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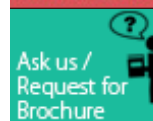
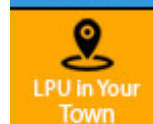
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## Sample question paper

### Chemistry

#### Question 1:

The density (in  $\text{g mL}^{-1}$ ) of a 3.60 M sulphuric acid solution that is 29%  $\text{H}_2\text{SO}_4$  (Molar mass =  $98\text{g mol}^{-1}$ ) by mass will be

➤ A) 1.40

- B) 1.50
- C) 1.88
- D) 1.22

**Question 2:**

In the cell reaction  $\text{Cu (s)} + 2 \text{Ag}^+ (\text{aq}) \rightarrow \text{Cu}^{2+} (\text{aq}) + 2 \text{Ag (s)}$ ,  $E_{\text{cell}}^0 = 0.46 \text{ V}$ . By doubling the concentration of  $\text{Cu}^{2+}$ ,  $E_{\text{cell}}^0$  is

- A) doubled
- B) Does not changed
- C) increased but less than double
- D) decreased by a small fraction

**Question 3:**

Before introducing FeO in blast furnace, it is converted to  $\text{Fe}_2\text{O}_3$  by roasting so that

- A) it may not be removed as slag with silica
- B) it may not evaporate in the furnace
- C) Presence of it may increase the m.p of charge
- D) It may not form iron carbide with coke.

**Question 4:**

Which of the following statements is incorrect?

- A)  $\text{Cr}^{2+}$  is strongly reducing while  $\text{Mn}^{3+}$  is strongly oxidizing.
- B)  $\text{Co}^{2+}$  is stable in aqueous solution but in the presence of complexing reagents it is easily oxidised.
- C)  $[\text{Cu}(\text{CN})_4]^{2-}$  is more stable than  $[\text{Cu}(\text{NH}_3)_4]^{2+}$
- D)  $[\text{Ti F}_6]^{2-}$  is highly unstable while  $[\text{Ti Cl}_6]^{2-}$  is stable.

**Question 5.**

Reaction of cyclohexanone with dimethylamine in the presence of catalytic amount of an acid forms a compound if water during the reaction is continuously removed. The compound formed is generally known as

- A) an enamine
- B) a Schiff's base
- C) an amine

- D) an imine

## Physics

### Question 1

An electron moving towards the east enters a magnetic field directed towards the north. The force on the electron will be directed.

- A) vertically upward
- B) vertically downward
- C) towards the west
- D) towards the south.

### Question 2.

In a LCR series circuit, at resonant frequency

- A) the impedance and the current are maximum
- B) the impedance is maximum
- C) the current and voltage are out of phase
- D) the current is maximum

### Question 3:

The saturation current  $I$  of a photocell varies with distance from the source ( $d$ ) is

- A)  $I \propto d$
- B)  $I \propto d^2$
- C)  $I \propto 1/d$
- D)  $I \propto 1/d^2$

### Question 4:

A radioactive element X with half life 2 hrs decays giving a stable element Y. After a time  $t$ , ratio of X to Y atoms is 1:16 time  $t$  is

- A) 6 hrs
- B) 4 hrs
- C) 8 hrs
- D) 16 hrs

**Question 5:**

If no external voltage is applied across p-n junction, there would be

- A) no electric field pointing across the junction .
- B) an electric field pointing from n- type to p- type side across the junction.
- C) an electric field pointing from p- type to n- type side across the junction.
- D) a temporary electric field during formation of p-n junction that would subsequently disappear.

**Mathematics****Question 1:**

The sum of three consecutive terms in a geometric progression is 14. If 1 is added to the first and the second terms and 1 is subtracted from the third, the resulting new terms are in arithmetic progression. Then the lowest of the original term is

- (A) 1
- (B) 2
- (C) 4
- (D) 8

**Question 2:**

In the polynomial  $(x - 1)(x - 2)(x - 3)\dots\dots\dots(x - 100)$  the coefficient of  $x^{99}$  is

- (A) 5050
- (B) - 5050
- (C) 100
- (D) 99

**Question 3:**

India plays two matches each with West Indies and Australia. In any match the probabilities of India getting points 0, 1 and 2 are 0.45, 0.05 and 0.50 respectively. Assuming that the outcomes are independent, the probability of India getting at least 7 points, is:

- (A) 0.8750
- (B) 0.0875
- (C) 0.0625

- (D) 0.0250

**Question 4:**

An unbiased coin is tossed. If the result is a head, a pair of unbiased dice is rolled and the number obtained by adding the numbers on the two faces is noted. If the result is a tail, a card from a well shuffled pack of eleven cards numbered 2, 3, 4,.....,12 is picked and the number on the card is noted. The probability that the noted number is either 7 or 8, is

- (A) 0.24
- (B) 0.244
- (C) 0.024
- (D) None of these

**Question 5:**

There exists a function  $f(x)$  satisfying  $f(0) = f(1)$ ,  $f'(0) = -1$ ,  $f(x) > 0$  for all  $x$ , and

- (A)  $f''(x) > 0$  for all  $x$
- (B)  $-1 < f''(x) < 0$  for all  $x$
- (C)  $-2 < f''(x) < -1$  for all  $x$
- (D)  $f''(x) < -2$  for all  $x$

## Biology

**Question 1:**

Maximum life span of dog is:

- (A) 5 years
- (B) 10 years
- (C) 15 years
- (D) 20 years

**Question 2:**

The most abundant element present in plants is:

- (A) Manganese
- (B) Iron
- (C) Carbon

- (D) Nitrogen

**Question 3:**

Hunger center in human is present in

- (A) Medulla oblongata
- (B) Hypothalamus
- (C) Pons varolii
- (D) Mitochondria

**Question 4:**

Energy flow and energy transformations of a living system follow:

- (A) Law of limiting factor
- (B) Law of thermodynamics
- (C) Liebig's law of minimum
- (D) Biogenetic law

**Question 5:**

The statement correct about enzymes is:

- (A) they are amino acids
- (B) they are most active at a temperature of 0°C
- (C) they are all proteins
- (D) they are most active at pH 6.9

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