

HINTS & SOLUTION

1. b) ✗ “than the members began disputing” → ✓ “when the members began disputing”
 ➤ “Hardly” pairs with “when,” not “than” (correlative error).

2. b) ✗ “have submitted” → ✓ “has submitted”
 ➤ Subject is singular (“The professor”), interruptions like “together with” don’t change subject number.

3. c) ✗ “points towards” → ✓ “points to”
 ➤ “Point to” is the correct idiomatic usage in academic context.

4. c) ✗ “correlates” → ✓ “correlate”
 ➤ Plural subject “those [data] from the southern basin” requires plural verb “correlate.”

5. e) ✓ No error.
 ➤ Sentence structure is correct; parallelism and tense are accurately maintained.

6. b) “Affected” is an adjective describing the tone.

7. b) “Round the corner” → “round” is a preposition indicating movement.

8. b) “Because” introduces a subordinate clause.

9. c) “Fast” describes “decision” → adjective.

10. b) “Nevertheless” links two clauses with contrast → conjunctive adverb.

11. c) “The book that you gave me...” → “that” relates back to “book.”

12. b) “Hardly” modifies the verb “smiled” → adverb.

13. b) “Swimming” functions as a noun (subject).

14. c) “Uphold” is the main verb of the sentence.

15. b) “Can” here is a modal auxiliary showing ability.

16. b) Inveterate means long-established or habitual; chronic is the closest match.

17. c) Lachrymose means tearful or prone to weeping.

18. b) Execrate means to feel or express loathing or hatred.

19. c) Recondite refers to something obscure or known to a few; esoteric matches best.

20. a) Imprecation is a spoken curse.

21. b) Sanguine means optimistic; pessimistic is the antonym.

22. c) Pusillanimous means showing lack of courage; brave is its opposite.

23. c) Cacophony means harsh noise; euphony means pleasing sound.

24. c) Torpidity means sluggishness; alertness is the antonym.

25. b) Excoriate means to severely criticize; praise is opposite in tone.

26. c) logical flow from metaphor → shift → cognition → framework

27. a) central idea of tradition → examples → nuance

28. a) theoretical shift → implications → instability → summary

29. a) from concept → interpretation → bias → critique of objectivity

30. b) direct comparison followed by deeper insight

31. c) “Indigenous knowledge is often uprooted by modernity.”

32. c) “The pursuit of scientific truth entails a responsibility.”

33. b) “Despite scientific precision, language remains inherently ambiguous.”

34. c) “Postcolonial theory received a sharp critique from reductionist theory.”

35. d) “Through binary logic, colonial identities were carefully deconstructed.”

36. d) “Sardonic” means grimly mocking or cynical, fitting the idea of subtle skepticism.

37. c) Refers to logical argumentation, often in philosophy, especially when integrating complex systems like metaphysics.

38. d) Means ambiguous or open to more than one interpretation, precisely matching the sentence.

39. a) Means obscure or little-known; fits the idea of narrow academic references.

40. b) Means speaking in a roundabout way, avoiding direct statements—ideal for rhetorical evasion.

41. c) “Supersede” suggests replacement or taking over—apt in the debate of AI potentially replacing human creativity.

42. a) AI systems are often described as extrapolating from training data to generate new outputs—contextually and technically apt.

43. d) “Autonomous innovation” reflects a contentious but core idea—can AI originate ideas without external commands?

44. c) This reflects the philosophical stance of assessing creativity based on internal structure rather than intent.

45. d) When origin is de-emphasized, people tend to judge output based on its “aesthetic” value or appeal.

46. a) “To cast pearls before swine” means offering something valuable to someone who cannot appreciate it — apt for scholarly ideas wasted on disinterested minds.

47. c) This idiom conveys duplicity — pretending impartiality while benefiting from both conflicting sides.

48. c) “Crossing the Rubicon” refers to Julius Caesar’s point-of-no-return march — symbolizing commitment to a consequential course of action.

