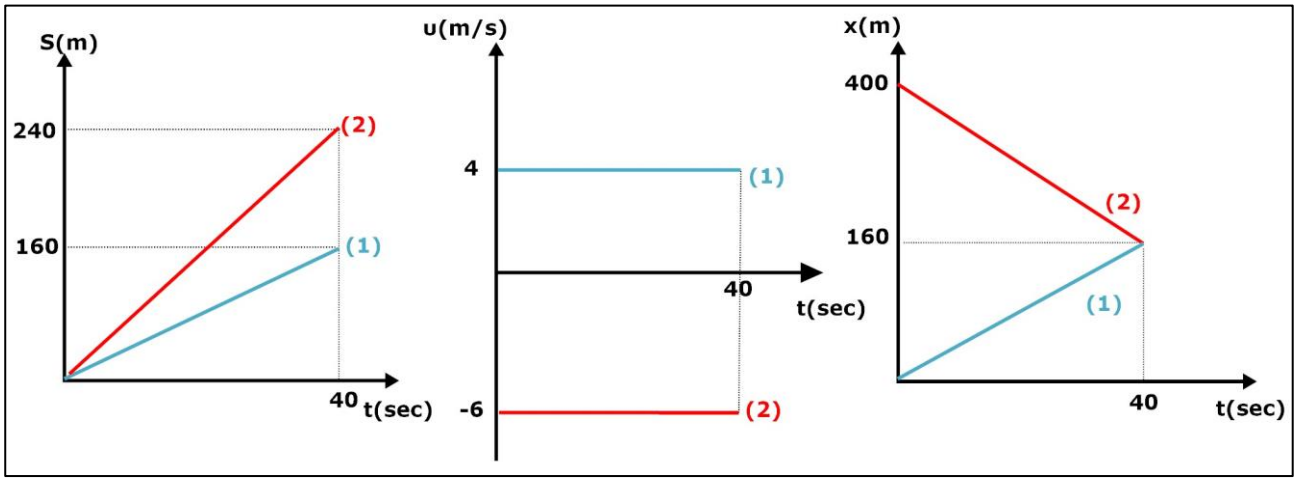
Β.

Γ4. $S_1 + S_2 = d \Rightarrow 6t + 4t = 400 \Rightarrow 10t = 400 \Rightarrow \boxed{t = 40s}$

$S_1 = 4t = 4 \cdot 40 \Rightarrow \boxed{S_1 = 160m}$

$S_2 = 6t = 6 \cdot 40 \Rightarrow \boxed{S_2 = 240m}$

Γ5.



Θέμα Δ

Δ1. Από 0-5 sec: Ε.Ο.Επιτ.Κ. με υ_0= 5 m/s
Από 5-15 sec: Ε.Ο.Κ. με υ=10 m/s σταθερή
Από 15-20 sec: Ε.Ο.Επιβ.Κ. με υ_0= 10 m/s
Από 20-25 sec:Ε.Ο.Επιτ.Κ. αντίθετης φοράς

Δ2. $a_1 = \dfrac{\Delta\upsilon}{\Delta t} \Rightarrow a_1 = \dfrac{10-5}{5-0} \Rightarrow \boxed{a_1 = 1\,m/s^2}$

$a_1 = \dfrac{\Delta\upsilon}{\Delta t} \Rightarrow a_2 = \dfrac{10-10}{15-5} \Rightarrow \boxed{a_2 = 0\,m/s^2}$

$a_3 = \dfrac{\Delta\upsilon}{\Delta t} \Rightarrow a_3 = \dfrac{0-10}{20-15} \Rightarrow \boxed{a_3 = -2\,m/s^2}$

$a_4 = \dfrac{\Delta\upsilon}{\Delta t} \Rightarrow a_4 = \dfrac{-10-0}{25-20} \Rightarrow \boxed{a_4 = -2\,m/s^2}$

Δ3. α) Από 0-5 s: $\mathrm{E}_1 = \dfrac{(\mathrm{B}+\beta)\cdot\upsilon}{2} = \dfrac{(10+5)\cdot 5}{2} = 37,5 \rightarrow \Delta x_1 = 37,5\,m$ *και* $S_1 = |\Delta x_1| = 37,5\,m$

Από 5-15 s: $\mathrm{E}_2 = \beta\cdot\upsilon = 10\cdot 10 = 100 \rightarrow \Delta x_2 = 100\ m$ *και* $S_2 = |\Delta x_2| = 100\ m$

