Topic:- BET SET-1 Section A

1) The time period of a simple pendulum will _____ (approximately) when it is shifted to a place which has 1% higher gravity.
[Question ID = 668]
1. Increase by 1% [Option ID = 2669]
2. Decrease by 1% [Option ID = 2670]
3. Increase by 0.5% [Option ID = 2671]
4. Decrease by 0.5% [Option ID = 2672]

Correct Answer :-
- Increase by 0.5% [Option ID = 2671]

2) A mutation that generates a termination codon is known as:
[Question ID = 669]
1. Missense mutation [Option ID = 2673]
2. Nonsense mutation [Option ID = 2674]
3. Silent mutation [Option ID = 2675]
4. Reverse mutation [Option ID = 2676]

Correct Answer :-
- Nonsense mutation [Option ID = 2674]

3) Which one of the following is an achiral amino acid?
[Question ID = 670]
1. Alanine [Option ID = 2677]
2. Proline [Option ID = 2678]
3. Phenylalanine [Option ID = 2679]
4. Glycine [Option ID = 2680]

Correct Answer :-
- Proline [Option ID = 2678]

4) In an enzymatic reaction following Michaelis-Menten kinetics, doubling the substrate concentration from S_0 to $2S_0$ resulted in an increase in the rate of reaction by 2 percent. Which of the following statements is TRUE?

[Question ID = 671]
1. $K_m > 2S_0$

[Option ID = 2681]
2. $S_0 < K_m > 2S_0$

[Option ID = 2682]
3. $\dfrac{S_0}{2} < K_m < S_0$

[Option ID = 2683]
4. $K_m << \dfrac{S_0}{2}$

[Option ID = 2684]

Correct Answer :-
- $\dfrac{S_0}{2} < K_m < S_0$

[Option ID = 2683]

5) If the row-wise and column-wise sums in the figure below are same for all rows and columns, x + y + z =

z	9	x
8	y	6
12	5	10

[Question ID = 672]
1. 24 [Option ID = 2685]
2. 27 [Option ID = 2686]
3. 31 [Option ID = 2687]
4. 34 [Option ID = 2688]

Correct Answer :-
- 24 [Option ID = 2685]

6) You are preparing 100 ml of a solution containing:
100 mM Tris-HCl (pH 7.5);
5 mM MgCl₂;
1 mM DTT.

If the stock solutions provided are: 1 M Tris-HCl (pH 7.5); 100 mM MgCl₂; 50 mM DTT, the amount of each component would be:

[Question ID = 673]
1. 1M Tris HCl (pH 7.5) : 20 ml ; 100 mM MgCl$_2$: 2.5 ml ; 50 mM DTT : 5 ml

     [Option ID = 2689]
2. 1M Tris HCl (pH 7.5) : 10 ml ; 100 mM MgCl$_2$: 5.0 ml ; 50 mM DTT : 2 ml

     [Option ID = 2690]
3. 1M Tris HCl (pH 7.5) : 05 ml ; 100 mM MgCl$_2$: 10 ml ; 50 mM DTT : 2.5 ml

     [Option ID = 2691]
4. 1M Tris HCl (pH 7.5) : 10 ml ; 100 mM MgCl$_2$: 7.5 ml ; 50 mM DTT : 10 ml

     [Option ID = 2692]

Correct Answer :-
- 1M Tris HCl (pH 7.5) : 05 ml ; 100 mM MgCl$_2$: 10 ml ; 50 mM DTT : 2.5 ml

     [Option ID = 2691]

7) For sequencing DNA by Sanger's method, the chain elongation is terminated by:
[Question ID = 674]
1. 4´, 3´ dideoxy nucleotides [Option ID = 2693]
2. 2´, 3´ dideoxy nucleotides [Option ID = 2694]
3. 2´, 4´ dideoxy nucleotides [Option ID = 2695]
4. 1´, 4´ dideoxy nucleotides [Option ID = 2696]

Correct Answer :-
- 2´, 4´ dideoxy nucleotides [Option ID = 2695]

8) Match the components of List I with those in List II.

