

MHT CET 2020 Biology Answer Key PDF

Physics

- Q1. (C) 1. Explanation: Using the transistor relation $\alpha = \beta/(\beta + 1)$, the given expression evaluates to 1.
- Q2. (A) 1, 0. Explanation: Evaluating the logic gate combination for all inputs high and then low gives outputs 1 and 0 respectively.
- Q3. (D) Undergoes total internal reflection at second refracting surface. Explanation: The angle inside the prism exceeds the critical angle for glass-air interface.
- Q4. (C) $\mu_0 \pi R_2^2 / (2R_1)$. Explanation: For $R_1 \gg R_2$, the magnetic field at the center of the larger ring is nearly uniform across the smaller ring.
- Q5. (C) $L^2 / (mr^3)$. Explanation: Using $L = mvr$ and $F_c = mv^2/r$.
- Q6. (D) 2.5. Explanation: Using vector identities and the given magnitudes.
- Q7. (A) 0.12 A m^2 . Explanation: Bending the magnet into a semicircle reduces its effective magnetic moment.
- Q8. (D) 21 J. Explanation: Work done = $\int (10 + 0.5x) dx$ from 0 to 2.
- Q9. (C) 20 N. Explanation: Centripetal force equals $T \sin \theta$ and $T \cos \theta = mg$.
- Q10. (C) $I\omega^2/4$. Explanation: Angular momentum is conserved when the second ring is gently placed.
- Q11. (D) 1 : 2. Explanation: Inside a uniform sphere, $g \propto r$.
- Q12. (C) 0.8. Explanation: Fringe width is proportional to wavelength.
- Q13. (A) 16 times. Explanation: For fixed radius, kinetic energy varies as B^2 .
- Q14. (B) Graph A. Explanation: $X_c = 1/(2\pi fC)$, an inverse relation with frequency.
- Q15. (D) $9 \times 10^{-2} \text{ m}$. Explanation: Upward force due to surface tension equals weight of water column.
- Q16. (C) $-a_2\hat{j} - a_3\hat{k}$. Explanation: Using vector triple product identity.
- Q17. (A) $2 \times 10^5 \text{ A/m}$. Explanation: $M = \chi H$ and $\chi \approx \mu_r$.
- Q18. (B) 7 : 50. Explanation: Using the Rydberg formula for Lyman and Paschen first lines.
- Q19. (A) $n/(2V^2)$. Explanation: Frequency varies as $1/(LV\mu)$.
- Q20. (B) 2R. Explanation: Lens maker's formula for plano-convex lens.
- Q21. (D) $\sqrt{2} T$. Explanation: Time period $T \propto \sqrt{m}$.
- Q22. (A) $hc/(\phi + eVs)$. Explanation: Einstein's photoelectric equation.
- Q23. (D) 4M. Explanation: Frequency $\propto \sqrt{\text{Tension}}$; octave means double frequency.
- Q24. (C) 3.2 cm. Explanation: g reduces to 0.64g at the given height.
- Q25. (D) $8 \times 10^{-24} \text{ Am}^2$. Explanation: Magnetic moment = $evr/2$.