49. a) “Hoist with his own petard” means being harmed by one’s own plot — poetic justice or self-sabotage.

50. b) “To have an axe to grind” refers to hidden agendas masked under the guise of neutrality or principle.

51. b) O_2 reacts with Cu to form CuO ; volume decreases as O_2 is consumed.

52. a) Equivalent mass varies with reaction; molecular mass is constant; derived relation holds.

53. d) KNO_3 is a synthetic/artificial fertilizer, not natural.

54. c) A, B, C – Camphor sublimes, iron is magnetic, salt crystallizes; all can be separated.

55. c) H₂ is in excess, O₂ is limiting; forms 36 g water, 2 g H₂ remains.

56. a) CaSO₄·2H₂O (gypsum), CaO (lime), Ca(OH)₂ (slaked lime), Ca(OCl)₂ (bleaching powder).

57. a) Compounds cannot be separated by physical methods.

58. b) 35.5 is the weighted average of Cl-35 and Cl-37 isotopes.

59. b) C₆H₁₂O₆ simplified by 6 = CH₂O (empirical formula).

60. b) Both CH₄ and NH₄⁺ have tetrahedral geometry (isostructural).

61. a) All correct except statement 4, which is vague/inaccurate.

62. c) Brass is a mixture (alloy), not a fixed composition compound.

63. a) EW = Molar mass/2 = 98/2 = 49, as only one H⁺ ion reacts.

64. a) Ca(OH)₂ and Na₂CO₃ give basic solutions; others are acidic or neutral.

65. c) CH₃COOH's empirical formula is not the same; should be CH₂O.

66. a) ATP comes from oxidative phosphorylation (major), glycolysis (minor), β -oxidation (from fats). Photophosphorylation is in plants.

67. a) Solar eclipse = Moon between Earth and Sun. Penumbra causes partial eclipses. Lunar eclipses are visible over a wider area.

68. a) Meteors come from asteroid belt; comets from Oort/Kuiper belts. Comets have ice sublimation. Meteors don't have long visibility.

69. a) Living systems replicate nucleic acids and maintain low internal entropy. Crystals are typical of non-living systems.

70. b) Growth \neq reproduction always. But in unicellular organisms, they overlap. Some living beings don't reproduce (e.g., mules).

71. b) Watson & Crick didn't give Central Dogma (it was Crick alone later). Other options are correct.

72. a) During fasting: gluconeogenesis \uparrow , insulin \downarrow , ketones used, proteins broken down later.

73. a) Chemosynthesis uses chemical energy, not light. Oxygen is not released. Photosynthesis in chloroplasts only.

74. a) Falsifiability is scientific criterion. Theories and laws are different entities. Reproducibility and observation matter.

75. a) Syngamy (fusion of gametes), meiosis (gamete formation), fertilization present in both. Parthenogenesis is rare in animals.

76. c) Rotation causes Coriolis force, equatorial bulge, and jet streams (not trade winds directly).

77. d) Lunar phases and eclipses are caused by positions of Earth, Sun, and Moon, not revolution.

78. a) Pumice (gas-trapped lava), Conglomerate (rounded pebbles), Travertine (chemical), Slate (metamorphosed shale).

79. a) Hydration is chemical weathering; the rest are mechanical.

80. d) All listed processes (oxidation, hydrolysis, carbonation, chelation) require water.

81. a) Water vapour, CO₂, and methane are variable and greenhouse gases; nitrogen is not.

82. a) Temperature increases in stratosphere and thermosphere; decreases in troposphere and mesosphere.

83. c) Thermosphere contains ionosphere, which supports satellite signals.

84. a) Coriolis affects winds, currents, and cyclones; not tectonic plates.

85. a) Quartzite is non-biological; others match their metamorphic types.

86. a) Limestone, rock salt, and gypsum are chemical sedimentary rocks; shale is clastic.