List I		List II	
A.	Methylation of Lys	I.	Collagen structure
B.	Hydroxylation of Proline	II.	Activates genes by modifying histones in chromatin
C.	Phosphorylation of Tyr	III.	Targets a protein for degradation
D.	Poly-ubiquitination of Lys	IV.	Cell signaling

[Question ID = 675]
1. A – II, B – I, C – III, D – IV [Option ID = 2697]
2. A – I, B – II, C – III, D – IV [Option ID = 2698]
3. A – II, B – I, C – IV, D – III [Option ID = 2699]
4. A – I, B – III, C – IV, D – II [Option ID = 2700]

Correct Answer :-
- A – I, B – II, C – III, D – IV [Option ID = 2698]

9) In a donor-acceptor pair, the one with the strongest tendency to donate electrons (e⁻) has the:

[Question ID = 676]
1. Most positive redox potentials and the weakest affinity for e⁻

[Option ID = 2701]

2. Most negative redox potentials and the weakest affinity for e⁻

[Option ID = 2702]

3. Most negative redox potentials and the strongest affinity for e⁻

[Option ID = 2703]

4. Most positive redox potentials and the strongest affinity for e⁻

[Option ID = 2704]

Correct Answer :-

- Most negative redox potentials and the weakest affinity for e⁻

[Option ID = 2702]

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10) Match the components of List I with those in List II under physiological conditions.

	List I	List II
A.	Leucine	I. Negatively charged
B.	Lysine	II. Non polar
C.	Glutamic acid	III. Uncharged polar
D.	Glutamine	IV. Positively charged

Choose the correct answer from the options given below:

[Question ID = 677]

1. A – III, B – II, C – I, D – IV [Option ID = 2705]
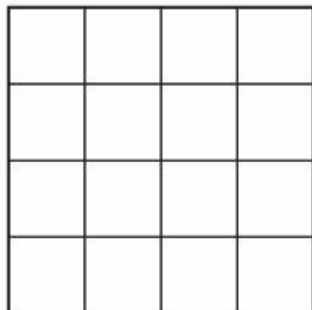2. A – IV, B – II, C – I, D – III [Option ID = 2706]
3. A – II, B – I, C – IV, D – III [Option ID = 2707]
4. A – II, B – IV, C – I, D – III [Option ID = 2708]

Correct Answer :-

- A – II, B – I, C – IV, D – III [Option ID = 2707]

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11) How many squares are there in the following figure?

[Question ID = 678]

1. 25 [Option ID = 2709]
2. 28 [Option ID = 2710]
3. 34 [Option ID = 2711]
4. 30 [Option ID = 2712]

Correct Answer :-

- 25 [Option ID = 2709]

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12) Treatment of glyceraldehyde with HIO_4 produces one among the following:
[Question ID = 679]

1. One molecule of formic acid and two molecules of formaldehyde [Option ID = 2713]
2. One molecule of formic acid and one molecule of formaldehyde [Option ID = 2714]
3. Two molecules of formic acid and one molecule of formaldehyde [Option ID = 2715]
4. One molecule of formic acid, one molecule of CO_2 and one molecule of formaldehyde [Option ID = 2716]

Correct Answer :-

- Two molecules of formic acid and one molecule of formaldehyde [Option ID = 2715]

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13) Which one of the following statements is CORRECT about the reactions catalyzed by serine hydrolases?
[Question ID = 680]

1. An aspartate residue abstracts a proton from a serine [Option ID = 2717]
2. A nucleophilic serine residue attacks the carboxyl carbon of aspartic acid [Option ID = 2718]
3. An aspartate residue abstracts a proton from a histidine [Option ID = 2719]

4. An aspartate residue attacks the carboxyl carbon of the ester to be hydrolysed [Option ID = 2720]

Correct Answer :-

- An aspartate residue abstracts a proton from a histidine [Option ID = 2719]

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14) The ratio of the perimeters of a circle and a square having the same area is:
[Question ID = 681]

1. $\pi : 4$

   [Option ID = 2721]

2. $\sqrt{\pi} : 2$

   [Option ID = 2722]

