KEAM 2026 Engineering April 19

Question Paper PDF

Conducted by CEE Kerala

General Instructions

(i) **Duration:** The total duration of the examination is 3 hours (180 minutes).

(ii) **Total Marks:** The complete paper carries a maximum of 600 marks.

(iii) **Structure:** The paper has 3 Sections:

- **Section A:** 45 Multiple Choice Questions (Physics).
- **Section B:** 30 Multiple Choice Questions (Chemistry).
- **Section B:** 75 Multiple Choice Questions (Mathematics).

(iv) **Compulsory Questions:** All 150 questions are compulsory.

(v) Each question has four options. Only **one** option is correct.

(vi) **Correct Answer:** +4 marks.

(vii) **Incorrect Answer:** −1 (Negative marking).

(viii) **Unanswered/Marked for Review:** 0 marks.

Chemistry

1. Reagent used to convert decanol to decanoic acid

(A) Tollen's reagent

(B) Jones reagent

(C) Grignard reagent

(D) Fehling's reagent

(E) DIBAC-H

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2. IUPAC name of $(CH_3)_3C-CH_2Br$

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3. Geometry of a molecule AB_3E_2 with 3 bond pairs and 2 lone pairs

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4. Which do not form carbylamine

(A) Ethanamine

(B) Benzamine

(C) Prop-2-amine

(D) Propan-1-amine

(E) N-methylethanamine

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5. Which transition metal has more than one metallic structure at normal temperature?

(A) Cr

(B) Ni

(C) Mn

(D) V

(E) Cu

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6. An organic compound $C_5H_{10}O$ does not reduces Tollen's reagent but forms addition compound with sodium hydrogen sulphite and gives the Iodoform test. On vigorous oxidation, it gives ethanoic acid and propanoic acid.

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10. Spin only magnetic moment given not correct is

(A) Ni^{2+} (4.73)

(B) Fe^{2+} (4.90)

(C) Ti^{2+} (2.84)

(D) CO^{2+} (3.89)

(E) Mg^{2+} (5.92)

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11. Minimum energy required to remove an atom from sodium is 3.313×10^{-19} J. Maximum wavelength of radiation that will get photoelectron

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12. Find the emf of the reaction at 298K

$$Ni_{(s)} + 2Ag^{+}_{(2\times10^{-3}M)} \rightarrow Ni^{2+}_{(4\times10^{-2}M)} + 2Ag_{(s)}$$

($E^{\circ}_{cell} = 1.5$ at 298K)

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13. $X_2 + O_2 \rightleftharpoons 2XO$ Concentration of X_2 and O_2 are 4×10^{-3} and 3×10^{-3} respectively. Equilibrium concentration of XO ($K_c = 0.5$)

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14. Which pairs have ability to form p-p multiple bonds

(A) C and O

(B) B and N

(C) N and P

(D) F and Cl

(E) C and Si

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15. Pyridinium chlorochromate is a complex of .....

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16. In Chemotherapy, ligand used to remove excess of Cu

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17. IUPAC name of

$$CH_3-CH(OH)-CH_2-CH(OH)-CH(C_2H_5)-CH_2-CH_3$$

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18. Which are carcinogenic hydrocarbon

(i) 1,2-Benzanthracene

(ii) pent-1-yne

(iii) 1,2-Benzpyrene

(iv) cyclohexane

(v) 3-methylcholanthrene

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19. Metals used in preparation of dihydrogen in lab

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20. Volume of methanol to make 2L of 0.4M solution (density = 0.64 kg/L, Molar Mass = 32 g/mol)

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21. Enthalpy of combustion of benzene, graphite, dihydrogen are -3260, -390 and -290 kJ/mol. Find the enthalpy of formation of benzene

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MATHEMATICS

1. If $9P_5 = 504\ (6P_\lambda)$. Find λ

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2. If $\vec{a} = 2\hat{i} - 2\hat{j} + 4\hat{k}$, $\vec{b} = -5\hat{i} - \hat{j} + 8\hat{k}$ and $\vec{c} = 3\hat{i} + \hat{j} - \lambda\hat{k}$. If $\vec{a} + \vec{b} + \vec{c}$ is perpendicular to $\vec{a} - \vec{b} + \vec{c}$, Find λ

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3. Find $\begin{vmatrix} 11 & 1 & 1 \\ 1 & 21 & 1 \\ 1 & 1 & 31 \end{vmatrix}$