87. d) All given transformations are examples of metamorphic processes.

88. d) All listed factors accelerate weathering: rainfall, topography, texture, and human activity.

89. a) Fossils are commonly found in coal, shale, and limestone.

90. a) These are flagship missions by the Indian government aimed at economic empowerment, infrastructure growth, and rural support.

91. a) India heavily imports crude oil, gold, and electronics; not pharma.

92. a) Troposphere hosts weather and jet streams; temperature decreases with altitude.

93. a) Ozone is variable; CO₂ is unevenly distributed; rest are correct.

94. d) All options (methane, aerosols, clouds, volcanic ash) affect radiation balance.

95. a) Karst, tafoni, and inselbergs are weathering features; deltas are depositional.

96. a) The First Plan focused on agriculture, Harrod-Domar model, and community development—not USSR support.

97. a) Bhoodan was voluntary, informal, aimed at harmony—not urban redistribution.

98. a) Gandhi's ideas promoted khadi, trusteeship, and rejection of industrialism.

99. a) These were key triggers; the Kentucky Resolution was post-independence.

100. b) Locke and Paine were major influences; Magna Carta/Mayflower were indirect.

101. a) Feudalism, fiscal crisis, and American inspiration led to the revolution.

102. a) Correct Enlightenment-revolutionary pairing.

103. a) India was key in NAM and Bandung, but had no military pact with USSR.

104. a) CDP aimed at rural uplift and local participation, not industry/Panchayati Raj law.

105. a) Madrasas, Tols, and Pathshalas were medieval educational institutions—not Kharkhanas.

106. a) Cholas dominated trade routes, raided Srivijaya, and had naval bases.

107. a) Alauddin Khalji introduced ‘Dagh’ and ‘Chehra’ for cavalry inspection.

108. a)

109. a) Bhikaji Cama published Bande Mataram in exile (Paris).

110. a) Ghadar was expatriate-based, violent, had its own mouthpiece—not aligned with INC.

111. a) INA under Bose with Japanese help, but failed to capture Delhi.

112. a) Cabinet Mission proposed federation and grouping—not immediate Dominion Status or separate electorates.

113. a) All matched correctly except Moplah, which was not part of Khilafat movement leadership.

114. a) Indian Councils Act 1909 expanded legislature, allowed some executive participation, and introduced separate electorates—not Dominion Status.

115. b) No immediate power transfer, princely state option, and exclusion of Congress in defence—all criticized; Dominion status delay wasn't main issue.

116. b) Theme of World Environment Day 2025 was “Beat Plastic Pollution,” hosted by South Korea.

117. c) Akashteer is a C4ISR system for air-defence operations and real-time response.

118. c) SeavGuardian drones are deployed by Indian Navy for maritime ISR.

119. d) The mission includes computing, communication, sensing — not military weaponization.

120. b) India ranked 6th in FDI inflows in the 2025 World Investment Report.

121. b) Sarod maestro Pandit Tejendra Majumdar was awarded Padma Shri in 2025.

122. c) Jyothi Yarraj became the first Indian woman to defend her 100 m hurdles title.

123. c) Avinash Sable won gold in 3000 m steeplechase, breaking a 36-year gap.

124. d) All three—Yoga Day, Music Day, and Hydrography Day—are celebrated on June 21.

125. a) June 26 is the UN Day against Drug Abuse & Illicit Trafficking, tied to Lin Zexu's actions.

126. b) The silvered plano-convex lens behaves like a concave mirror because the silvered plane side reflects the light after it refracts through the curved surface. The effective focal length of the system is given by the formula R divided by $2(n - 1)$, considering the refraction at the curved surface followed by reflection and another refraction. The system focuses parallel rays toward the convex side. However, the image is not always real and inverted; for certain object positions, it can be virtual, hence statement IV is incorrect.

