# TEST-02

Ultimate KCET Crash Course 2026

**PHYSICS**

**Q1** In series LCR circuit, the capacitance is changed from C to 4C. To keep the resonance frequency unchanged, the new inductance should be:

(A) reduced by $\frac{1}{4}L$

(B) increased by 2 L

(C) reduced by $\frac{3}{4}L$

(D) increased to 4L

**Q2** In an electromagnetic wave, the electric and magnetising fields are $200\ \mathrm{V/m}$ and $0.365\ \mathrm{A/m}$. The maximum rate of energy flow is

(A) $73.0\ \mathrm{W/m^2}$

(B) $36.5\ \mathrm{W/m^2}$

(C) $54.7\ \mathrm{W/m^2}$

(D) $77.8\ \mathrm{W/m^2}$

**Q3** Green light of wavelength 5,460 $\AA$ is incident on an air-glass If the refractive index of glass is 1 5, the wavelength of light in glass would be (Given that the velocity of light in air, c = 3 × $10^8$ m $s^{-1}$)

(A) 6731 Å (B) 3,640 Å

(C) 5,460 Å (D) 4,861 Å

**Q4** In young's double slit experiment, The distance between two consecutive bright and dark fringes are given by

(A) $\beta = \frac{\lambda D}{d}$

(B) $\beta = \frac{Dd}{\lambda}$

(C) $\beta = \frac{\lambda}{Dd}$

(D) $\beta = \frac{\lambda d}{D}$

**Q5** If a photocell is illuminated with a radiation of ( $1240\ \mathring{A}$), then stopping potential is found to be $8\ \mathrm{V}$. The work function of the emitter and the threshold wavelength are

(A) $1\ \mathrm{eV}, 5200\ \mathring{A}$

(B) $2\ \mathrm{eV}, 6200\ \mathring{A}$

(C) $3\ \mathrm{eV}, 7200\ \mathring{A}$

(D) $4\ \mathrm{eV}, 4200\ \mathring{A}$

**Q6** The time period of electron in the ground state of hydrogen atom is three times the time period of the electron in the second excited state of a certain hydrogen like atom (atomic number Z ). The value of Z is

(A) 4 (B) 2

(C) 3 (D) 9

**Q7** The Bohr model of atom

(A) predicts continuous emission spectra for atoms

(B) predicts the same emission spectra for all types of atoms

(C) assumes that the angular momentum of electrons is quantized

(D) uses Einstein's photoelectric equation

**Q8** In nuclear reaction, there is conservation of

(A) mass only

(B) energy only

(C) momentum only

(D) mass, energy and momentum

**Q9** When the forward bias voltage of a diode is changed from 0.6 V to 0.7 V , the current changes from 5 mA to 15 mA . Then its forward bias resistance is

(A) 0.01Ω

(B) 0.1Ω

(C) 10Ω

(D) 100Ω

**Q10** The dimensions of torque are same as that of

(A) moment of force

(B) pressure

(C) acceleration

(D) impulse

**Q11** The position of an object moving along *x*-axis is given by $x = a + bt^2$ , where $a = 8.5 m$ and $b = 2.5\ ms^{-2}$ is measured in seconds. The velocity of the object at $t = 2\ s$ is

(A) 5 m $s^{-1}$ (B) 10 m $s^{-1}$

(C) 15 m $s^{-1}$ (D) 20 m $s^{-1}$

**Q12** The displacement-time graphs of two moving particles make angles of 30° and 45° with the *X*-axis. The ratio of their velocities is

(A) $\sqrt{3} : 1$ (B) 1 : 1

(C) 1 : 2 (D) $1 : \sqrt{3}$

**Q13** The number of significant figures in 0.0006312 are

(A) 2 (B) 3

(C) 4 (D) 5

**Q14** The dimensional formula of torque is

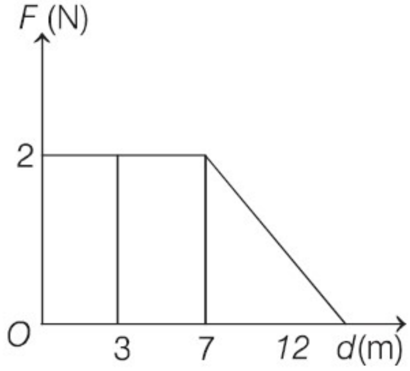
(A) $[ML^{-2}T^{-2}]$

(B) $[ML^{2}T^{-2}]$

(C) $[M^{-1}L^{-2}T^{-2}]$

(D) $[M^{2}LT^{-2}]$

**Q15** A Force F on a particle moving in a straight line varies with distance d as shown in the figure. The work done on the particle during its displacement of 12 m is




(A) 21 J (B) 26 J

(C) 13 J (D) 18 J

**Q16** A particle moves along the *X*-axis from $x = 0$ to $x = 5$ m under the influence of a force given by $F = 7 - 2x + 3x^2$. The work done in the process is

(A) 70 J (B) 270 J

(C) 35 J (D) 135 J

**Q17** An engine pumps water continuously through a hose. Water leaves the hose with a velocity v and m is the mass per unit length of the water jet. What is the rate at which kinetic energy is imparted to water?

