DIRECTORATE OF SCHOOL EDUCATION TAMILNADU

12NPCB07 (2023-24)	NEET PRACTICE QUESTIONS (TEST-7)	Class : XII Time : 1.15 hrs Total Marks : 240

Answer key

12TH Physics

1. Ans : C) 4.8×10^{-2} V

e = $M \frac{di}{dt} = \frac{\mu_0 N_1 N_2 A}{l} \frac{di}{dt}$

e = $\frac{4\pi x 10^{-7}\ x\ 2000\ x\ 300\ 1.2\ x\ 10^{-3}}{0.3} \frac{[2-(-2)]}{0.25}$

e = 4.8×10^{-2} V

2. Ans : D) $\frac{a^2T^3}{3R}$

Given $\emptyset = at(T-t)$

Induced emf , E = $\frac{d\emptyset}{dt} = \frac{d[at(T-t))}{dt}$

E = at (0 - 1) + a (T - t)

E = a (T - 2t)

Induced emf is a function of time.

Heat generated in time T is

H = $\int_0^T \frac{E^2}{R} dt = \frac{a^2}{R}\int_0^T (T-2t)^2\, dt$

H = $\frac{a^2T^3}{3R}$

3. Ans : D) $\frac{{B_0}^2\, \pi^2 r^4}{R}$

$P = \frac{e^2}{R}$

$e = \frac{d\emptyset}{dt} = \frac{d(BA)}{dt} = A\frac{dB}{dt} = A\frac{d(B_0 e^{-1})}{dt} = AB_0e^{-1}$

$P = \frac{e^2}{R} = \frac{(AB_0e^{-1})2}{R}$

$P = \frac{{B_0}^2\, \pi^2 r^4}{R}$ since $e^{-2} \sim 1$

4. Ans : A) 1 : 2

Self inductance of a solenoid $L = \frac{\mu_0 N^2 A}{l} = \frac{\mu_0 N^2 \pi r^2}{l}$

Given N1 = N2 and $\frac{l_1}{l_2} = \frac{r_1}{r_2} = \frac{1}{2}$

so $\frac{L_1}{L_2} = \frac{l_2}{l_1}$ x $(\frac{r_1}{r_2})^2$

$\frac{L_1}{L_2} = \frac{2}{1}$ x $(\frac{1}{2})^2 \rightarrow \frac{1}{2}$

5. Ans : D) 0.02 V

$e = -\frac{d\emptyset}{dt}$

$e = -\frac{(NBAcos90 - NBAcos0)}{dt} = \frac{NBA}{dt} = \frac{800\ x\ 5\ x\ 10^{-5}\ x\ 0.05}{0.1}$

