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CEE Based Model Questions

Answer Key & Explanations

(Set-D)

Answer Key + Explanations

Zoology

Answers + Explanations

Q.	Answer	Explanation
1	B	The Miller–Urey experiment used electrical sparks to simulate lightning in the primitive atmosphere and investigate the formation of organic molecules.
2	C	Similarities in early embryonic development can provide evidence of evolutionary relationships and common ancestry.
3	B	Neo-Darwinism combines natural selection with genetic variation, mutation, recombination, and population genetics.
4	B	Echinoderms possess a water vascular system used in locomotion, feeding, and other functions.
5	C	Ascaris is a pseudocoelomate; its body cavity is not completely lined by mesoderm.
6	A	The notochord is a supportive rod along the dorsal side of chordates, at least during some stage of development.
7	B	Nervous tissue receives and transmits electrical signals through neurons.
8	C	Schwann cells form myelin sheaths around axons in the peripheral nervous system.

Q.	Answer	Explanation
9	A	Adipose tissue stores fat, provides insulation, and cushions organs.
10	B	Cilia move mucus and trapped dust or microorganisms toward the throat.
11	C	Sexual reproduction of Plasmodium occurs in the female Anopheles mosquito.
12	B	Sporozoites enter humans through the bite of an infected female Anopheles mosquito.
13	B	Earthworm nephridia remove metabolic wastes and help regulate water and ionic balance.
14	C	The clitellum secretes material involved in cocoon formation during reproduction.
15	B	A frog's thin, moist, vascular skin permits cutaneous gas exchange.
16	B	The nephron is the structural and functional unit of the kidney.
17	B	During ventricular systole, left ventricular pressure rises and ejects blood into the aorta.
18	C	The sinoatrial node initiates the normal heartbeat and acts as the heart's natural pacemaker.
19	C	In the ABO system, group AB red cells possess both A and B antigens.

Q.	Answer	Explanation
20	B	Most oxygen binds reversibly to haemoglobin in red blood cells.
21	B	Oxygen and carbon dioxide cross the alveolar-capillary membrane down their partial-pressure gradients.
22	A	The medulla oblongata contains vital centres involved in respiratory and cardiovascular regulation.
23	B	Antidiuretic hormone increases water reabsorption in the kidney collecting ducts.
24	B	Thyroid hormones are essential for normal brain development and physical growth in childhood.
25	B	A surge in luteinizing hormone triggers ovulation in a typical menstrual cycle.
26	B	Enzymes in the sperm acrosome help the sperm penetrate the egg's protective coverings.
27	B	Tuberculosis is caused by the bacterium Mycobacterium tuberculosis.
28	C	Passive immunity occurs when preformed antibodies are transferred to an individual.
29	A	Live attenuated vaccines contain weakened pathogens that can stimulate immunity without usually causing disease in healthy recipients.

Q.	Answer	Explanation
30	B	Activated B lymphocytes can differentiate into plasma cells that secrete antibodies.
31	B	Tissue matching helps reduce immune-mediated rejection of a transplanted organ.
32	B	IVF involves fertilization outside the body under controlled laboratory conditions.
33	B	Properly treated drinking water reduces exposure to many waterborne pathogens.
34	B	Biological control uses natural enemies, such as predators or parasites, to suppress pests.
35	B	A reflex is a rapid response mediated through a reflex arc, often without conscious planning.
36	A	Seasonal migration often helps birds find favourable climates, food, and breeding sites.
37	B	Sulfur dioxide can form acids in the atmosphere and contribute to acid rain.
38	C	Critically Endangered indicates an extremely high risk of extinction in the wild.
39	B	A streamlined body reduces resistance while moving through water.
40	B	Ramsar sites are designated for the conservation and wise use of wetlands.