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4. Find the eqn of the line passing through (-1, 2, -4) and parallel to $\frac{-x-1}{4} = \frac{2y+1}{-1} = \frac{-z+4}{3}$

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5. Find the minimum value of $f(x) = \frac{x^{100}-1}{x^{100}+1}$

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6. If $y = \frac{3x^3-2x^2+x}{|x|}$, $x \neq 0$ find $\frac{dy}{dx}$ at $x = -2$

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7. $\int \frac{\sin(\cot^{-1} x)}{1+x^2}\, dx$

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8. Find the number of terms in 2, 6, 18...1458

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9. Find the domain of $\frac{\log(x-5)}{x^2+3x-4}$

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10. $\lim_{x\to 0}\left[\frac{\sin^2 x}{1-\cos x}\right]$

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11. If $\tan\alpha = \frac{5}{6}$, $\tan\beta = \frac{1}{11}$ $(0 < \alpha, \beta < \frac{\pi}{2})$**, find** $\alpha + \beta$

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12. Find the sum of all 3 digit numbers using the digits 1, 2, 3, 4 without repetition

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13. $\int_0^1 \left[\tan^{-1}\left(\frac{1}{1+x+x^2+x^3}\right) + \tan^{-1}(1+x+x^2+x^3)\right]dx$

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14. Find the differential equation of $y = Ae^x + Be^{-2x}$

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15. Solve $5 < |x-1| < 15$

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16. Find the value of $\sin\left(2\sin^{-1}\frac{3}{5}\right)$

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17. If $f(x) = x^2 + 4x + 4$; $x \le -2$**. Find** $f^{-1}(x)$

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18. Find the length of latus rectum of $y^2 + 8x + 4y + 12 = 0$

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19. Find $\sin^{-1}\left(\sin\frac{5\pi}{9}\cdot\cos\frac{\pi}{9} + \sin\frac{\pi}{9}\cdot\cos\frac{5\pi}{9}\right)$

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20. If $Z_1 = \frac{5+7i}{7-5i}$, $Z_2 = \frac{3+2i}{3-2i}$, $Z_3 = \frac{1+11i}{11-i}$. Find the value of $Z_1 \times \overline{Z_1} + Z_2 \times \overline{Z_2} + Z_3 \times \overline{Z_3}$

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21. Find the eqn of the parabola having vertex (2, -5) and focus (5, -5)

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22. If $(3+i)x + (1-i)y + (3i-4) = (2x+1)i + (x-y+2)i$. Find (x, y)

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23. Find the shortest distance b/w the line $\vec{r} = -\hat{i} + t\hat{k}$ and $\vec{r} = -\hat{j} + S\hat{i}$; t, S $\in$ R

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24. $\lim_{x \to 0} \frac{\sqrt{1-\cos(x^2)}}{1-\cos x}$

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25. $\int \frac{\sin t + \cos t}{13 + 36 \sin 2t}\, dt$

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26. $\lim_{x \to 1} \frac{x-1}{\sqrt[3]{x}-1}$

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27. If $f(x) = \frac{2x+3}{x-2}$; $x \neq 2$, find $f(f(x))$

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28. If $P = \begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 10 & 100 & -1 \end{bmatrix}$**. Find** P^{4052}

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29. If $|\vec{a}| = \sqrt{26}$, $|\vec{b}| = \sqrt{3}$, $\vec{a} \times \vec{b} = 5\hat{i} + \hat{j} - 4\hat{k}$. Find $\vec{a} \cdot \vec{b}$

30. In a GP $a_1 = 7$, $a_n = 448$ and $S_n = 889$. Find the common ratio of the G.P

31. If R (-2, 2) is a point on the ellipse $\frac{(x-3)^2}{25} + \frac{(y+2)^2}{16} = 1$. If S and T are the foci of an ellipse find RS + RT

32. Find the coefficient of x^{-2} in $\left(3x - \frac{1}{3x}\right)^4$

33. Find the solution set of $\frac{x-3}{x-2} \geq 1$

34. $\int_0^1 x(1-x)^4\,dx$

35. Find the domain of $f(x) = 2[\sin^{-1}(2x-1)] - \frac{\pi}{4}$

36. Find the value of $1^{13} + 1^{19} + \cdots + 1^{226}$

37. If $\frac{4^{n+1}+16^{n+1}}{4^n+16^n}$ = G.M of 4 and 16, find n?

38. If $(3+5x)e^y = x$, find $\frac{dy}{dx}$

39. If the end of a diameter of the circle $x^2 + y^2 - 2x + 6y - 3 = 0$ is (-4, -2), find the other end of the diameter

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40. Find x in $4\sin^2 x - 2(1+\sqrt{3})\sin x + \sqrt{3} = 0$, for $0° \leq x \leq 360°$