e = 0.02V

6. Ans : A) 0.138 H

Magnetic potential energy $U = \frac{1}{2}LI^2$

$L = \frac{2U}{I^2} = \frac{2\ x\ 25\ x\ 10^{-3}}{(600\ x\ 10^{-3})^2}$

L = 0.138 H

7. Ans : D) 1 H

$\phi = LI$

$L = \frac{\phi}{I} = \frac{N\phi}{I} = \frac{1000 \ x \ 4 \ x \ 10^{-3}}{4}$

L = 1 H

8. Ans : B) πμ V

Magnetic flux, $\phi = B.A$

$\phi = B.\pi r^2$

Induced emf $|e| = \frac{d\emptyset}{dt} = B\pi 2r\frac{dr}{dt}$

$e = 0.025 \times \pi \times 2 \times 2 \times 10^{-2} \times 1 \times 10^{-3}$

$e = \pi \times 10^{-6} = \pi\mu$ V

9. Ans : B) Kt

From work energy theorem $W_{net} = \Delta KE$

Given $F = \frac{K}{v}$

$a = F/m = \frac{K}{mv}$

$\frac{dv}{dt} = \frac{K}{mv} \rightarrow K\,dv = \frac{K}{m}\,dt$

$\int_{v_1}^{v_2} v dv = \frac{K}{m} \int_0^t dt$

$\frac{v_2^2 - v_1^2}{2} = \frac{K}{m}(t-0)$

$m\frac{v_2^2 - v_1^2}{2} = kt$

$\frac{1}{2}$ m(v_2^2 - v_1^2) = Kt

ΔKE = Kt so From work energy theorem W= ΔKE = Kt

10. A) t

From v = u + at

v = 0 + at → v = at

Power P = F x v

P = ma x at → P = ma^2t

P α t

11. C) 4.5 J

P = mu → u = $\frac{P}{m}$ = $\frac{8}{2}$ = 2 ms^{-1}

a = $\frac{F}{m}$ → a = $\frac{0.2}{4}$ = 0.05 ms^{-2}

s = ut + $\frac{1}{2}$ at^2 → (2 x 10) + $\frac{1}{2}$(0.05 x 10^2) = 22.5 m

W = F.S = 0.2 x 22.5 = 4.5 J

According to work energy theorem, work done is equal to change in kinetic energy

12. Ans : D) 1500 J

workdone = Area under F - x graph

W = Area of rectangle + Area of triangle

W = (100 x 10) + 1/2 (10 x 100)

W = 1000 + 500 = 1500J

13. Ans : A) 1 MW

Given : v = 2 m/s

Area, A = width x depth = 50 x 5 = 250 m^2

Density, ρ = 1000 kgm^{-3}

From continuity equation volume V = Av

so, mass, m = ρV = ρAv

KE = $\frac{1}{2}mv^2 = \frac{1}{2}\rho Av \times v^2$

Power = Kinetic Energy per second

P = $\frac{1}{2}\rho Av^3 \rightarrow \frac{1}{2} \times 1000 \times 250 \times 2 \times 2 \times 2$

P = 10^6 W $\rightarrow$ 1 MW

14. Ans = A) 41.9 x 10^{8} kg

E = mc^2

$\frac{dE}{dt} = \frac{dm}{dt}c^2$

$\frac{dm}{dt} = \frac{dE}{dt} \times \frac{1}{c^2} \rightarrow 3.77 \times 10^{26} / (3 \times 10^8)^2$

$\frac{dm}{dt}$ = 41.9 x 10^{8} kg

15. Ans : C) 5 : 4

KE = $P^2/2m$

Given $P_1 = P_2$

$\frac{K_1}{K_2} = \frac{m_2}{m_1} = \frac{5}{4}$

DIRECTORATE OF SCHOOL EDUCATION TAMILNADU

11NPCB07 (2023-24)	NEET PRACTICE QUESTIONS (TEST-7)	Class : XII Time : 1.15 hrs Total Marks : 240

Answer key

11^{TH} - Physics

1. Ans : B) 60^0

$\vec{A}.\vec{B}$ = AB COSθ

6 = 3X 4 COSθ

COSθ = 1/2

θ = 60^0

2. Ans : A) 100 ms^{-1}

Final Kinetic Energy, $K_f = \frac{1}{2} mv^2 = 50$ J

Initial Kinetic Energy is K_i

Given `K_i x $\frac{10}{100} = 50$

`K_i = 500 J

$\frac{1}{2} mu^2 = 500 \rightarrow u^2 = \frac{2 \, x \, 500}{100 \, x \, 10^{-3}}$

u = 100 ms^{-1}

3. Ans : D) 9J

Given $\vec{F} = (3\hat{\imath} + \hat{\jmath})$, $\vec{r_1} = (2\hat{\imath} + \hat{k})$ and $\vec{r_2} = (4\hat{\imath} + 3\hat{\jmath} - \hat{k})$

$\vec{d} = \overrightarrow{r_2} = \overrightarrow{r_1} = (4\,\hat{\imath} + 3\hat{\jmath} - \hat{k}) - (2\hat{\imath} + \hat{k}) = (2\,\hat{\imath} + 3\hat{\jmath} - 2\hat{k})$

$W = \vec{F} \cdot \vec{d} = (3\hat{\imath} + \hat{\jmath}) \cdot (2\,\hat{\imath} + 3\hat{\jmath} - 2\hat{k})$

$W = 6 + 3 = 9J$

4. D) 0

Power, $P = \vec{F} \cdot \vec{v}$

$P = FV \cos\theta$

In circular motion F and V are perpendicular so $\theta = 90^0$ and $\cos 90 = 0$

