KVPY SA Memory-based Questions 2022

Section A: Biology

Q1) Which of the following biomolecules is an end product of amylolysis?

Q2) Which one of the following is not used in constructing phylogenetic trees?

Q3) Ceacum is located between?

Q4) Which one of the following is an invasive species that has spread to many parts of Indian subcontinent?

Q5) Which one of the following process maximally facilitates ascent of Sap?

Q6) Which one of the following biomolecule is not present in healthy colostrum?

Q7) You have to make mixed vegatable curry with Potato, Cauliflower, Radish, Tomato, Spiced with Mustard, Cinnamon and Clove. The culinary adventure consists of:

Q8) Which of the following processes would be an immediate effect on a plant if there is a sudden and large increase in Salinity?

Q9) High blood glucose in diabetic patients is known to induce cataract. This is because of high glucose:

Q10) Which of the following is most likely to occur because of climate change driven temperature increase

Q11) Which one of the following cell types contains Nissl's granules?

Q12) Within the kingdom of animalia which one is the primary feature for classification of organisms?

Q13) In ureotelic organisms, urea is produced by:

Q14) Which one of the following statements about pollen is incorrect?

Q15) Grazing food chains seldom extends to 4 to 5 trophic levels because

Q16) Which of the following plot is the best way to describe relationship between human infant mortality and birth weight?
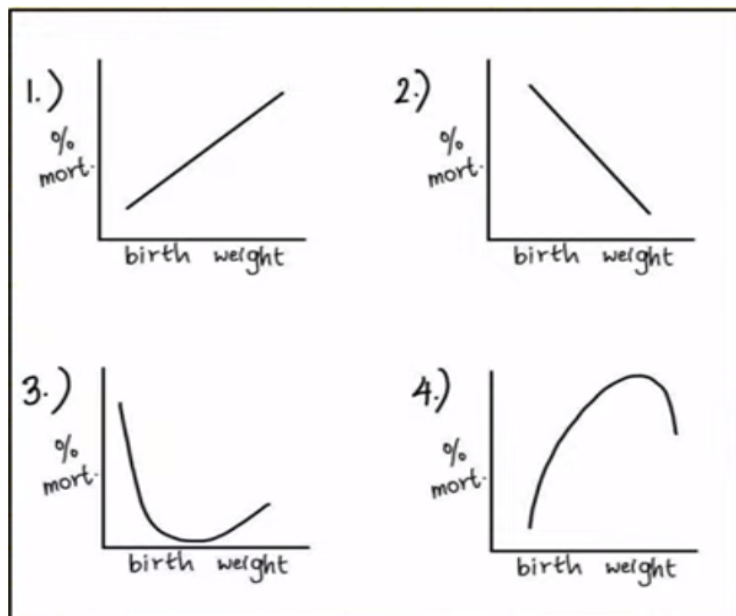
Q17) Population growth rate is given by $dn/dt = rN$, where r is dependent on

Q18) Match the Column I with Column II

Q19) A student performed an experiment on photosynthesis on two plants. He covered a part of a leaf from each plant with a black strap. He kept the first plant (Leaf A) in a dark room (away from sunlight) and other (Leaf B) in sunlight. After 48 hours, he exposed both plants to sunlight for a few hours and performed a starch test. Which of the following would have been the correct result?

Section B: Chemistry

Q1) How does Lithium and Magnesium resemble in property?

Q2) How many number of acidic hydrogens are there in H_3PO_4, H_3PO_3, H_3PO_2

Q3) Thermal stability of hydrides of Group 16 elements order

Q4) How many moles of HCL formed from 5.6 L of Cl2 and 11.2 L of H2 at STP?
$H_2 + Cl_2 = 2HCL$

Q5) Which one of the following has 17.75% N in the given compound?

Q6) What is the stability order of the given compounds cation on Cyclopentane, cation on Cyclopentent, cation on Cyclopentadiene, cation on Cycloheptatriene?

Q7) Hydrocarbon with the formula C_5H_{10} gives tert alcohol with dil sulphuric and gives ketone and carboxylic acid with $KMnO_4$?

Q8) P equilibrium Q, initially conc of P=2, Q=0, after equilibrium is established, the conc of P was halved. Final conc of Q after second equilibrium if $Kc= 3/2$

Q9) Which structure represents 2-methyl butane?

Q10) Properties of the solution when Alkali metal added to liquid NH_3, Color, Paramagnetism, reason of behaviour

Q11) Isobaric PV graph convert to TS graph

Q12) What is the amount of work done in isothermal, isobaric, adiabatic expansion

Q13) Acetyl chloride reacted with benzene and nitrobenzene in the presence of $AlCl_3$. What is the major product?

Q14) Iodination is carried out in the presence of?

Q15) Geometry of Thionyl Tetrafluoride?

Section C: Mathematics

Q1) No. of positive integers satisfying: $1/x + 1/x+1 + 1/x+2 = 13/ 12$

Q2) Find number of integers n such that n+3 divided n3-3

Q3) 1,2,3,...., n are written on a board. A random number 'k' in between 1 and n is erased then average of rest was given 16. Find the value of n+k.

Q4) Sum of sides of right triangle is 42, difference of median and altitude on hypotenuse is 2. Find the area of triangle.

Q5) $x6- 6x5+ 15x4- 20x3 + 15x2- 6x +1 = 0$. Here a = smallest root, b =largest root. Find $(a2+ b2)/ (a+ b+ 1)$

Q6) In triangle ABC, O is circumcenter. I is Incentre. BCIO is cyclic. Find angle B + angle C.

