

MHT CET 2024 Biology Answer Key PDF

Answer Key

Question 1 Correct Answer – (3) $n^2 - 1$

Explanation: The potential energy is $P.E. = \frac{1}{2} k x^2 = \frac{1}{2} k \left(\frac{A}{n} \right)^2$. $P.E. = \frac{1}{2} k x^2 = \frac{1}{2} k \left(\frac{A}{n} \right)^2$

. The kinetic energy is $K.E. = \frac{1}{2} k (A^2 x^2) = \frac{1}{2} k A^2 \left(\frac{1}{n^2} \right)$. $K.E. = \frac{1}{2} k (A^2 x^2) = \frac{1}{2} k A^2 \left(\frac{1}{n^2} \right)$. Taking the ratio $K.E. / P.E.$ yields $n^2 - 1$.
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Question 2 Correct Answer – $\frac{14}{5} MR^2$

Explanation: The moment of inertia of one solid sphere about its center of mass is $\frac{2}{5} MR^2$. Applying the parallel axis theorem for an axis at a distance $d = R$ gives $I = \frac{2}{5} MR^2 + MR^2 = \frac{7}{5} MR^2$. For two identical symmetric spheres, $I_{total} = \frac{14}{5} MR^2$.

Question 3 Correct Answer – (1) $\sqrt{rg \tan \theta}$

Explanation: The optimum safe speed for a vehicle traversing a banked, frictionless curved road of radius r is given by $v = \sqrt{rg \tan \theta}$.

Question 4 Correct Answer – (3) Reed swamp stage

Explanation: In ecological succession within water bodies (hydrosere), the reed swamp stage (characterized by plants like *Typha*) immediately precedes the sedge-meadow stage.

Question 5 Correct Answer – (1) Linearly with the frequency of incident radiation

Explanation: According to Einstein's photoelectric equation, $K.E._{max} = h\nu - \Phi_0$, showing that maximum kinetic energy is a linear function of the frequency ν of the incident light.

Question 6 Correct Answer – (1) Second

Explanation: The inductive time constant of an L - R circuit is $\tau = L/R$, which has the dimension of time and is measured in seconds.

Question 7 Correct Answer – (1) 0.66 hp

Explanation: The power required is $P = F \cdot v = mg \cdot v = 250 \times 9.8 \times 0.20 = 490$ W. Converting to horsepower gives $\frac{490}{746} \approx 0.66$ hp.

Question 8 Correct Answer – (1) *Salmonella typhi*

Explanation: Typhoid fever is a waterborne systemic infection caused specifically by the pathogenic bacterium *Salmonella enterica* serovar Typhi.

Question 9 Correct Answer – (3) Henry Dixon and John Joly

Explanation: Dixon and Joly proposed the cohesion-tension theory in 1894 to explain how transpiration pull drives the continuous upward movement of water through xylem vessels.

Question 10 Correct Answer – (4) Female wasp and fig species

Explanation: The interaction between wasps and figs is an example of mutualism, whereas the other pairings represent commensalism.

Question 11 Correct Answer – (1) Open circulatory system

Explanation: Most arthropods possess an open circulatory system where hemolymph is pumped by a dorsal heart into a cavity called the hemocoel, directly bathing tissues.

Question 12 Correct Answer – (4) Cytoplasmic streaming

Explanation: Cytoplasmic streaming (or cyclosis) is the continuous, directed movement of the fluid cytoplasm within a living cell to distribute nutrients and organelles.

Question 13 Correct Answer – (4) Four times

Explanation: In one turn of the Krebs cycle, oxidation reactions occur four times to yield three molecules of NADH and one molecule of FADH₂.

Question 14 Correct Answer – (1) Sporozoite phase

Explanation: The infectious stage of the malaria-causing parasite *Plasmodium* that enters the human body via a female *Anopheles* mosquito bite is the sporozoite.

Question 15 Correct Answer – (4) Testes

Explanation: Spermatozoa are produced in the seminiferous tubules of the testes through the process of spermatogenesis.

Question 16 Correct Answer – (3) 1980s

Explanation: Joint Forest Management (JFM) was formally introduced by the Government of India in the 1980s to involve local communities in forest conservation.

Question 17 Correct Answer – (1) 4.42×10^{-6} J

Explanation: The electrostatic energy density is $u = \frac{1}{2}\epsilon_0 E^2 = \frac{1}{2}(8.85 \times 10^{-12})(10^3)^2 \approx 4.42 \times 10^{-6}$ J/m³. This represents the base energy stored in a unit volume of air.

Question 18 Correct Answer – (4) All of the above

Explanation: For a bound satellite, kinetic energy K , potential energy V , and total energy E are related by $V = -2K$, $E = -K$, and $E = V/2$, making all options correct.

Question 19 Correct Answer – (2) Speciation that occurs in the same geographic region without physical separation

Explanation: Sympatric speciation is the evolution of a new species from a surviving ancestral species while both continue to inhabit the same geographic area.