Hence $P = 0$

5. Ans: D) mgh

From work energy theorem $W_{net} = \Delta KE$

Here $\Delta K = 0$ since the body is moving slowly and $W_{net} = W_F + (-W_g)$

So, $W_{net} = W_F - W_g = 0$

$W_F = W_g = mgh$

6. Ans : D) $50\sqrt{2}$ ms^{-1}

From work Energy theorem

$W_{net} = \Delta KE$

Case (i)

$\frac{1}{2} m(100)^2 - 0 = f \times 1 \rightarrow f = 5000m$ N

Case (ii)

$\frac{1}{2} mv^2 - \frac{1}{2} mv_1^2 = f \times 0.5$

$m (v^2 - v_1^2) = f \times 0.5 \times 2 = 5000m \times 0.5 \times 2$

$(v^2 - v_1^2) = 5000$

$v_1^2 = v^2 - 5000 = 10000 - 5000$

$v_1^2 = 5000$

$v_1^2 = 50\sqrt{2}$ ms^{-1}

7. Ans : B) 700 J

P = W / t

W =mgh/t

W = (50 + 20) x 10 x (40 x 0.25)/10

W = 700 J

8. Ans : C) – 400 J

From work energy theorem $W_{net} = \Delta KE$

From figure

at t = 0, v = 20 ms^{-1}

$KE_1 = \frac{1}{2} mv^2 \rightarrow \frac{1}{2} \times 2 \times 20^2 = 400$ J

at t = 2 s v = 0

$KE_2 = \frac{1}{2} mv_1^2 \rightarrow 0$

$W = \Delta KE = 0 - 400 = - 400$ J

9. Ans : B) Kt

From work energy theorem $W_{net} = \Delta KE$

Given F = $\frac{K}{v}$

a = F/m = $\frac{K}{mv}$

$\frac{dv}{dt} = \frac{K}{mv}$ → K dv = $\frac{K}{m}$ dt

$\int_{v_1}^{v_2} vdv = \frac{K}{m} \int_0^t dt$

$\frac{v_2^2 - v_1^2}{2} = \frac{K}{m}$ (t-0)

$m \frac{v_2^2 - v_1^2}{2}$ = kt

$\frac{1}{2}$ m(v_2^2 - v_1^2) = Kt

ΔKE = Kt so From work energy theorem W= ΔKE = Kt

10. A) t

From v = u + at

v = 0 + at → v = at

Power P = F x v

P = ma x at → P = ma^2t

P α t

11. C) 4.5 J

P = mu → u = $\frac{P}{m}$ = $\frac{8}{2}$ = 2 ms^{-1}

a = $\frac{F}{m}$ → a = $\frac{0.2}{4}$ = 0.05 ms^{-2}

s = ut + $\frac{1}{2}$ at^2 → (2 x 10) + $\frac{1}{2}$(0.05 x 10^2) = 22.5 m

W = F.S = 0.2 x 22.5 = 4.5 J

According to work energy theorem, work done is equal to change in kinetic energy

12. Ans : D) 1500 J

workdone = Area under F - x graph

W = Area of rectangle + Area of triangle

W = (100 x 10) + 1/2 (10 x 100)

W = 1000 + 500 = 1500J

13. Ans : A) 1 MW

Given : v = 2 m/s

Area, A = width x depth = 50 x 5 = 250 m^2

Density, ρ = 1000 kgm^{-3}

From continuity equation volume V = Av

so, mass, m = ρV = ρAv

KE = $\frac{1}{2}mv^2 = \frac{1}{2}\rho Av \times v^2$

Power = Kinetic Energy per second

P = $\frac{1}{2}\rho Av^3 \rightarrow \frac{1}{2} \times 1000 \times 250 \times 2 \times 2 \times 2$

P = 10^6 W $\rightarrow$ 1 MW

14. Ans = A) 41.9 x 10^8 kg

E = mc^2

$\frac{dE}{dt} = \frac{dm}{dt} c^2$

$\frac{dm}{dt} = \frac{dE}{dt} \times \frac{1}{c^2} \rightarrow 3.77 \times 10^{26} / (3 \times 10^8)^2$