- Q26. (C) 4 cm. Explanation: End correction = $d/3$.
- Q27. (D) 3 J. Explanation: Compare total kinetic energies of rolling ring and disc.
- Q28. (B) 2.5×10^6 m/s. Explanation: $F = qvB \sin \theta$.
- Q29. (B) Magnet is stationary. Explanation: In suspended coil galvanometer, the coil moves.
- Q30. (A) 3 V, 7 V. Explanation: Applying Kirchhoff's voltage law.
- Q31. (D) $[L^{1/2} M^{3/2} T^{-2}]$. Explanation: Obtained from dimensional analysis.
- Q32. (B) 40 cm. Explanation: Using meter bridge balance condition before and after shunting.
- Q33. (B) $2E_1 = E_2$. Explanation: Electric field near conductor surface is σ/ϵ_0 while plane sheet gives $\sigma/2\epsilon_0$.
- Q34. (B) $\sqrt{2} d$. Explanation: Range $\propto v h$.
- Q35. (A) Decrease by 15/16. Explanation: Comparing initial and final centripetal forces.
- Q36. (D) An atomiser. Explanation: Atomiser works on Bernoulli's principle.
- Q37. (B) $(1/2\pi)v(YA/mL)$. Explanation: Vertical oscillations of stretched wire.
- Q38. (A) $(4W_1 + 3W)/(4A)$. Explanation: Stress equals load above the section divided by area.
- Q39. (D) $7R/2$, $5R/2$, rigid diatomic. Explanation: $\gamma = 1.4$ corresponds to rigid diatomic gas.
- Q40. (C) 9×10^{-3} . Explanation: Fractional compression = βP .
- Q41. (D) $Pm/(kBT)$. Explanation: Using $PV = NkBT$ and density = Nm/V .
- Q42. (A) 0.48 s. Explanation: Effective spring constant adds.
- Q43. (C) $2u/(1 + m/M)$. Explanation: Standard elastic collision formula.
- Q44. (D) 1.8 V. Explanation: Stopping potential = $(3 - 1.2)$ eV.
- Q45. (A) 2 : 3. Explanation: Equivalent capacitance obtained by symmetry reduction.
- Q46. (D) Reflected light is plane polarised light but transmitted light is partially polarised.
Explanation: Brewster's law.
- Q47. (A) 506 Hz. Explanation: Beat frequencies determine actual source frequency.
- Q48. (A) $\pi m^2 e^6 / (4\epsilon_0^3 h^4 n^2)$. Explanation: Derived from Bohr model.
- Q49. (B) $3VT(1/r - 1/R)$ is released. Explanation: Reduction in surface energy during coalescence.
- Q50. (D) Blue colour. Explanation: Resolving power increases as wavelength decreases.

Chemistry

- Q1. (A) Fe. Explanation: Iron is above hydrogen in the reactivity series and reacts with dilute H_2SO_4 to liberate hydrogen.
- Q2. (D) Prontosil. Explanation: Prontosil is an antibacterial sulpha drug, not a tranquilizer.

- Q3. (A) Gallium. Explanation: Zone refining is used for highly pure semiconductors such as gallium and germanium.
- Q4. (B) $\Delta H - \Delta U = \Delta nRT$. Explanation: This is the relation between heat changes at constant pressure and volume.
- Q5. (A) $2.1 \times 10^{-5} \text{ s}^{-1}$. Explanation: For a first-order reaction, $k = \text{Rate}/[A] = (6.3 \times 10^{-6})/(0.3)$.
- Q6. (B) NO_2 . Explanation: NO_2 contains one unpaired electron and is therefore paramagnetic.
- Q7. (C) Benzaldehyde. Explanation: This is the Gattermann-Koch reaction.
- Q8. (D) Butan-2-one. Explanation: Secondary alcohols oxidize first to ketones.
- Q9. (D) Polythene. Explanation: Polythene is formed by addition polymerization of ethene.
- Q10. (D) $\text{C}_2\text{H}_5\text{NHCOCH}_3$. Explanation: Acetylation of ethylamine gives N-ethylacetamide.
- Q11. (A) Nitrogen. Explanation: Dumas method is used for estimation of nitrogen.
- Q12. (B) The shape of hybrid orbitals is same as that of atomic orbitals. Explanation: Hybrid orbitals have different shapes from the original atomic orbitals.
- Q13. (C) 0.1 NA. Explanation: BCC contains 2 atoms per unit cell; 4 g of an element with atomic mass 40 corresponds to 0.1 mole.
- Q14. (D) $\text{BaO}_2 + \text{H}_2\text{O} + \text{CO}_2$. Explanation: This is Merck's process for preparing hydrogen peroxide.
- Q15. (D) 692 K. Explanation: Zinc melts at approximately 692 K.
- Q16. (D) 77.7%. Explanation: For $\text{K}_3[\text{Fe}(\text{CN})_6]$, maximum particles = 4. Using $i = 3.333$ gives $\alpha \approx 77.7\%$.
- Q17. (D) 425 kJ mol^{-1} . Explanation: Applying bond-energy calculations using Hess's law.
- Q18. (D) Butylated Hydroxy Anisole. Explanation: BHA is widely used as an antioxidant in food.
- Q19. (A) 800 mm of Hg. Explanation: Boyle's law, $P_1V_1 = P_2V_2$.
- Q20. (C) Nylon-6,6. Explanation: Nylon-6,6 contains amide linkages.
- Q21. (D) 1 M KCl. Explanation: KCl dissociates into ions and gives the highest van't Hoff factor.
- Q22. (D) 112 pm. Explanation: The C-H bond length in alkanes is about $1.12 \text{ \AA}$.
- Q23. (C) $\text{C}_3\text{H}_5\text{Br}$. Explanation: Allyl bromide has the structure $\text{CH}_2=\text{CH}-\text{CH}_2\text{Br}$.
- Q24. (A) $\text{C}_5\text{H}_5\text{NH}^+\text{CrO}_3\text{Cl}^-$. Explanation: PCC oxidizes alcohols to aldehydes without further oxidation.
- Q25. (B) 127.65 pm. Explanation: For FCC structures, $r = a/(2\sqrt{2})$.
- Q26. (C) It contains two asymmetric carbon atoms. Explanation: Glyceraldehyde contains only one chiral carbon atom.
- Q27. (D) 2,4,6-Tribromoaniline. Explanation: Aniline reacts readily with bromine water.
- Q28. (B) Conductivity. Explanation: SI unit of conductivity is siemens per metre (S m^{-1}).
- Q29. (B) Propanone. Explanation: Dehydrohalogenation followed by Grignard-type conversion yields acetone.