3. $\pi : 2$

   [Option ID = 2723]

4. $\pi : \sqrt{2}$

   [Option ID = 2724]

Correct Answer :-

- $\sqrt{\pi} : 2$

   [Option ID = 2722]

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15) Four coins are tossed simultaneously. You bet that it will come up as 2 heads & 2 tails but your friend says it will be either 3 heads & 1 tail or 1 head & 3 tails. In terms of probability:
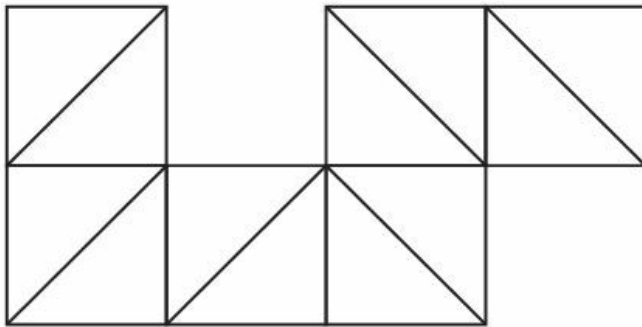[Question ID = 682]

1. Your friend has a higher chance of winning [Option ID = 2725]
2. You have a higher chance of winning [Option ID = 2726]
3. Both of you have equal chance of winning [Option ID = 2727]
4. The chances of both of you losing is > 50% [Option ID = 2728]

Correct Answer :-

- You have a higher chance of winning [Option ID = 2726]

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16) How many rectangles are there in the following diagram?

[Question ID = 683]

1. 6 [Option ID = 2729]
2. 8 [Option ID = 2730]
3. 10 [Option ID = 2731]
4. 12 [Option ID = 2732]

Correct Answer :-

- 10 [Option ID = 2731]

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17) 100 mL of 0.1 N HCl solution was diluted with 50 mL of 0.05 N HCl solution. The normality of the final solution is:
[Question ID = 684]

1. 0.25 N [Option ID = 2733]
2. 0.125 N [Option ID = 2734]
3. 0.083 N [Option ID = 2735]
4. 0.067 N [Option ID = 2736]

Correct Answer :-

- 0.25 N [Option ID = 2733]

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18) Match the components of List I with those in List II.

List I	List II

A. Isomerization	I.	Transfer of a functional group from one molecule to another
B. Redox reaction	II.	Electron transfer from one species to another
C. Group transfer	III.	Cleavage of bonds by addition of water
D. Hydrolysis	IV.	Rearrangement of atoms to form isomers.

Choose the correct answer from the options given below:

[Question ID = 685]
1. A – I, B – II, C – IV, D – III [Option ID = 2737]
2. A – IV, B – II, C – III, D – I [Option ID = 2738]
3. A – IV, B – III, C – I, D – II [Option ID = 2739]
4. A – IV, B – II, C – I, D – III [Option ID = 2740]

Correct Answer :-
- A – IV, B – III, C – I, D – II [Option ID = 2739]

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19) Which one of the following CANNOT be used for differential gene expression analysis?
[Question ID = 686]
1. Whole genome sequencing data analysis [Option ID = 2741]
2. EST data analysis [Option ID = 2742]
3. Microarray data analysis [Option ID = 2743]
4. mRNA sequencing data analysis [Option ID = 2744]

Correct Answer :-
- Microarray data analysis [Option ID = 2743]

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20) If the codons for translation of mRNAs to proteins were 4 letters long instead of 3, what would be the maximum number of hypothetical amino acids that could uniquely be recognized by the tRNAs, assuming only one codon as stop codon?
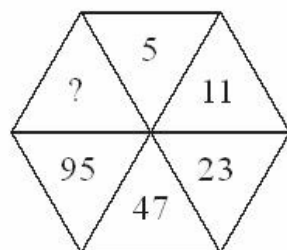**[Question ID = 687]**
1. 63 [Option ID = 2745]
2. 255 [Option ID = 2746]
3. 728 [Option ID = 2747]
4. 1295 [Option ID = 2748]

Correct Answer :-
- 255 [Option ID = 2746]