Q7) A work is done by company A and B. A can complete it in 9 days, B can complete the same in 18 days. If A started the work in 2 days then B joined. They were together for 4 days then A left. Then B was asked to increase its efficiency to twice. Determine how many days are required to complete the work.

Q8) Ordered pairs (a,b) such that (a-b) is a root of $x^2+ax+b = 0$

Q9) In convex quadilateral ABCD, AC=BD & AB=CD and angle ABC= 50 degree, angle ACB = 40 degree. Find acute angle between AC & BD.

Q10) Find 2 digit number such that $Ab= 4(a!+b!)$. A and b are the digits of the 2 digit number.

Section D: Physics

Q1) In expansion of gas from initial volume V1, to final volume V2, through which process work done is maximum?

Q2) A fluid in a container is accelerated horizontally with acceleration a as shown. Find the angle which the free surface makes with horizontal.
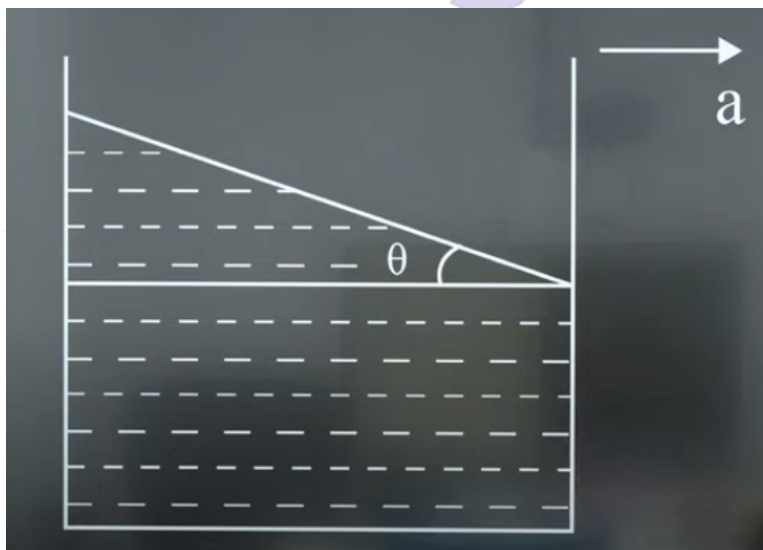

Q3) One Kilogram of ice at -8°C is heated to convert it into water at 10°C. Find the amount of heat required for the process? (Swater =1 cal/ gm°C, Sice= 1/2 cal/ gm°C)

Q4) A girl of mass m= 50 kg has a height of 1.5m. Her COM is at a height of 1m. She bends by 0.2m in order to jump a height of 1m from ground. Whats is the ratio of force applied by the ground to the weight of the girl?

Q5) A test tube of length 20 cm is open from one side. Now it is inserted such that only 10 cm of tube is available above the outside water surface. Find the level of water depressed (Atmospheric pressure= 100000 Pascals, Density of water= 1000 kg/ m3)

Q6) Initially the value of R' =1. Now when the R' is changed to 10, the current through R' does not change. Find the value of unknown resistance R0?
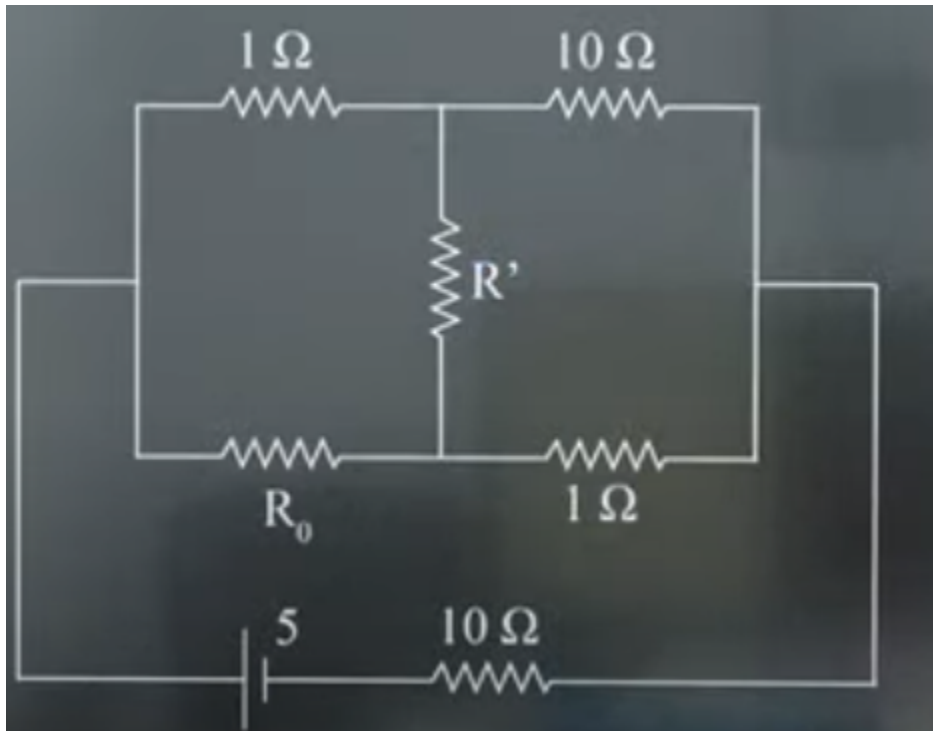
Q7) A uranium reactor produces a power of 1 GW and has an efficiency of 4.2%. Find the mass of Uranium (U235) required in half an hour to power the reactor.