127. d) When a ray travels from a medium of lower refractive index to a higher one, it bends towards the normal, making statement I correct. If the ray then moves from the higher index (μ_2) to a lower one (μ_3), and the angle of incidence is sufficiently large,

total internal reflection can occur at the $\mu_2-\mu_3$ boundary, validating statement II. If the first and third media have equal refractive indices, the emergent ray will be parallel to the incident ray, making statement III correct. Finally, lateral displacement depends on the angle of incidence, thickness of the intermediate layer, and refractive index, hence statement IV is also valid.

128. b) The eye adjusts its focusing power by changing the curvature of the lens using ciliary muscles, which makes statement I correct. In myopia, the lens focuses light too strongly, forming images in front of the retina for distant objects, thus statement II is correct. Statement III is incorrect because the retina's position is fixed and cannot be adjusted. Rod cells are highly sensitive in dim light but are incapable of detecting color, so statement IV is correct.

129. a) A diverging lens always forms a virtual, upright, and diminished image, which makes statement I correct. Its focal length is negative, and the power is also negative, measured in dioptres, validating statement II. Since virtual images formed by lenses lie on the same side as the object, the image distance is taken as negative, confirming statement III. Statement IV is incorrect because immersing the lens in a denser medium does not necessarily make a diverging lens behave like a converging one unless the refractive index of the lens material becomes lower than that of the medium, which is rare.

130. c) A diverging lens always forms a virtual, upright, and diminished image, which makes statement I correct. Its focal length is negative, and the power is also negative, measured in dioptres, validating statement II. Since virtual images formed by lenses lie on the same side as the object, the image distance is taken as negative, confirming statement III. Statement IV is incorrect because immersing the lens in a denser medium does not necessarily make a diverging lens behave like a converging one unless

the refractive index of the lens material becomes lower than that of the medium, which is rare.

131. a) Natural magnets like lodestone possess magnetism due to the spontaneous alignment of spin domains over geological time, which makes statement A correct. Artificial magnets, on the other hand, can be tailored to have specific magnetic properties such as high coercivity (for permanent magnets) or low coercivity (for electromagnets), as stated in option C. Option B is incorrect because natural magnets generally do not perform well under varying temperatures compared to well-engineered artificial magnets. Option D is also incorrect since artificial magnets can have well-aligned domains if they are deliberately magnetized.

132. b) The Earth's magnetic axis is tilted approximately 11.3° from its rotational axis, validating option A. The Earth's magnetic field is often modeled as a tilted dipole to a first-order approximation, making option B correct. Secular variations in the field, i.e., slow changes in magnetic strength and direction, occur due to the movement of molten iron and convective currents in the Earth's outer core, thus D is also true. Option C is incorrect because the Earth's magnetic field is not uniform; it varies with location, especially due to anomalies in the crust and varying depths.

133. a) Diamagnetic materials exhibit negative magnetic susceptibility, which means they are weakly repelled by a magnetic field, confirming statement 1. Ferromagnetism is a result of strong exchange interactions among neighboring atoms that cause spins to align parallel, as given in statement 2. The Curie temperature is the critical point where ferromagnetic materials lose their ordered domain structure and become paramagnetic, supporting statement 4. However, statement 3 is incorrect because paramagnetic substances do not retain any magnetization once the external field is removed.

134. b) Heating a ferromagnetic material beyond its Curie point leads to thermal agitation strong enough to break domain alignment, thereby destroying its magnetism (A is correct). Physical shock, such as hammering a magnet, disrupts the domain structure, leading to demagnetization (B is correct). Cooling a magnet in the presence of a magnetic field causes domains to align better and enhances coercivity, especially in hard magnetic materials (D is correct). However, statement C is incorrect because soft iron does not retain magnetism permanently when magnetized using AC; it loses it quickly once the current is switched off.