Botany

Answers + Explanations

Q.	Answer	Explanation
41	A	The enzyme's active site binds the substrate and supports the catalytic reaction.
42	B	In a hypertonic solution, water leaves a plant cell and the protoplast pulls away from the cell wall; this is plasmolysis.
43	B	Magnesium is the central metal ion in the chlorophyll molecule.
44	B	Binomial nomenclature assigns each species a two-part scientific name: genus and specific epithet.
45	C	Bacteria are prokaryotes and lack a membrane-bound nucleus.
46	A	Certain cyanobacteria fix atmospheric nitrogen and contribute to nutrient cycling.
47	B	Viruses require host-cell machinery to reproduce.
48	B	Ascomycetes are traditionally known as sac fungi because they form sexual spores in asci.
49	B	A lichen is a symbiotic association involving a fungus and a photosynthetic alga or cyanobacterium.
50	A	Phycoerythrin is a red accessory pigment that helps many red algae capture light.

Q.	Answer	Explanation
51	B	In bryophytes, the gametophyte is the dominant, conspicuous generation.
52	A	Fern sporangia are commonly grouped into clusters called sori.
53	C	Gymnosperms produce seeds that are not enclosed within an ovary-derived fruit.
54	A	In Pinus, the pollen grain represents the highly reduced male gametophyte.
55	B	After fertilization, the ovary typically develops into the fruit.
56	B	A gamopetalous flower has petals fused together.
57	A	Fabaceae includes pea and bean and commonly has a papilionaceous corolla.
58	B	Solanaceae commonly has five stamens attached to the corolla (epipetalous).
59	B	Neem's scientific name is Azadirachta indica.
60	B	Rauwolfia serpentina, or Sarpagandha, is a source of reserpine.
61	A	Phytoplankton photosynthesize and serve as primary producers in many aquatic ecosystems.
62	B	Nitrogen fixation converts atmospheric nitrogen into compounds usable by organisms.

Q.	Answer	Explanation
63	A	Carbon dioxide is a major greenhouse gas released by fossil-fuel combustion.
64	B	Primary succession begins on a substrate where developed soil is absent.
65	B	Xerophytes possess adaptations for living in dry environments.
66	B	Mitochondria are the main site of aerobic respiration in eukaryotic cells.
67	A	The fluid-mosaic model describes a flexible lipid bilayer containing proteins and other components.
68	A	The Golgi apparatus modifies, sorts, and packages many proteins and lipids.
69	B	Chromosomes align at the equatorial plate during metaphase.
70	B	Crossing over occurs during pachytene of prophase I in meiosis.
71	A	DNA polymerase adds nucleotides to synthesize a new DNA strand.
72	B	The central dogma describes the usual information flow from DNA to RNA to protein.
73	B	With complete dominance, the dominant allele determines the phenotype of a heterozygote, Aa.

Q.	Answer	Explanation
74	B	Codominance occurs when both alleles are fully expressed in the heterozygote.
75	B	Down syndrome most commonly results from an extra copy of chromosome 21.
76	B	Xylem transports water and dissolved minerals, mainly from roots toward the shoot.
77	A	Transpiration creates tension, while cohesion between water molecules helps maintain the continuous water column in xylem.
78	B	The Calvin–Benson cycle takes place in the chloroplast stroma.
79	A	Auxin promotes cell elongation and contributes to apical dominance.
80	B	Totipotency is the capacity of a plant cell to regenerate an entire plant under suitable conditions.

Chemistry

Answers + Explanations

Q.	Answer	Explanation
81	B	Moles =9/18=0.50=9/18=0.50=9/18=0.50 mol, because the molar mass of water is 18 g/mol.

Q.	Answer	Explanation
82	B	Isotopes have the same atomic number but different mass numbers. Chlorine-35 and chlorine-37 both have atomic number 17.
83	B	The maximum electron capacity of a principal shell is 2n22n^22n2. For n=3n=3n=3, it is 2(3)2=182(3)^2=182(3)2=18.
84	C	The magnetic quantum number mlm_lml specifies an orbital's orientation in space.
85	C	Fluorine has the highest electronegativity on the usual Pauling scale.
86	B	Ammonia has three bonding pairs and one lone pair, giving a trigonal-pyramidal molecular shape.
87	A	Each carbon in ethyne has two electron domains and is sp-hybridized.
88	D	Water has a bent shape, so its O–H bond dipoles do not cancel.
89	B	Hydrogen bonding is the strongest important intermolecular attraction between ordinary water molecules.
90	B	Magnesium loses electrons to form Mg^{2+}, so it is oxidized.