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21) The missing number in the diagram is:

[Question ID = 688]
1. 2 [Option ID = 2749]
2. 191 [Option ID = 2750]
3. Either 2 or 191 [Option ID = 2751]
4. 140 [Option ID = 2752]

Correct Answer :-
- 191 [Option ID = 2750]

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22) Beta-lactam ring is present in:
[Question ID = 689]
1. Penicillin [Option ID = 2753]
2. Tetracycline [Option ID = 2754]
3. Chloramphenicol [Option ID = 2755]
4. Erythromycin [Option ID = 2756]

Correct Answer :-
- Chloramphenicol [Option ID = 2755]

23) Which one of the following amino acids has a strong tendency to disrupt α-helices and ß-strands?

[Question ID = 690]
1. Alanine

   [Option ID = 2757]
2. Tyrosine

   [Option ID = 2758]
3. Glutamate

   [Option ID = 2759]
4. Proline

   [Option ID = 2760]

Correct Answer :-
- Alanine

   [Option ID = 2757]

24) Which one of the following is NOT a characteristic of a collagen fibre?

[Question ID = 691]
1. It is the main component of skin, bones, tendons and teeth

   [Option ID = 2761]
2. It is a fibrous protein with alpha-helical coiled-coil structure

   [Option ID = 2762]
3. The core of the triple-stranded helix is populated with glycine residues

   [Option ID = 2763]
4. Each of the strand is independently stable due to the presence hydrogen bonds

   [Option ID = 2764]

Correct Answer :-
- The core of the triple-stranded helix is populated with glycine residues

   [Option ID = 2763]

25) If 3 oranges and 2 apples cost Rs. 100, while 2 oranges and 3 apples cost Rs. 120, how much will 6 oranges and 2 apples cost?
[Question ID = 692]
1. 136 [Option ID = 2765]
2. 124 [Option ID = 2766]
3. 200 [Option ID = 2767]
4. 180 [Option ID = 2768]

Correct Answer :-
- 200 [Option ID = 2767]

26) Match the components of List I with those in List II.

List I	List II	
A. Neutrophils	I.	Make antibodies
B. Platelets	II.	Phagocytose and destroy bacteria
C. B-cells	III.	Kill virus-infected cells
D. T-cells	IV.	Initiate blood clotting

Choose the correct answer from the options given below:

[Question ID = 693]
1. A - II, B - IV, C - III, D - I [Option ID = 2769]
2. A - IV, B - II, C - I, D - III [Option ID = 2770]
3. A - IV, B - II, C - III, D - I [Option ID = 2771]
4. A - II, B - IV, C - I, D - III [Option ID = 2772]

Correct Answer :-
- A - IV, B - II, C - I, D - III [Option ID = 2770]

27) Sachin's average run score jumped from 50 to 51 when he scored 151 in his last match. How many matches has Sachin played in total?

[Question ID = 694]

1. 50 [Option ID = 2773]
2. 51 [Option ID = 2774]
3. 101 [Option ID = 2775]
4. 100 [Option ID = 2776]

Correct Answer :-

- 51 [Option ID = 2774]

28) Breeding of Aa and AA genotype resulted in five offspring. What is the probability that exactly four offspring will have AA genotype?

[Question ID = 695]

1. $\dfrac{1}{16}$

   [Option ID = 2777]

2. $\dfrac{1}{32}$

   [Option ID = 2778]

3. $\dfrac{5}{16}$

   [Option ID = 2779]

4. $\dfrac{5}{32}$

   [Option ID = 2780]

Correct Answer :-

- $\dfrac{5}{16}$

   [Option ID = 2779]

29) A took 10 hours to complete a task. B could finish only two-thirds of the task alone by that time. How much time will it take if they worked together to finish the task?