$\frac{dm}{dt} = 41.9 \times 10^{8}$ kg

15. Ans : C) 5 : 4

KE = $P^2/2m$

Given $P_1 = P_2$

$\frac{K_1}{K_2} = \frac{m_2}{m_1} = \frac{5}{4}$

DIRECTORATE OF SCHOOL EDUCATION TAMILNADU

12JPCM07 **(2023-24)**	**JEE PRACTICE QUESTIONS** **(TEST-7)**	**Class : XII** **Time : 1.15 hrs** **Total Marks : 180**

Answer key

12^{TH} - Physics

1. Ans : C) 4.8 x 10^{-2} V

e = $M\frac{di}{dt} = \frac{\mu_0 N_1 N_2 A}{l}\frac{di}{dt}$

e = $\frac{4\pi x 10^{-7}\ x\ 2000\ x\ 300\ 1.2\ x\ 10^{-3}}{0.3}\frac{[2-(-2)]}{0.25}$

e = 4.8 x 10^{-2} V

2. Ans : D) $\frac{a^2T^3}{3R}$

Given $\emptyset = at(T-t)$

Induced emf , E = $\frac{d\emptyset}{dt} = \frac{d[at(T-t))}{dt}$

E = at (0 - 1) + a (T - t)

E = a (T - 2t)

Induced emf is a function of time.

Heat generated in time T is

H = $\int_0^T \frac{E^2}{R} dt = \frac{a^2}{R}\int_0^T (T-2t)^2\, dt$

H = $\frac{a^2T^3}{3R}$

3. Ans : D) $\frac{{B_0}^2 \pi^2 r^4}{R}$

$P = \frac{e^2}{R}$

$e = \frac{d\emptyset}{dt} = \frac{d(BA)}{dt} = A\frac{dB}{dt} = A\frac{d(B_0 e^{-1})}{dt}$ = AB_0e^{-1}

$P = \frac{e^2}{R} = \frac{(AB_0 e^{-1})2}{R}$

$P = \frac{{B_0}^2 \pi^2 r^4}{R}$ since $e^{-2} \sim 1$

4. Ans : A) 1 : 2

Self inductance of a solenoid $L = \frac{\mu_0 N^2 A}{l} = \frac{\mu_0 N^2 \pi r^2}{l}$

Given N1 = N2 and $\frac{l_1}{l_2} = \frac{r_1}{r_2} = \frac{1}{2}$

so $\frac{L_1}{L_2} = \frac{l_2}{l_1}$ x $(\frac{r_1}{r_2})^2$

$\frac{L_1}{L_2} = \frac{2}{1}$ x $(\frac{1}{2})^2 \rightarrow \frac{1}{2}$

5. Ans : D) 0.02 V

$e = -\frac{d\emptyset}{dt}$

$e = -\frac{(NBAcos90 - NBAcos0)}{dt} = \frac{NBA}{dt} = \frac{800\ x\ 5\ x\ 10^{-5}\ x\ 0.05}{0.1}$

e = 0.02V

6. Ans : A) 0.138 H

Magnetic potential energy $U = \frac{1}{2} LI^2$

$L = \frac{2U}{I^2} = \frac{2\ x\ 25\ x\ 10^{-3}}{(600\ x\ 10^{-3})^2}$

L = 0.138 H

7. Ans : D) 1 H

$\phi = LI$

$L = \frac{\phi}{I} = \frac{N\phi}{I} = \frac{1000 \times 4 \times 10^{-3}}{4}$

L = 1 H

8. Ans : B) πμ V

Magnetic flux, $\phi = B.A$

$\phi = B.\pi r^2$

Induced emf $|e| = \frac{d\emptyset}{dt} = B\pi 2r\frac{dr}{dt}$

$e = 0.025 \times \pi \times 2 \times 2 \times 10^{-2} \times 1 \times 10^{-3}$

$e = \pi \times 10^{-6} = \pi\mu$ V

9. Ans : B) Kt

From work energy theorem $W_{net} = \Delta KE$

Given $F = \frac{K}{v}$

$a = F/m = \frac{K}{mv}$

$\frac{dv}{dt} = \frac{K}{mv} \rightarrow$ K dv $= \frac{K}{m}$ dt

$\int_{v_1}^{v_2} vdv = \frac{K}{m} \int_0^t dt$

$\frac{v_2^2 - v_1^2}{2} = \frac{K}{m}$ (t-0)