Q.	Answer	Explanation
91	A	0.5×6.022×1023=3.011×10230.5 \times 6.022\times10^{23}=3.011\times10^{23}0.5×6.022×1023=3.011×1023 molecules.
92	D	Avogadro's law states that equal gas volumes contain equal numbers of molecules at the same temperature and pressure.
93	B	Boyle's law gives P∝1/VP\propto1/VP∝1/V for a fixed amount of gas at constant temperature.
94	C	The equilibrium constant changes with temperature; concentration, pressure, and catalysts do not change its value at fixed temperature.
95	B	Adding heat to an exothermic reaction favours the reverse direction, which absorbs heat.
96	C	Molarity =0.2/0.5=0.4=0.2/0.5=0.4=0.2/0.5=0.4 mol/L.
97	B	For a strong acid at this dilute concentration, H+≈10−5H+\approx10^{-5}H+≈10−5 M, so pH is approximately 5.
98	B	Sodium hydroxide is a strong base and produces a solution with pH greater than 7 at 25°C.

Q.	Answer	Explanation
99	B	A buffer contains a weak acid/base and its conjugate partner, which neutralize small additions of acid or base.
100	B	For a first-order reaction, t1/2=0.693/kt_{1/2}=0.693/kt1/2=0.693/k, independent of initial concentration.
101	B	A catalyst provides an alternative pathway with lower activation energy.
102	B	Oxidation occurs at the anode in both galvanic and electrolytic cells.
103	A	Faraday's laws relate the amount of material deposited to the charge passed.
104	A	Entropy describes energy dispersal and the number of accessible microscopic arrangements.
105	B	At constant temperature and pressure, a process is spontaneous when ΔG<0\Delta G<0ΔG<0.
106	C	Carbon-14 decays over time and is used to estimate the age of suitable once-living materials.
107	B	Anhydrous sodium carbonate can be prepared and weighed accurately and is commonly used as a primary standard.

Q.	Answer	Explanation
108	C	In H2SO4H_2SO_4H2SO4, 2(+1)+S+4(−2)=02(+1)+S+4(-2)=02(+1)+S+4(−2)=0, giving sulfur an oxidation number of +6.
109	C	Aluminium oxide reacts with both acids and bases, so it is amphoteric.
110	B	Hydrogen chloride dissolves in moisture to form hydrochloric acid, turning moist blue litmus red.
111	A	Methane is generally the major component of natural gas.
112	B	Graphite has delocalized electrons that can move along its layered structure.
113	B	Bauxite is the principal commercial ore of aluminium.
114	B	A flux reacts with gangue to form slag, which can be separated from the metal.
115	B	Chromium forms a thin, adherent oxide layer that protects stainless steel against further corrosion.
116	B	Haemoglobin's heme groups contain ferrous iron, Fe^{2+}, which binds oxygen reversibly.

Q.	Answer	Explanation
117	A	Zinc is an essential cofactor in numerous enzymes and contributes to normal immune function.
118	A	Lead exposure can harm the nervous system and interfere with blood formation, among other effects.
119	B	An aldehyde contains the terminal functional group −CHO-CHO−CHO.
120	A	CH3CH2CH2OHCH_3CH_2CH_2OHCH3CH2CH2OH has three carbon atoms and an OH group on carbon 1: propan-1-ol.
121	A	Ethanol and dimethyl ether share the molecular formula C2H6OC_2H_6OC2H6O but have different functional groups.
122	B	A nucleophile donates an electron pair to form a new bond.
123	A	HBr adds across the carbon–carbon double bond of ethene, a typical electrophilic addition reaction.
124	A	Tollens' reagent is generally reduced by aldehydes, producing a silver mirror under suitable conditions; most ketones do not respond.

Q.	Answer	Explanation
125	A	Esterification commonly combines an alcohol and a carboxylic acid to form an ester and water.
126	B	Proteins are polymers formed from amino acid monomers linked by peptide bonds.
127	A	Saponification is alkaline hydrolysis of fats or oils, producing soap and glycerol.
128	A	Chromatography separates mixture components through their different interactions with stationary and mobile phases.
129	B	At the equivalence point, reactants have been mixed in their stoichiometric proportions.
130	A	Acid–base titration determines an acid's concentration by reaction with a standard base.