- Q30. (C) Li. Explanation: Lithium has the most negative reduction potential and is the strongest reducing agent.
- Q31. (D) Mn ($Z = 25$). Explanation: Mn has electronic configuration $[\text{Ar}] 3d^5 4s^2$ with five d and one s unpaired electrons.
- Q32. (B) 353.5 pm. Explanation: For FCC, $a = 2\sqrt{2} r$.
- Q33. (C) It is heterocyclic with oxygen atom in ring. Explanation: Pyran is a six-membered oxygen-containing heterocycle.
- Q34. (D) Loss and gain of electron. Explanation: Electron transfer is not part of hybridization.
- Q35. (C) $\text{Ca}(\text{HCO}_3)_2$. Explanation: Excess CO_2 converts CaCO_3 into soluble calcium bicarbonate.
- Q36. (A) 1.0 mole. Explanation: Only one chloride ion lies outside the coordination sphere.
- Q37. (C) +6. Explanation: In potassium ferrate (K_2FeO_4), Fe has oxidation state +6.
- Q38. (D) $[\text{Pt}(\text{NH}_3)_2\text{Cl}_2]$. Explanation: This platinum complex is square planar, not octahedral.
- Q39. (D) One. Explanation: Lactic acid contains one hydroxyl group.
- Q40. (D) Vinyl alcohol. Explanation: The hydroxyl group is attached to an sp^2 carbon atom.
- Q41. (C) 560.0 sec. Explanation: First-order rate equation gives approximately 560 seconds.
- Q42. (D) 1, 3. Explanation: The structure contains one tertiary and three primary carbon atoms.
- Q43. (B) 1.75 V. Explanation: $E^\circ_{\text{cell}} = E^\circ_{\text{cathode}} - E^\circ_{\text{anode}} = 1.50 - (-0.25)$.
- Q44. (C) 6.07 g. Explanation: Chlorine is the limiting reagent and produces approximately 6.07 g AuCl_3 .
- Q45. (A) 4-Hydroxybenzene sulphonic acid. Explanation: Phenol undergoes para sulphonation under the given conditions.
- Q46. (A) 1386.0 kJ. Explanation: $0.154 \text{ kg CO}_2 = 3.5 \text{ moles}$; heat released = 3.5×396 .
- Q47. (B) $\text{H}_3\text{PO}_4 + \text{PH}_3$. Explanation: Orthophosphorous acid undergoes disproportionation.
- Q48. (C) 0.01 M. Explanation: 6.022×10^{20} molecules correspond to 10^{-3} moles in 100 mL solution.
- Q49. (D) Solid foam. Explanation: Pumice stone is gas dispersed in a solid medium.
- Q50. (A) 2-Methyl-2-nitropropane. Explanation: Tertiary nitroalkanes do not react with nitrous acid.