(A) $\frac{1}{2}mv^3$ (B) $mv^3$

(C) $\frac{1}{2}mv^2$ (D) $\frac{1}{2}m^2v^2$

**Q18** The potential energy of a particle in a force field is $U = \frac{A}{r^2} - \frac{B}{r}$, where *A* and *B* are positive constants and ris r the distance of particle from the centre of the field. For stable equilibrium, the distance of the particle is

(A) B/2A (B) 2A/B

(C) A/B (D) B/A

**Q19** A spring of spring constant $5 \times 10^3$ $Nm^{-1}$ is stretched initially by 5 cm from the unstretched position. Then, the work required to stretch it further by another 5 cm is

(A) 12.50 N-m
(B) 18.75 N-m
(C) 25.00 N-m
(D) 6.25 N-m

**Q20** A body of mass 1 kg is thrown upwards with a velocity 20 $ms^{-1}$. It momentarily comes to rest after attaining a height of 18 m. How much energy is lost due to air friction? (Take, g = 10 $ms^{-2}$)

(A) 20 J (B) 30 J
(C) 40 J (D) 10 J

**Q21** If stress is equal to young's modulus, then change in length is equal to

(A) Original length
(B) Half of the original length
(C) Twice the original length
(D) $\frac{1}{4}th$ of the original length

**Q22** When a wire of young's modulus $Y$ is subjected to tensile force, the strain produced is $\alpha$. Then the elastic energy stored per unit volume is

(A) $\frac{\alpha^2}{2Y}$ (B) $\frac{Y\alpha^2}{2}$
(C) $2Y\alpha^2$ (D) $\frac{2Y}{\alpha^2}$

**Q23** The isothermal bulk modulus of a perfect gas at atmospheric pressure is

(A) $1.03 \times 10^5$ $N/m^2$
(B) $1.0 \times 10^4$ $N/m^2$
(C) $1.03 \times 10^{11}$ $N/m^2$
(D) $1.03 \times 10^{10}$ $N/m^2$

**Q24** A force of 100N increases the length of a given wire by 0.1 mm. Then the force required to increase its length by 0.25 mm is

(A) 50 N (B) 150 N
(C) 250 N (D) 500 N

**Q25** A metal plate of area $10^{-3}$ $m^2$ is placed on a liquid layer of thickness 0.8 mm. The coefficient of viscosity of that liquid is 24 poise. Then the horizontal force required to move the plate with a velocity of 1 cm $s^{-1}$ is

(A) 0.01 N (B) 0.02 N
(C) 0.03 N (D) 0.04 N

**Q26** Two identical liquid drops are falling down through air with a steady velocity of $V$. If those two drops merge, the new steady velocity of the bigger drop formed is

(A) $2^{1/3}$ V (B) $2^{3/2}$ V
(C) $2^{2/3}$ V (D) $2^{4/3}$ V

**Q27** Two liquids A and B are at 32°C and 24°C. When mixed in equal masses, the temperature of mixture is found to be 28°C. Their specific heats are in the ratio of

(A) 1 : 1 (B) 1 : 2
(C) 2 : 1 (D) 1 : 4

**Q28** A metal rod of cross-sectional area $3 \times 10^{-6}$ $m^2$ is suspended vertically from one end has a length 0.4 m at 100°C. Now, the rod is cooled upto 0°C, but prevented from contracting by attaching a mass m at the lower end. The value of m is:

(take, $Y$ = $10^{11}$ $N/m^2$, coefficient of linear expansion $=10^{-5}$/K, g = 10 $m/s^2$)

(A) 30 kg
(B) 40 kg
(C) 20 kg
(D) 10 kg

**Q29** Two moles of oxygen is mixed with eight moles of helium. The effective specific heat of the mixture at constant volume is

(A) 1.3 R (B) 1.4 R
(C) 1.7 R (D) 1.9 R

**Q30** Same quantity of ice is filled in each of the two metal containers *P* and *Q* having the same size, shape and wall thickness but made of different materials. The containers are kept in identical surroundings. The ice in *P* melts completely in time $t_1$ whereas that in *Q* takes a time $t_2$. The ratio of thermal conductivities of the materials of *P* and *Q* is