Physics

Answers + Explanations

Q.	Answer	Explanation
131	B	Speed =150/10=15=150/10=15=150/10=15 m/s.
132	B	The slope of a velocity–time graph is change in velocity divided by time, which is acceleration.

Q.	Answer	Explanation
133	B	Circular motion involves continuously changing velocity direction, so centripetal acceleration exists even at constant speed.
134	C	Newton's second law gives F=ma=4×3=12F=ma=4\times3=12F=ma=4×3=12 N.
135	D	ΔPE=mgh=2×10×5=100\Delta PE=mgh=2\times10\times5=100ΔPE=mgh=2×10×5=100 J.
136	B	Kinetic energy is KE=12mv2KE=\frac12mv^2KE=21mv2, so it is proportional to v2v^2v2 for fixed mass.
137	C	Power =W/t=600/20=30=W/t=600/20=30=W/t=600/20=30 W.
138	B	Total linear momentum remains constant when the net external force on the system is zero.
139	B	Moment (torque) equals force multiplied by the perpendicular distance from the pivot.
140	A	Pascal's principle states that pressure applied to an enclosed fluid is transmitted throughout the fluid.

Q.	Answer	Explanation
141	A	Specific heat capacity is energy per unit mass per unit temperature change: J kg−1 K−1\mathrm{J\,kg^{-1}\,K^{-1}}Jkg−1K−1.
142	A	Conduction transfers thermal energy through a metal mainly via particle interactions and mobile electrons.
143	B	During melting, heat breaks or weakens the solid structure rather than increasing temperature.
144	B	At constant volume, the ideal gas law gives P∝TP\propto TP∝T when temperature is measured in kelvin.
145	B	The first law expresses conservation of energy, relating heat transfer, work, and internal energy.
146	B	Heat-engine efficiency is useful work output divided by heat absorbed from the hot source.
147	B	Sound in air travels mainly through longitudinal pressure variations and requires a material medium.
148	B	Since v=fλv=f\lambdav=fλ, doubling frequency at constant wave speed halves wavelength.
149	B	The Doppler effect is the apparent change in frequency caused by relative motion between source and observer.

Q.	Answer	Explanation
150	B	Resonance occurs when a driving frequency matches a system's natural frequency.
151	B	Refractive index n=c/vn=c/vn=c/v, the speed of light in vacuum divided by its speed in the medium.
152	B	Light moving from glass to air can undergo total internal reflection if the incidence angle exceeds the critical angle.
153	B	A real image forms where rays actually converge and can therefore be projected onto a screen.
154	B	Fringe spacing is β=λD/d\beta=\lambda D/dβ=λD/d; increasing screen distance DDD increases spacing.
155	A	Diffraction is a characteristic wave phenomenon in which waves spread around obstacles or through apertures.
156	B	Electric field is defined as force per unit positive test charge: E=F/qE=F/qE=F/q.
157	B	Like electric charges repel each other.
158	B	The SI unit of potential difference is the volt.
159	B	A capacitor stores energy in the electric field between its conductors.

Q.	Answer	Explanation
160	B	For a parallel-plate capacitor, C=εA/dC=\varepsilon A/dC=εA/d; doubling ddd halves capacitance.
161	C	Ohm's law gives V=IR=3×4=12V=IR=3\times4=12V=IR=3×4=12 V.
162	A	Two equal resistors in parallel have half the resistance of either resistor: 6/2=3 Ω6/2=3\ \Omega6/2=3 Ω.
163	B	Electrical power dissipated in a resistor is P=I2RP=I^2RP=I2R.
164	A	An applied electric field causes charge carriers to drift, producing electric current.
165	B	Magnetic force magnitude is F=|q|vBsin⁡θF=|q|vB\sin\thetaF=|q|vBsinθ; it is zero when velocity is parallel or antiparallel to the field.
166	B	Magnetic flux density is measured in tesla (T).
167	A	Faraday's law states that changing magnetic flux through a circuit induces an emf.
168	A	A transformer works by mutual induction between its primary and secondary windings.
169	B	For an ideal transformer, Vs/Vp=Ns/Np=100/500V_s/V_p=N_s/N_p=100/5