[Question ID = 696]

1. 5 hours [Option ID = 2781]
2. 6 hours [Option ID = 2782]
3. 8 hours [Option ID = 2783]
4. 4 hours [Option ID = 2784]

Correct Answer :-

- 5 hours [Option ID = 2781]

30) During a fed batch process, cells grew from a cell density of 1×10^6 cells/mL to 16×10^6 cells/mL over 12 days. Simultaneously, the average cell diameter also increased from 12 microns to 18 microns over the same period. Total fold increase in cell volume per mL over the entire process is:

[Question ID = 697]

1. 24 [Option ID = 2785]
2. 36 [Option ID = 2786]
3. 54 [Option ID = 2787]
4. 81 [Option ID = 2788]

Correct Answer :-

- 54 [Option ID = 2787]

31) A biased coin with probability of getting head being 0.4 was tossed for four times. What is the probability of getting head at least once?

[Question ID = 698]

1. 0.4 [Option ID = 2789]
2. 0.6 [Option ID = 2790]
3. 0.36 [Option ID = 2791]
4. 0.87 [Option ID = 2792]

Correct Answer :-

- 0.36 [Option ID = 2791]

32) If x/y = 3/2, find the value of (4x + 5y)/(2x - y)

[Question ID = 699]

1. 11/2 [Option ID = 2793]
2. 2/11 [Option ID = 2794]
3. 20/2 [Option ID = 2795]
4. 2/20 [Option ID = 2796]

Correct Answer :-

- 2/11 [Option ID = 2794]

33) Which one of the following molecules causes catabolite repression of lac operon?

[Question ID = 700]

1. Lactose [Option ID = 2797]
2. Arabinose [Option ID = 2798]
3. Glucose [Option ID = 2799]
4. Galactose [Option ID = 2800]

Correct Answer :-

- Arabinose [Option ID = 2798]

34) Which nuclease of bacteria is responsible for degrading the genome of the invading lambda phage?

[Question ID = 701]

1. Exonuclease [Option ID = 2801]
2. Phagodegradase [Option ID = 2802]
3. Restriction endonuclease [Option ID = 2803]
4. Topoisomerase [Option ID = 2804]

Correct Answer :-

- Restriction endonuclease [Option ID = 2803]

35) DNA fingerprinting for forensic investigation is based on:

[Question ID = 702]

1. Intron sequences [Option ID = 2805]
2. Exon sequences [Option ID = 2806]
3. Repetitive sequences [Option ID = 2807]
4. Promoter sequences [Option ID = 2808]

Correct Answer :-

- Exon sequences [Option ID = 2806]

36) At which phase of the growth curve are bacteria more sensitive to ampicillin?

[Question ID = 703]

1. Lag phase [Option ID = 2809]
2. Log phase [Option ID = 2810]
3. Stationary phase [Option ID = 2811]
4. Declining phase [Option ID = 2812]

Correct Answer :-

- Log phase [Option ID = 2810]

37) You are performing a PCR reaction in which you need to use 20 pmoles of each primer. If both the primers are 20 nucleotides long and the average molecular weight of each nucleotide is 300 Da, the amount of each primer required for 100 μl reaction is:

[Question ID = 704]

1. 1200 ng [Option ID = 2813]
2. 120 ng [Option ID = 2814]
3. 12 ng [Option ID = 2815]
4. 1.2 ng [Option ID = 2816]

Correct Answer :-

- 12 ng [Option ID = 2815]

38) The blood volume of an individual is 5 litres. The person was injected with 500 mg of a drug that has molecular weight of 100 Da. If the drug is metabolized so that half of the drug remains in the bloodstream after every passing hour, the concentration of the drug four hours after injection is:

[Question ID = 705]

1. 0.5 mM [Option ID = 2817]
2. 0.25 mM [Option ID = 2818]
3. 0.125 mM [Option ID = 2819]
4. 0.0625 mM [Option ID = 2820]

Correct Answer :-

- 0.5 mM [Option ID = 2817]

39) In the electron transport chain, which one of the following can be a two-electron carrier?
[Question ID = 706]
1. Cytochrome [Option ID = 2821]
2. Iron-sulphur proteins (Fe-S cluster) [Option ID = 2822]
3. Flavin [Option ID = 2823]
4. Cupro proteins [Option ID = 2824]

Correct Answer :-
- Flavin [Option ID = 2823]