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41. Find mean deviation about mean of 5, 6, 14, 15

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42. Find the value of $\sin 12° \sin 48° \sin 54°$

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43. If $y = e^{-x^2}$, find $\frac{d^2y}{dx^2} + 2x\frac{dy}{dx}$

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44. If $I = \int_{-1}^{1} \frac{x^4}{1+x^4} \cos^{-1}\left(\frac{2x}{1+x^2}\right) dx$, find $2I$

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45. If $A = \begin{bmatrix} 0 & 1 \\ -1 & 0 \end{bmatrix}$ and $(\alpha I + \beta A)^2 = A$, find $\alpha^2 - \beta^2$?

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46. If $\sin\theta \cos\theta > 0$, then θ lies in which quadrant(s)?

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47. Find the product: $\begin{bmatrix} 1 & 1 & 1 \\ -1 & 0 & 1 \\ 1 & 0 & -1 \end{bmatrix} \begin{bmatrix} 2 \\ 3 \\ 1 \end{bmatrix}$

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48. Solve $(x+2y)\,dx+(2x-y)\,dy=0$

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49. Find the interval where $f(x)=1+x\log\left(x+\sqrt{x^2+1}\right)-\sqrt{x^2+1}$ **is strictly increasing for** $x\geq 0$**.**

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50. $\int\left[\frac{1}{1+x^2}-\frac{2x}{(1+x^2)^2}\right]e^x\,dx$

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51. A perpendicular drawn from the origin to the straight line $\sqrt{3}x+y-24=0$ **makes an angle** α **with the positive direction of the X-axis. Find** α**.**

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52. Which of the following is not true?

(a) $f(x)=x|x|$ is differentiable in $(-1,1)$
(b) $g(x)=\sqrt{|x|}$ is differentiable in $(4,5)$
(c) $h(x)=|x-2|+|x-3|$ is differentiable in $(2,3)$
(d) $k(x)=|x+1|+|x-6|$ is differentiable in $(-1,6)$
(e) $f(x)=x+[x]$ is differentiable at $x=2$

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53. If $f(x)=\begin{cases}\frac{2x^2+3x-5}{x-1}, & x\neq 1\\ k, & x=1\end{cases}$ **is continuous at** $x=1$**, then find** k**.**

PHYSICS

1. A spherical conductor contains 5×10^6 **electrons. If the radius of the sphere is 10cm, find**

the electric field at its surface.

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2. Find the total energy released when 235g of ^{235}U undergoes complete fission. Assume that the energy released per fission is about 200 MeV.

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3. Transverse wave in a string is given by $y = 3\sin 2\pi(25t + 0.4x)$ m. What is the velocity of the wave?

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4. A ball of mass 200g strikes a wall with a speed 5m/s and rebounds with same speed in the opposite direction. If the average force exerted on the ball is 5N, find the time of contact between the ball and wall.

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5. Two identical cells, each of emf 2V and internal resistance 0.1Ω, are connected in parallel. Find effective emf and the effective internal resistance of the combination.

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6. A copper wire of cross sectional area 2mm^2 carries a current I and has drift velocity V_1. Another copper wire of cross-sectional area 1.5mm^2 carries a current 2I and has drift velocity V_2. Find ratio $\frac{V_1}{V_2}$

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7. A solid sphere of radius 20cm has the same mass as a solid cylinder. If their moments of inertia about their respective central axes are equal, find the radius of the cylinder.

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8. In which thermodynamic process does the internal energy of an ideal gas remain unchanged?

9. A gun fires 25 bullets per second. Each bullet has a mass of 10g and is fired with a velocity of 20m/s. Find the recoil force on the gun.

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10. A satellite moves in an elliptical orbit around a planet such that its maximum distance and minimum distance from the planet are in the ratio 3:1. If its speed at the nearest point (perigee) is V, find its speed at the farthest point (Apogee).