Biology

- Q1. (C) A-(iii), B-(iv), C-(i), D-(ii). Explanation: Fibrinogen causes coagulation of semen, fructose provides energy, prostaglandins induce contractions in the female reproductive tract, and lactobacilli prevent fungal infections.
- Q2. (B) DNA. Explanation: DNA is not directly involved in translation; mRNA, tRNA and rRNA are required.

- Q3. (C) Aerobic conditions, high CO₂ concentration and enough light intensity. Explanation: These conditions favor non-cyclic photophosphorylation.
- Q4. (A) JG apparatus. Explanation: Renin is secreted by juxtaglomerular cells.
- Q5. (D) P-680. Explanation: P-680 is the reaction center chlorophyll of Photosystem II.
- Q6. (C) 00. Explanation: mRNA is single stranded and therefore contains no base pairs.
- Q7. (D) Paramecium. Explanation: Paramecium is a eukaryotic protozoan whereas the others are prokaryotes.
- Q8. (C) Anabaena. Explanation: Azolla leaves contain symbiotic Anabaena filaments.
- Q9. (D) 5–10. Explanation: Platelets survive for approximately 5–10 days.
- Q10. (B) HbA_{1c}. Explanation: Carriers of sickle-cell anemia are heterozygous.
- Q11. (A) Proprioceptors. Explanation: These receptors respond to tension, vibration and body position.
- Q12. (A) Seminal vesicles. Explanation: Fructose in semen is secreted by seminal vesicles.
- Q13. (D) C₄ pathway reaction takes place in mesophyll chloroplast and C₃ pathway reactions in bundle sheath chloroplast. Explanation: This is the characteristic feature of C₄ plants.
- Q14. (D) Conjugated. Explanation: Proteins attached with prosthetic groups are called conjugated proteins.
- Q15. (D) Atrial systole. Explanation: Atrial systole is the shortest phase of the cardiac cycle.
- Q16. (D) a-iv, b-iii, c-ii, d-i. Explanation: Female banded krait provides DNA probe, dog pancreas yielded insulin, human hair root provides DNA sample and E. coli produces Humulin.
- Q17. (D) Hereditary material of bacterium. Explanation: The bacterial chromosome, not plasmid, is the principal hereditary material.
- Q18. (A) Runner. Explanation: A runner is a subaerial branch creeping horizontally on soil.
- Q19. (C) Johannsen. Explanation: Johannsen formulated Mendelian principles into the laws of inheritance.
- Q20. (D) Connective. Explanation: The connective joins filament and anther.
- Q21. (C) Blood. Explanation: Dead leucocytes are destroyed mainly in spleen, liver and lymph nodes.
- Q22. (B) Catecholamines. Explanation: Stress responses involve adrenaline and noradrenaline secretion.
- Q23. (D) Combined. Explanation: Water present as hydrated oxides of silicon and aluminium is called combined water.
- Q24. (C) N, P, K. Explanation: Nitrogen, phosphorus and potassium are critical macronutrients.
- Q25. (C) Madagascar. Explanation: Lemurs are endemic to Madagascar.
- Q26. (D) (i)-c, (ii)-e, (iii)-a, (iv)-d, (v)-b. Explanation: This correctly matches Drosophila wing phenotypes with genotypes.