40) The *E. coli* cell has a volume of 1 μm^3 and the volume of a single base pair is 1 nm^3. If the *E. coli* DNA has 5×10^6 base pairs then the volume occupied by the genome in the cell is:
[Question ID = 707]
1. 5% [Option ID = 2825]
2. 0.50% [Option ID = 2826]
3. 0.05% [Option ID = 2827]
4. 0.01% [Option ID = 2828]

Correct Answer :-
- 0.05% [Option ID = 2827]

41) If a random year is selected, the probability that it will have both 53 Mondays and 53 Tuesdays is:
[Question ID = 708]
1. 0

[Option ID = 2829]
2. $\dfrac{1}{4}$

[Option ID = 2830]
3. $\dfrac{1}{7}$

[Option ID = 2831]
4. $\dfrac{1}{28}$

[Option ID = 2832]

Correct Answer :-
- $\dfrac{1}{4}$

[Option ID = 2830]

42) In an equilateral triangle the mid points of each side is joined to form a smaller equilateral triangle inside the larger triangle. The ratio of their perimeters is:

[Question ID = 709]
1. 1:4

[Option ID = 2833]
2. 1:3

[Option ID = 2834]
3. 1:2

[Option ID = 2835]
4. 1 : √3

[Option ID = 2836]

Correct Answer :-
- 1:3

[Option ID = 2834]

43) Which one among the following can be effectively transmitted from person to person due to coughing?

[Question ID = 710]
1. Swine Flu & Adenovirus

[Option ID = 2837]
2. AIDS & Tuberculosis

[Option ID = 2838]

3. Dengue & COVID-19

   [Option ID = 2839]
4. Malaria & Typhoid

   [Option ID = 2840]

Correct Answer :-

- Dengue & COVID-19

   [Option ID = 2839]

44) A highly sensitive instrument with large fluctuations measures the trace amount of impurity in a sample and the two readings are 10^{-7} mg and 10^{-9} mg, respectively. The best estimate of the impurity level which can be found by taking the arithmetic mean of these two data points is approximately

[Question ID = 711]
1. 10^{-8} mg [Option ID = 2841]
2. 10^{-7} mg [Option ID = 2842]
3. 5×10^{-7} mg [Option ID = 2843]
4. 5×10^{-8} mg [Option ID = 2844]

Correct Answer :-

- 10^{-8} mg [Option ID = 2841]

45) During replication, DNA polymerase-

[Question ID = 712]
1. Can initiate DNA synthesis de novo [Option ID = 2845]
2. Cannot initiate DNA synthesis de novo [Option ID = 2846]
3. Synthesizes DNA in 3´ to 5´ direction [Option ID = 2847]
4. Unwinds DNA in a 5´ to 3´ direction [Option ID = 2848]

Correct Answer :-

- Synthesizes DNA in 3´ to 5´ direction [Option ID = 2847]

46) Conversion of L-pyruvate to L-lactate is an example of:

[Question ID = 713]
1. Reduction [Option ID = 2849]
2. Oxidation [Option ID = 2850]
3. Isomerisation [Option ID = 2851]
4. Transesterification [Option ID = 2852]

Correct Answer :-

- Isomerisation [Option ID = 2851]

47) Conversion of UDP-Galactose to UDP-Glucose occurs by:

[Question ID = 714]
1. Oxidation and reduction [Option ID = 2853]
2. Dehydration and hydration [Option ID = 2854]
3. Reductive elimination [Option ID = 2855]
4. Oxidative addition [Option ID = 2856]

Correct Answer :-

- Dehydration and hydration [Option ID = 2854]

48) A 2 Kb insert has to be ligated to a 8 Kb plasmid in a ligation mix where we want to keep the vector insert molar ratio as 1: 2. If 1 µg of vector is used, the amount of insert to be used is:

[Question ID = 715]
1. 2 µg [Option ID = 2857]
2. 1 µg [Option ID = 2858]
3. 0.5 µg [Option ID = 2859]
4. 0.25 µg [Option ID = 2860]

Correct Answer :-

- 1 µg [Option ID = 2858]

49) The shortest land route has to be determined from Mumbai to a city X in Mexico at the same latitude. The route will be:

[Question ID = 716]
1. The latitude line connecting Mumbai and X [Option ID = 2861]
2. A line curving so that it touches higher latitudes [Option ID = 2862]
3. A line curving so that it touches lower latitudes [Option ID = 2863]
4. A line passing through the North Pole [Option ID = 2864]

Correct Answer :-

- A line curving so that it touches lower latitudes [Option ID = 2863]

50) During translation, which one of the following aminoacyl-tRNA binds first to the P site of bacterial ribosomes?