Από 15-20 s: $\mathrm{E}_3 = \dfrac{\beta\cdot\upsilon}{2} = \dfrac{10\cdot 5}{2} = 25 \rightarrow \Delta x_3 = 25\,m$ *και* $S_3 = |\Delta x_3| = 25\ m$

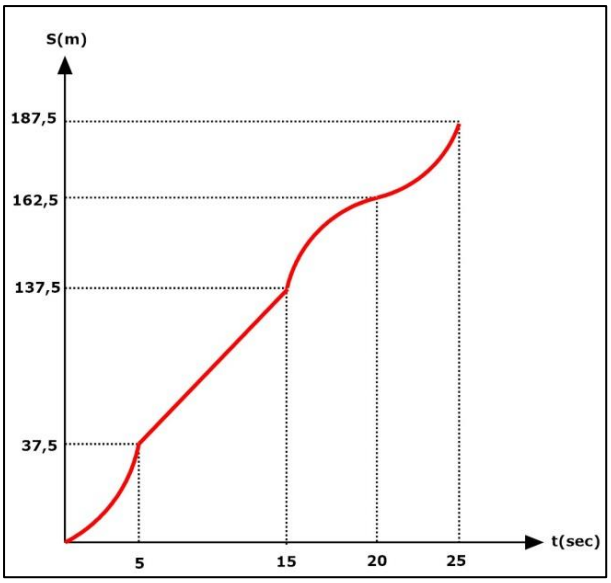
Από 20-25 s: $\mathrm{E}_4 = \dfrac{\beta\cdot\upsilon}{2} = \dfrac{10\cdot 5}{2} = 25 \rightarrow \Delta x_4 = -25\,m$ *και* $S_4 = |\Delta x_4| = 25\ m$

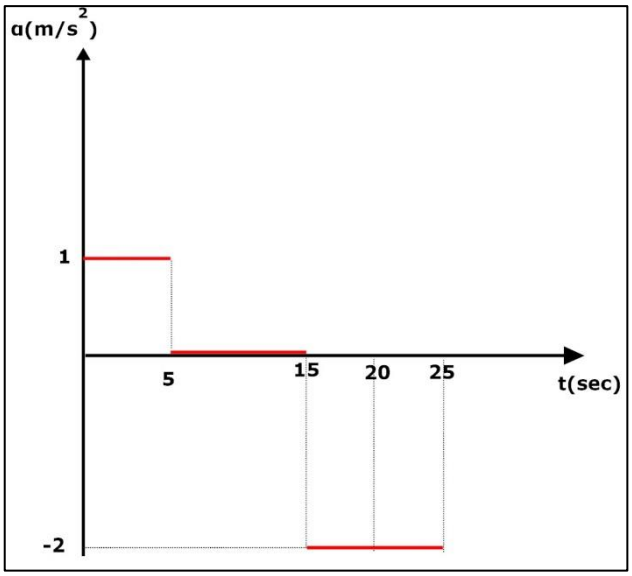
$\Delta x_{ολ.} = \Delta x_1 + \Delta x_2 + \Delta x_3 + \Delta x_4 \Rightarrow \Delta x_{ολ.} = 37,5+100+25-25 \Rightarrow \boxed{\Delta x_{ολ.} = 137,5\,m}$

$S_{ολ.} = |\Delta x_1| + |\Delta x_2| + |\Delta x_3| + |\Delta x_4| \Rightarrow \Delta x_{ολ.} = 37,5+100+25+25 \Rightarrow \boxed{\Delta x_{ολ.} = 187,5\,m}$

Δ4. $\upsilon_\mu = \dfrac{S_{ολ.}}{t_{ολ.}} \Rightarrow \upsilon_\mu = \dfrac{187,5}{25} \Rightarrow \boxed{\upsilon_\mu = 7,5\,m/s}$

Δ5.





Δ6.

$$x = \upsilon_0 t + \frac{1}{2} a_1 t^2 \xrightarrow{t=1sec} x_1 = 5 \cdot 1 + \frac{1}{2} \cdot 1 \cdot 1^2 \Rightarrow x_1 = 5,5\, m$$

$$x = \upsilon_0 t + \frac{1}{2} a_1 t^2 \xrightarrow{t=2sec} x_2 = 5 \cdot 2 + \frac{1}{2} \cdot 1 \cdot 2^2 \Rightarrow x_2 = 12\, m$$

$$\Delta x = x_2 - x_1 \Rightarrow \Delta x = 12 - 5,5 \Rightarrow \boxed{\Delta x = 6,5\, m}$$