- Q27. (B) Mesozoic. Explanation: Triassic, Jurassic and Cretaceous belong to the Mesozoic era.
- Q28. (A) AUG-UAG. Explanation: AUG is the initiation codon and UAG is a termination codon.
- Q29. (B) Implantation — Setting of zygote in the endometrium uterus. Explanation: Implantation involves the blastocyst, not the zygote.
- Q30. (D) Release of CO₂. Explanation: Glycolysis does not release carbon dioxide.
- Q31. (A) 0.49. Explanation: Frequency of homozygous dominant genotype = $p^2 = (0.7)^2 = 0.49$.
- Q32. (D) Deaths. Explanation: Mortality refers to the number of deaths per unit area per unit time.
- Q33. (D) Fragrance. Explanation: Bird-pollinated flowers are generally odorless.
- Q34. (B) (i)-b, (ii)-c, (iii)-d, (iv)-a. Explanation: This correctly matches symport, facilitated diffusion, antiport and plasmolysis.
- Q35. (B) Budding. Explanation: Hydra and yeast reproduce asexually by budding.
- Q36. (C) 94°C. Explanation: Taq polymerase remains stable at very high temperatures used in PCR.
- Q37. (B) Lymphatic vessels. Explanation: Lymphatic vessels contain numerous internal valves.
- Q38. (C) Queen bee and worker bees have haploid number of chromosomes. Explanation: Queen and worker bees are diploid, making this statement incorrect.
- Q39. (C) Liver. Explanation: Jaundice is associated with bilirubin accumulation and liver dysfunction.
- Q40. (D) C₅₅H₇₂O₅N₄Mg. Explanation: This is the empirical formula of chlorophyll-a.
- Q41. (A) The ovum secretes antifertilizin. Explanation: Antifertilizin secreted by ovum interacts with fertilizin from sperm.
- Q42. (C) Sweat. Explanation: Mammary glands are modified sweat glands.
- Q43. (D) Cuboidal cells with many microvilli. Explanation: PCT is lined by cuboidal epithelium with a brush border.
- Q44. (C) High dose of UV-B rays. Explanation: Snow blindness results from excessive UV-B exposure.
- Q45. (C) 5. Explanation: Tiger, lion, musk deer, one-horned rhinoceros and great Indian bustard are endangered.
- Q46. (D) Hyaluronic acid. Explanation: Hyaluronic acid is a heteropolysaccharide.
- Q47. (A) Camel. Explanation: Desert animals possess longer loops of Henle for water conservation.
- Q48. (A) Distillation. Explanation: Beer and wine are produced by fermentation without distillation.
- Q49. (B) Coronary artery. Explanation: Coronary arteries carry oxygenated blood to the heart muscle.
- Q50. (A) Usnea. Explanation: Usnic acid is commercially obtained from lichens of the genus Usnea.
- Q51. (A) Histamine. Explanation: Histamine causes vasodilation and increases capillary permeability.
- Q52. (D) Pneumonia. Explanation: Pneumonia is characterized by inflammation of alveoli, consolidation and exudation in lungs.

Q53. (C) Patients called non-progressors develop AIDS very slowly or never at all. Explanation: Non-progressors show delayed progression of HIV infection.

Q54. (D) Test cross. Explanation: A test cross is used to determine whether an individual is homozygous or heterozygous.

Q55. (C) Corpus luteum. Explanation: Corpus luteum secretes progesterone required for maintenance of pregnancy.

Q56. (B) Auxin. Explanation: Auxin promotes apical dominance in plants.

Q57. (A) Gibberellin. Explanation: Gibberellins stimulate stem elongation and bolting.

Q58. (D) Acrosome. Explanation: The acrosome contains enzymes required for fertilization.

Q59. (B) Mycoplasma. Explanation: Mycoplasma is the smallest self-replicating organism.

Q60. (C) Endoplasmic reticulum. Explanation: ER plays a major role in intracellular transport.

Q61. (A) Cro-Magnon man. Explanation: Cro-Magnon man represents early modern humans.

Q62. (B) Acetylcholine. Explanation: Acetylcholine is the neurotransmitter released at neuromuscular junctions.

Q63. (D) Placenta. Explanation: Placenta acts as an endocrine tissue during pregnancy.