135. a) While Earth's magnetic field is roughly dipolar, this model breaks down near the poles due to local geological anomalies and higher-order field components, making statement 1 true. The intensity and direction of Earth's magnetic field vary with latitude and altitude, especially due to differences in conductivity and crustal composition, validating statement 2. Solar wind interacts with the magnetosphere, causing distortions such as geomagnetic storms and auroras, making statement 4 correct. However, statement 3 is incorrect because the observed westward drift of magnetic features is due to fluid motion in the outer core, not the inner core.

136. a) The gramophone and telephone both convert mechanical energy into sound energy and vice versa. The gramophone uses vibration and stylus pressure, while the telephone uses a diaphragm and coil. Telegraphs deal with electrical signals, not sound, and safety fuses are thermal protection devices.

137. a) A siphon functions due to gravitational pull and atmospheric pressure. It cannot work in a vacuum because it relies on external air pressure. It also fails if the height of the bend exceeds the cohesive strength of water (~ 10.3 meters), which breaks the column of

liquid. Equal-height reservoirs cannot sustain siphon flow.

138. b) Periscope operates on the principle of reflection and rectilinear propagation of light—not diffraction. Hydrometer uses buoyancy, thermos flask limits heat transfer via insulation against radiation and convection, and the mariner's compass aligns with Earth's magnetic field.

139. b) The simple pendulum converts gravitational potential energy into kinetic and back. Siphons convert potential energy of the fluid column into flow energy. Levers convert gravitational energy into work via torque. Hydrometers float in equilibrium and don't experience such conversion.

140. b) Pressure cookers depend on temperature to build steam pressure. Thermos flasks insulate against temperature exchange but lose efficiency with gradients. Hydrometer accuracy is affected by liquid density, which is temperature-dependent. Safety fuses are designed to melt at specific temperatures and don't rely on surrounding temperature variations.

141. a) Both blocks accelerate with the same acceleration. If the total mass is $2m$, then acceleration $a = F/2m$. Tension T on the second block provides this acceleration: $T = ma = m(F/2m) = F/2$.

142. a) Total mechanical energy E of a satellite in circular orbit is $E = -GMm/2r$, where $r = R + h$. Hence, $E = -GMm/2(R + h)$.

143. c) Using conservation of energy and radial force equation, the normal force becomes zero when the centripetal force equals the radial component of weight. Solving gives height $h = R \cos \theta = 2R/3$.

144. a) To prevent slipping, friction must balance the component of gravity down the incline. The condition is $\mu \geq \tan \theta$.

145. *a)* Volume of hollow shell = $(4/3)\pi(R^3 - r^3)$.
 Multiply by density ρ and gravity g to get weight: $W = (4/3)\pi g \rho (R^3 - r^3)$.

146. *b)* Using the continuity equation ($A_1v_1 = A_2v_2$),
 the ratio of speeds $v_1/v_2 = A_2/A_1$.

147. *b)* The speed of light in a vacuum is 3.0×10^8 m/s.
 In a liquid, light slows down based on the refractive index. The problem shows light bending at the surface, indicating a speed less than 3.0×10^8 m/s. Using the geometry (4 cm vertical, 3 cm horizontal), the angle of refraction suggests a refractive index around 1.25, corresponding to a speed of approximately 2.4×10^8 m/s in the liquid.

148. *c)* For three positive charges at the vertices of an equilateral triangle, the electric field lines radiate outward symmetrically from each charge, with the lines repelling each other due to like charges, creating a pattern of outward-spreading lines.

149. *b)* The time period of vibration for a ball in a tunnel dug along a chord of the Earth is the same as the period of a simple pendulum with a length equal to the Earth's radius, approximately 84.6 minutes, due to the inverse square law of gravitational force.

150. *b)* The prism will separate the colors due to different refractive indices (1.39 for red, 1.44 for green, 1.47 for blue), causing dispersion. Since blue has the highest refractive index, it will bend the most, and red the least. The prism will separate all three colors from one another.