(A) $t_2 : t_1$

(B) $t_1 : t_2$

(C) $t_1^2 : t_2^2$

(D) ${t_2}^2 : {t_1}^2$

# Answer Key

| | |
|---|---|
| Q1 | C |
| Q2 | A |
| Q3 | B |
| Q4 | A |
| Q5 | B |
| Q6 | D |
| Q7 | C |
| Q8 | D |
| Q9 | C |
| Q10 | A |
| Q11 | B |
| Q12 | D |
| Q13 | C |
| Q14 | B |
| Q15 | D |
| Q16 | D |
| Q17 | A |
| Q18 | B |
| Q19 | B |
| Q20 | A |
| Q21 | A |
| Q22 | B |
| Q23 | A |
| Q24 | C |
| Q25 | C |
| Q26 | C |
| Q27 | A |
| Q28 | A |
| Q29 | C |
| Q30 | A |

# Hints & Solutions

Note: scan the QR code to watch video solution

**Q1 Video Solution:**

**Q2 Text Solution:**

Here: Intensity of electric field $E_0 = 200 \text{ V/m}$

Intensity of magnetizing field $H_0 = 0.365 \text{ A/m}$ The maximum energy flow $S = E_0 \times H_0 = 200 \times 0.365 = 73.0 \text{W/m}^2$

**Video Solution:**

**Q3 Text Solution:**

3,640 $\mathring{A}$

Explanation:

now $\lambda' = \frac{\lambda}{\mu} - \frac{5460}{1.5} ... \mathring{A}$

**Video Solution:**

**Q4 Text Solution:**

$\beta = \frac{\lambda D}{d}$

**Video Solution:**

**Q5 Video Solution:**

**Q6 Text Solution:**

Answer (D)

Hint: $T \propto \frac{n^3}{Z^2}$

Sol.: $T_1 = 3T_2$

$\frac{1^3}{1^2} = \frac{3(3)^3}{Z^2}$

$Z = 9$

**Video Solution:**

**Q7 Text Solution:**

(C) assumes that the angular momentum of electrons is quantized

Explanation

Bohr's model of atoms assumes that the angular momentum of electrons is quantized.

**Video Solution:**

**Q8 Video Solution:**

**Q9 Text Solution:**

The forward bias resistance of the diode is

$$r_{fb} = \frac{\Delta V}{\Delta I} = \frac{(0.7-0.6)\text{V}}{(15-5)\text{ mA}} = \frac{0.1\text{ V}}{10\times10^{-3}\text{ A}} = 10\Omega$$

**Video Solution:**

**Q10 Text Solution:**

Moment of force is known as torque. Thus dimensions of force and torque are same. Dimension of torque = Dimension of moment of force = $[ML^2T^{-2}]$

**Video Solution:**

**Q11 Text Solution:**

Here, $x = a + bt^2$

Where,

$$a = 8.5m \text{ and } b = 2.5\text{ms}^{-2}$$

$$Velocity,\ v = \frac{dx}{dt} = \frac{d}{dt}\left(a + dt^2\right) = 2bt$$

$$At\ t = 2,\ v = 2\left(2.5s^{-2}\right)(2s) = 10ms^{-1}$$

**Video Solution:**

**Q12 Text Solution:**

Slope of displacement time graph gives velocity ($v_1/v_2$ = tan 45°/tan 30°)

$$= \frac{v_2}{v_1} = 1\left(1/\sqrt{3}\right) = \frac{v_2}{v_1} = \sqrt{3} : 1$$

**Video Solution:**

**Q13 Text Solution:**

If the number is less than 1, the zero's on the right of decimal point are significant but to the left of the first non-zero digit are not significant. Therefore 0.0006312 has 4 significant figures

**Video Solution:**

**Q14 Text Solution:**

Dimensions of torque = $[ML^2T^{-2}]$

**Video Solution:**

**Q15 Text Solution:**

Work Done = Area under (F – d) Graph

$= 2 \times (6) + \frac{1}{2} \times 2 \times (12 - 6)$

$= 12 + 6 = 18J$

**Video Solution:**

**Q16 Text Solution:**

Work done, dW = F.dx

$\Rightarrow W = \int_0^5 \left(7 - 2x + 3x^2\right) dx$

$\Rightarrow W = \left[7x - x^2 + x^3\right]_0^5$

$\therefore W = 7 \times 5 - (5)^2 + (5)^3 = 135\text{J}$

**Video Solution:**

**Q17 Text Solution:**

As m is the mass per unit lenght, then rate of mass per second

$= \frac{mx}{t} = mv$

$\therefore Rate\,of\,KE = \frac{1}{2}(mv)v^2 = \frac{1}{2}mv^2$

**Video Solution:**

**Q18 Text Solution:**

Given, the potential energy of a particle in a force field,

$U = \frac{A}{r^2} - \frac{B}{r^1}$

For stable equilibrium, $F = -\frac{dU}{dr} = 0$

$= \frac{dU}{dr} = -2Ar^{-3} + Br^{-2}$

$0 = -\frac{2A}{r^3} + \frac{B}{r^2}\left(As\frac{-dU}{dr} = 0\right)$

$or\ \frac{2A}{r} = B$

The distance of particle from the centre of the field $r = \frac{2A}{B}$

**Video Solution:**

**Q19 Text Solution:**

$W_1 = \frac{1}{2}kx_1^2 = \frac{1}{2} \times 5 \times 10^3 \times \left(5 \times 10^{-2}\right)^2$