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11. A particle moves such that its position is given by $y = t^2 + 2t + 3$ (m). Find the average acceleration of the particle between $t = 3s$ and $t = 6s$.

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12. $A = \frac{B}{CD^2}$. If B, C and D have dimensions of inductive reactance, capacitive reactance and angular frequency respectively, find the dimension of A.

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13. A beam of unpolarized light of intensity I_0 is incident on a polarizer. A second polaroid is placed in the path such that its transmission axis makes an angle of 45° with the first polaroid. What is the intensity of light after it passes through the second polaroid?

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14. For an electron of mass m and charge e, find the ratio of angular momentum (L) to magnetic dipole moment (μ).

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15. Which of the following has the highest modulus of elasticity?

(A) Steel

(B) Aluminium

(C) Brass

(D) Glass

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16. At which condition do the experimental P-V curve and predicted P-V curve (for an ideal gas) closely match?

(a) Low temperature and high pressure

(b) High temperature and low pressure

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17. Which law is the symmetrical counterpart of Faraday's law in electromagnetic induction?

(A) Ampere-Maxwell law

(B) Ampere's Circuital law

(C) Gauss's law

(D) Coulomb's law

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18. A wire of fixed length is bent into a single circular turn, producing a magnetic field B at its center. If the same wire is bent into 3 circular turns (carrying the same current), what will be the magnetic field at the center?

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19. Find the RMS current for the given expression: $i = 4\sqrt{2}\sin\omega t + 3\sqrt{2}\cos\omega t$

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20. What is the ratio of distance travelled by a freely falling body in successive equal intervals of time (starting from rest)?

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21. A block of 10kg mass moving on a frictionless surface with 5m/s compresses a spring by 5cm and comes to rest. What is the force constant of the spring?

22. A uniform rod of mass m and length l is rotating in a horizontal circle about a vertical axis passing through one of its ends with angular velocity ω. What is the angular momentum of the rod?

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23. If the threshold wavelengths of two metals are in the ratio 3:1, what is the ratio of their work functions?

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24. If the electric potential is $V = 3x^2 + 4x$, then the magnitude of the Electric field at $x = 1$m is?

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25. Which of the following is not an extensive variable?

(a) Total mass
(b) Internal energy
(c) Volume
(d) Density
(e) Work done

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26. What is the mass of one molecule of water in kg?

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27. A capacitor has capacitance $C = 4\,\mu$F. If the energy stored in it is 18×10^{-8} J, find the charge stored in the capacitor.

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28. The radius of the innermost orbit of a Hydrogen atom is 0.53Å. What is the radius of the 3rd orbit?

29. The order of the electric field required to pull out electrons from a metal by field emission is

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30. The relative viscosity of blood ($\frac{\eta_{blood}}{\eta_{water}}$) is constant in which temperature range?

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31. The magnifying power of a simple microscope can be increased by using a lens of ____.

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32. In a Silicon (Si) crystal containing N atoms at absolute zero, the number of energy states in the valence band is ____.

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33. Two particles with charges $2q$ and q having equal momentum enter a uniform magnetic field in a direction perpendicular to the field. Find the ratio of the radii of their circular paths.

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34. The instantaneous displacement of a wave is given by $y = 2\sin pt + 2\sqrt{3}\cos pt$. Find the amplitude of the wave in cm.

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35. An air-core solenoid has an inductance $L = 0.5\,\text{mH}$. It is then filled with soft iron of relative permeability $\mu_r = 1500$. Find the new inductance.

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36. A bar magnet is rotated from a parallel position ($0°$) to a $45°$ position, and the work done is $2.07\,\text{J}$. Find the work done to rotate it from $45°$ to the anti-parallel ($180°$) position.

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37. A real object is placed at the focus in front of a concave mirror of focal length f. Find the distance to the image formed.

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38. Find the ratio of the magnitude of gravitational potential energy to that of kinetic energy for a satellite of mass m orbiting a planet.

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39. A uniform metallic wire of radius r and length ℓ is heated by passing a constant current. To make the heat produced 8 times the original value, which of the following changes can be made?

(a) 2ℓ
(b) $\frac{\ell}{2}, \frac{r}{2}$
(c) $2\ell, \frac{r}{2}$
(d) $2r$
(e) $2\ell, 2r$

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40. Two capillary tubes of radii in the ratio $1:2$ are dipped in the same solution. Find the ratio of the heights to which the liquid rises in the tubes.