Q.	Answer	Explanation
		00Vs/Vp=Ns/Np=100/500, so Vs=220/5=44V_s=220/5=44Vs=220/5=44 V.
170	B	Photon energy is E=hfE=hfE=hf, directly proportional to frequency.
171	B	The photoelectric effect supports the quantized transfer of light energy in photons.
172	A	The de Broglie relation is λ=h/p\lambda=h/pλ=h/p, so wavelength is inversely proportional to momentum.
173	B	An alpha particle contains two protons and two neutrons, equivalent to a helium-4 nucleus.
174	A	In beta-minus decay, a neutron becomes a proton while an electron and an electron antineutrino are emitted.
175	B	Half-life is the time for half of the radioactive nuclei in a sample to decay.
176	B	Nuclear fission splits a heavy nucleus into smaller nuclei and releases energy.
177	A	Doping changes the concentration and type of charge carriers in a semiconductor.
178	B	A trivalent impurity creates a p-type semiconductor with holes as the majority carriers.

Q.	Answer	Explanation
179	B	The photon is the gauge boson that mediates the electromagnetic interaction.
180	B	The Sun produces most of its energy by nuclear fusion, primarily converting hydrogen into helium.

MAT

Answers + Explanations

Q.	Answer	Explanation
181	C	“Abundant” means plentiful and is the opposite of “scarce.”
182	B	A thermometer measures temperature; a barometer measures atmospheric pressure.
183	C	“All surgeons are doctors” is explicitly given and must be true. The other conclusions do not necessarily follow.
184	C	Each term is multiplied by 2 and then increased by 1: 79×2+1=15979\times2+1=15979×2+1=159.
185	D	The letter positions increase by 3, 4, 5, and 6; the next increase is 7. T (20) + 7 wraps around to A.
186	A	The 8 m east and 8 m west movements cancel. The student remains 6 m north of the starting point.

Q.	Answer	Explanation
187	Correction: C should be 77	The letter values are N=14, U=21, R=18, S=19, E=5. Their sum is 14+21+18+19+5=7714+21+18+19+5=7714+21+18+19+5=77. The original options for Question 187 did not include 77; the correct answer is 77.
188	D	Triangle, square, and pentagon are two-dimensional polygons; a sphere is a three-dimensional object.
189	B	S must be before P, P before Q, and Q before R. The order S, P, Q, R, T satisfies all three conditions.
190	C	If yesterday was Thursday, today is Friday and tomorrow is Saturday. Ten days after Saturday is Tuesday.
191	C	Discount =0.15×800=120=0.15\times800=120=0.15×800=120. Selling price =800−120=Tk 680=800-120=\text{Tk }680=800−120=Tk 680.
192	B	Total ratio parts =5+2=7=5+2=7=5+2=7. Water =(2/7)×28=8=(2/7)\times28=8=(2/7)×28=8 L.
193	B	The total of five numbers is 5×18=905\times18=905×18=90. The four known numbers sum to 72, so the fifth is 90−72=1890-72=1890−72=18.

Q.	Answer	Explanation
194	C	Production rate =240/6=40=240/6=40=240/6=40 items/hour. In 9 hours: 40×9=36040\times9=36040×9=360.
195	B	Total work is 3×12=363\times12=363×12=36 worker-days. With 6 workers, time =36/6=6=36/6=6=36/6=6 days.
196	B	Outcomes greater than 4 are 5 and 6, so probability =2/6=1/3=2/6=1/3=2/6=1/3.
197	C	Each row doubles from left to right: 5→10→205\to10\to205→10→20.
198	B	A 3×3×3 cube has 12 edge-centre cubes with exactly two painted faces. The corner cubes have three painted faces.
199	C	At 3:00, the minute hand is at 12 and the hour hand at 3, making a 90° angle.
200	B	Studying at least one subject: 22+18−10=3022+18-10=3022+18−10=30. Neither: 40−30=1040-30=1040−30=10.

__Best Wishes__