Q64. (C) Operon. Explanation: An operon is a functional unit of gene regulation in prokaryotes.

Q65. (A) Euglena. Explanation: Euglena shows both plant-like and animal-like characteristics.

Q66. (B) Cycas. Explanation: Cycas possesses coralloid roots containing cyanobacteria.

Q67. (D) Golgi apparatus. Explanation: Golgi bodies package and secrete cellular products.

Q68. (C) Amphibians. Explanation: Amphibians are the first vertebrates adapted to life on land.

Q69. (B) Nephridia. Explanation: Nephridia are excretory organs of earthworms.

Q70. (A) Pons. Explanation: Pons is a part of the hindbrain.

Q71. (C) Sclerenchyma. Explanation: Sclerenchyma provides mechanical support due to lignified walls.

Q72. (D) Trisomy. Explanation: Presence of an extra chromosome results in trisomy.

Q73. (A) Penicillin. Explanation: Penicillin is produced by species of *Penicillium*.

Q74. (B) ATP. Explanation: ATP is regarded as the energy currency of the cell.

Q75. (A) 37.2%. Explanation: This value corresponds to the required genetic probability in the given problem.

Q76. (B) 1660 kb. Explanation: The genome size of *Methanococcus jannaschii* is approximately 1660 kb.

Q77. (D) Eye. Explanation: The sixth cranial nerve controls lateral eye movement.

Q78. (B) Matrix of mitochondria. Explanation: Enzymes of Krebs cycle are located in the mitochondrial matrix.

- Q79. (A) Deuteromycetes. Explanation: Sexual reproduction is absent or unknown in Deuteromycetes.
- Q80. (B) b and c. Explanation: Eukaryotic cells do not possess mesosomes and fimbriae.
- Q81. (B) Heterozygous for the two selected traits. Explanation: F₁ offspring from a dihybrid cross between pure lines are heterozygous for both traits.
- Q82. (D) Mitochondria. Explanation: Mitochondria contain their own DNA and ribosomes.
- Q83. (C) Mutation. Explanation: Mutation introduces new genetic variation into a population.
- Q84. (A) Pituitary gland. Explanation: Pituitary gland is known as the master endocrine gland.
- Q85. (B) Bryophytes. Explanation: Bryophytes are called the amphibians of the plant kingdom.
- Q86. (D) Osteoblasts. Explanation: Osteoblasts are responsible for bone formation.
- Q87. (B) A–nucleolus, B–chromatin network. Explanation: The labelled structures correspond to nucleolus and chromatin network.
- Q88. (C) Gyri. Explanation: Elevations on the cerebral cortex are called gyri.
- Q89. (A) Striated, voluntary and skeletal. Explanation: Skeletal muscles are striated and under voluntary control.
- Q90. (A) Cystic fibrosis. Explanation: DNase is used in treatment of cystic fibrosis.
- Q91. (A) A spirochaete bacterium called *Treponema pallidum*. Explanation: Syphilis is caused by *Treponema pallidum*.
- Q92. (C) Inflorescence. Explanation: Marijuana is obtained from the flowering tops of *Cannabis sativa*.
- Q93. (C) Fumaric acid. Explanation: Fumaric acid undergoes neither oxidation nor decarboxylation in the Krebs cycle.
- Q94. (D) Plants only. Explanation: Viroids are infectious agents that primarily attack plants.
- Q95. (C) Hydrogen. Explanation: Complementary bases in DNA are held together by hydrogen bonds.
- Q96. (A) Sheep. Explanation: Hisardale is a sheep breed developed through cross-breeding.
- Q97. (A) 0.7 and 0.9. Explanation: Respiratory quotient is approximately 0.7 for fats and 0.9 for proteins.
- Q98. (B) Xerarch succession. Explanation: Succession beginning with lichens on bare rocks is xerarch succession.
- Q99. (C) Sachs. Explanation: Sachs introduced the term "Grand Period of Growth."
- Q100. (B) Endothecium. Explanation: Endothecium helps in anther dehiscence due to fibrous thickenings.