$= 6.25J$

$W_2 = \frac{1}{2}K(x_2 + x_2)^2$

$= \frac{1}{2} \times 5 \times 10^3 \left(5 \times 10^{-2} + 5 \times 10^{-2}\right)^2$

$= 25J$

Net Work Done $W_2 - W_1$

$= 25 - 6.25 = 18.75J = 18.75N - m$

**Video Solution:**

**Q20 Text Solution:**

Initially body posseses only kinetic energy and after attaining a height, the kinetic energy is zero.

Therefore, loss of energy = KE - PE

$= \frac{1}{2}mc^2 - mgh$

$= \frac{1}{2} \times 1 \times 400 - 1 \times 18 \times 10$

$= 200 - 180 = 20J$

**Video Solution:**

**Q21 Text Solution:**

Original length

**Video Solution:**

**Q22 Text Solution:**

Energy stored per unit volume is,

E = $\frac{1}{2} \times \text{Stress} \times \text{Strain}$

E $= \frac{1}{2} \times Y \times \text{Strain} \times \text{Strain} = \frac{Y\alpha^2}{2}$

$\left(\because \text{Y} = \frac{\text{stress}}{\text{strain}}\right)$

**Video Solution:**

**Q23 Text Solution:**

$1.03 \times 10^5$ $Nm^{-2}$

**Video Solution:**

**Q24 Text Solution:**

$F_2 = F_1 \times \frac{e_2}{e_1} = 100 \times \frac{0.25}{0.1} = 250N$

**Video Solution:**

**Q25 Text Solution:**

Plate area $A = 10^{-3} m^2$

Velocity gradient $\left(\frac{dV}{dx}\right) = \frac{10^{-2}}{0.8\times10^{-3}} = 12.5\ s^{-1}$

Coefficient of viscosity $\eta = 24 \times 10^{-1}$ Pas

Force

$F = \eta A \frac{dV}{dx} = 24 \times 10^{-1} \times 10^{-3} \times 12.5$

$= 0.03 N$

**Video Solution:**

**Q26 Text Solution:**

Terminal velocity $V_t = \frac{2}{9} \frac{r^2 g(\rho - \sigma)}{\eta}$

Here, $V_t \propto r^2$

If $r$ is radius of smaller drop and $R$ is radius of bigger drop, then

$\frac{4}{3}\pi R^3 = 2 \times \frac{4}{3}\pi r^3 \Rightarrow R = 2^{1/3} r$

If $V$ and $V'$ are the terminal velocities of smaller and bigger drops, then

$\frac{V}{V'} = \frac{r^2}{R^2} = \frac{1}{2^{2/3}} \Rightarrow V' = 2^{2/3} V$

**Video Solution:**

**Q27 Text Solution:**

When mixed, the heat gained by liquid *B* is equal to heat lost by liquid *A*. The final temperature of the mixture is 28°C. Heat lost by

$A = M_A . S_A$ (32-28)

Heat gained by $B = m_B . S_B$ (28 – 24)

$M_A S_A$(32-28) = $M_B S_B$ (28 – 24)

As $M_A = m_B$, $S_A = S_B$ or $S_A : S_B = 1 : 1$

**Video Solution:**

**Q28 Text Solution:**

We know that,

$\Delta L = L\alpha\Delta T = \frac{FL}{AY}$

$\Rightarrow \quad F = AY\alpha\Delta T$

$\Rightarrow \quad Mg = AY\ \alpha\ \Delta T \qquad [\because F = Mg]$

$\Rightarrow \quad M = \frac{AY\ \alpha\ \Delta T}{g}$

$\Rightarrow \quad M = \frac{3\times10^{-6}\times10^{11}\times10^{-5}\times100}{10} = 30\text{ kg}$

**Video Solution:**

**Q29 Video Solution:**

**Q30 Text Solution:**

Let $K_1$ and $K_2$ be the thermal conductivities of containers $P$ and $Q$ respectively.

As the same quantity of ice melts in $P$ and $Q$, so the quantity of heat flows in $P$ and $Q$ must be same.

$$\therefore \quad Q = \frac{K_1 A(T_1 - T_2)t_1}{x} = \frac{K_2 A(T_1 - T_2)t_2}{x}$$

or $K_1 t_1 = K_2 t_2 \quad \text{or} \quad \frac{K_1}{K_2} = \frac{t_2}{t_1}$

**Video Solution:**