$m\frac{v_2^2 - v_1^2}{2}$ = kt

$\frac{1}{2}$ m(v_2^2 - v_1^2) = Kt

ΔKE = Kt so From work energy theorem W= ΔKE = Kt

10. A) t

From v = u + at

v = 0 + at → v = at

Power P = F x v

P = ma x at → P = ma^2t

P α t

11. C) 4.5 J

P = mu → u = $\frac{P}{m}$ = $\frac{8}{2}$ = 2 ms^{-1}

a = $\frac{F}{m}$ → a = $\frac{0.2}{4}$ = 0.05 ms^{-2}

s = ut + $\frac{1}{2}$ at^2 → (2 x 10) + $\frac{1}{2}$(0.05 x 10^2) = 22.5 m

W = F.S = 0.2 x 22.5 = 4.5 J

According to work energy theorem, work done is equal to change in kinetic energy

12. Ans : D) 1500 J

workdone = Area under F - x graph

W = Area of rectangle + Area of triangle

W = (100 x 10) + 1/2 (10 x 100)

W = 1000 + 500 = 1500J

13. Ans : A) 1 MW

Given : v = 2 m/s

Area, A = width x depth = 50 x 5 = 250 m^2

Density, ρ = 1000 kgm^{-3}

From continuity equation volume V = Av

so, mass, m = ρV = ρAv

KE = $\frac{1}{2}mv^2$ = $\frac{1}{2}$ $\rho Av \times v^2$

Power = Kinetic Energy per second

P = $\frac{1}{2}$ ρAv^3 → $\frac{1}{2}$ x 1000 x 250 x 2 x 2 x 2

P = 10^6 W → 1 MW

14. Ans = A) 41.9 x 10^{8} kg

E = mc^2

$\frac{dE}{dt} = \frac{dm}{dt} c^2$

$\frac{dm}{dt} = \frac{dE}{dt} \times \frac{1}{c^2}$ → 3.77 x 10^{26} / (3 x $10^8)^2$

$\frac{dm}{dt}$ = 41.9 x 10^{8} kg

15. Ans : C) 5 : 4

KE = $P^2/2m$

Given $P_1 = P_2$

$\frac{K_1}{K_2} = \frac{m_2}{m_1} = \frac{5}{4}$

DIRECTORATE OF SCHOOL EDUCATION TAMILNADU

11JPCM07 (2023-24)	JEE PRACTICE QUESTIONS (TEST-7)	Class : XI Time : 1.15 hrs Total Marks : 180

Answer key

11TH - Physics

1. Ans : B) 60^0

$\vec{A}.\vec{B}$ = AB COSθ

6 = 3X 4 COSθ

COSθ = 1/2

θ = 60^0

2. Ans : A) 100 ms^{-1}

Final Kinetic Energy, $K_f = \frac{1}{2} mv^2 = 50$ J

Initial Kinetic Energy is K_i

Given `K_i x $\frac{10}{100} = 50$

`K_i = 500 J

$\frac{1}{2} mu^2 = 500 \rightarrow u^2 = \frac{2 x 500}{100 x 10^{-3}}$

u = 100 ms^{-1}

3. Ans : D) 9J

Given $\vec{F} = (3\hat{\imath} + \hat{\jmath})$, $\vec{r_1} = (2\hat{\imath} + \hat{k})$ and $\vec{r_2} = (4\,\hat{\imath} + 3\hat{\jmath} - \hat{k})$

$\vec{d} = \overrightarrow{r_2} = \overrightarrow{r_1} = (4\hat{\imath} + 3\hat{\jmath} - \hat{k}) - (2\hat{\imath} + \hat{k}) = (2\hat{\imath} + 3\hat{\jmath} - 2\hat{k})$

$W = \vec{F} \cdot \vec{d} = (3\hat{\imath} + \hat{\jmath}) \cdot (2\hat{\imath} + 3\hat{\jmath} - 2\hat{k})$

W = 6 + 3 = 9J

4. D) 0

Power, $P = \vec{F} \cdot \vec{v}$

P = FV cosθ

In circular motion F and V are perpendicular so $\theta = 90^0$ and cos90 = 0

Hence P = 0

5. Ans: D) mgh

From work energy theorem $W_{net} = \Delta KE$

Here $\Delta K = 0$ since the body is moving slowly and $W_{net} = W_F + (-W_g)$

So, $W_{net} = W_F - W_g = 0$

$W_F = W_g = mgh$

6. Ans : D) $50\sqrt{2}$ ms^{-1}

From work Energy theorem

$W_{net} = \Delta KE$

Case (i)

$\frac{1}{2}m(100)^2 - 0 = f \times 1 \rightarrow f = 5000m$ N

Case (ii)

$\frac{1}{2}mv^2 - \frac{1}{2}mv_1^2 = f \times 0.5$

$m(v^2 - v_1^2) = f \times 0.5 \times 2 = 5000m \times 0.5 \times 2$

$(v^2 - v_1^2) = 5000$

$v_1^2 = v^2 - 5000 = 10000 - 5000$

$v_1^2 = 5000$

$v_1^2 = 50\sqrt{2}$ ms^{-1}

7. Ans : B) 700 J

P = W / t

W =mgh/t

W = (50 + 20) x 10 x (40 x 0.25)/10

W = 700 J

8. Ans : C) – 400 J

From work energy theorem $W_{net} = \Delta KE$

From figure

at t = 0, v = 20 ms^{-1}

$KE_1 = \frac{1}{2} mv^2 \rightarrow \frac{1}{2} \times 2 \times 20^2 = 400$ J

at t = 2 s v = 0

$KE_2 = \frac{1}{2} mv_1^2 \rightarrow 0$

$W = \Delta KE = 0 - 400 = -400$ J

9. Ans : B) Kt

From work energy theorem $W_{net} = \Delta KE$

Given F = $\frac{K}{v}$

a = F/m = $\frac{K}{mv}$

$\frac{dv}{dt} = \frac{K}{mv}$ → K dv =$\frac{K}{m}$ dt

$\int_{v_1}^{v_2} vdv = \frac{K}{m} \int_0^t dt$

$\frac{v_2^2 - v_1^2}{2} = \frac{K}{m}$ (t-0)

$m\frac{v_2^2 - v_1^2}{2}$ = kt

$\frac{1}{2}$ m(v_2^2 - v_1^2) = Kt

ΔKE = Kt so From work energy theorem W= ΔKE = Kt

10. A) t

From v = u + at

v = 0 + at → v = at

Power P = F x v

P = ma x at → P = ma^2t

P α t

11. C) 4.5 J

P = mu → u = $\frac{P}{m}$ = $\frac{8}{2}$ = 2 ms^{-1}

a = $\frac{F}{m}$ → a = $\frac{0.2}{4}$ = 0.05 ms^{-2}

s = ut + $\frac{1}{2}$ at^2 → (2 x 10) + $\frac{1}{2}$(0.05 x 10^2) = 22.5 m

W = F.S = 0.2 x 22.5 = 4.5 J

According to work energy theorem, work done is equal to change in kinetic energy

12. Ans : D) 1500 J

workdone = Area under F - x graph

W = Area of rectangle + Area of triangle

W = (100 x 10) + 1/2 (10 x 100)

W = 1000 + 500 = 1500J

13. Ans : A) 1 MW

Given : v = 2 m/s

Area, A = width x depth = 50 x 5 = 250 m^2

Density, ρ = 1000 kgm^{-3}

From continuity equation volume V = Av

so, mass, m = ρV = ρAv

KE = $\frac{1}{2}mv^2 = \frac{1}{2}\rho Av \times v^2$

Power = Kinetic Energy per second

P = $\frac{1}{2}\rho Av^3 \rightarrow \frac{1}{2} \times 1000 \times 250 \times 2 \times 2 \times 2$

P = 10^6 W $\rightarrow$ 1 MW

14. Ans = A) 41.9 x 10^8 kg

E = mc^2

$\frac{dE}{dt} = \frac{dm}{dt} c^2$

$\frac{dm}{dt} = \frac{dE}{dt} \times \frac{1}{c^2} \rightarrow 3.77 \times 10^{26} / (3 \times 10^8)^2$

$\frac{dm}{dt} = 41.9 \times 10^{8}$ kg

15. Ans : C) 5 : 4

$KE = P^2/2m$

Given $P_1 = P_2$

$\frac{K_1}{K_2} = \frac{m_2}{m_1} = \frac{5}{4}$