[Question ID = 717]
1. Met-tRNA^{Met}

   [Option ID = 2865]
2. fMet-tRNA^{fMet}

   [Option ID = 2866]
3. Met-tRNA^{fMet}

   [Option ID = 2867]
4. fMet-tRNA^{Met}

   [Option ID = 2868]

Correct Answer :-
- Met-tRNA^{Met}

   [Option ID = 2865]

Topic:- BET SET-1 Section B

1) DNA replication requires DNA-Topoisomerase to remove the supercoiling of DNA that accumulates at the end of a growing replication fork. You wish to perform a PCR amplification of a gene that has been provided to you in a 6 kb plasmid vector. Why will you NOT use topoisomerase in your PCR reaction mix?

[Question ID = 1228]
1. Taq polymerase has innate topoisomerase activity

   [Option ID = 4909]
2. Denaturation step in the PCR protocol precludes formation of supercoils

   [Option ID = 4910]
3. Reaction buffer has a pH that denatures DNA and avoids supercoiling

   [Option ID = 4911]
4. The 5´ › 3´ exonuclease activity of Taq polymerase does not allow supercoiling

   [Option ID = 4912]

Correct Answer :-
- Reaction buffer has a pH that denatures DNA and avoids supercoiling

   [Option ID = 4911]

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2) Enzyme-linked immunospot (ELISPOT) assay measures:

[Question ID = 1229]
1. Cytokine concentration in culture supernatant

   [Option ID = 4913]
2. Number of cytokine releasing cells at single cell level

   [Option ID = 4914]
3. Expression of cytokine gene

   [Option ID = 4915]
4. Intracellular cytokine concentration

   [Option ID = 4916]

Correct Answer :-
- Expression of cytokine gene

   [Option ID = 4915]

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3) Which one of the Immunoglobulins (Ig) cause type-I hypersensitive immune reaction?
[Question ID = 1230]
1. IgE [Option ID = 4917]
2. IgG [Option ID = 4918]
3. IgM [Option ID = 4919]
4. IgA [Option ID = 4920]

Correct Answer :-
- IgG [Option ID = 4918]

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4) You have recently observed a mutation in gene X in patients with lung cancer. You have sequenced the gene X in these patients and have observed that (i) both the copies of gene X are mutated, and (ii) the mutation leads to absence of the protein X in the patients. The gene is most likely:

[Question ID = 1231]

1. An oncogene [Option ID = 4921]
2. A tumor suppressor [Option ID = 4922]
3. A metastasis inducer [Option ID = 4923]
4. A stem cell associated gene [Option ID = 4924]

Correct Answer :-

- A tumor suppressor [Option ID = 4922]

5) Which one of the following strategies do viruses employ to evade the human immune system?

[Question ID = 1232]

1. Virus infected cells show reduced expression of surface MHC Class I molecules [Option ID = 4925]
2. Virus infected cells show increased expression of pro-inflammatory cytokines [Option ID = 4926]
3. Viruses bind to surface Ig on B-cells and neutralize them [Option ID = 4927]
4. Virus binds to TCR and blocks activation of T-cells [Option ID = 4928]

Correct Answer :-

- Viruses bind to surface Ig on B-cells and neutralize them [Option ID = 4927]

6) A protein cargo X is destined for lysosomal degradation in cells under specific conditions. This can be tracked by red fluorescence emitted by the tag when it reaches lysosomes. What will happen when you treat the cells with NH_4Cl:

[Question ID = 1233]

1. Red fluorescence will be emitted throughout the cell

   [Option ID = 4929]
2. No red fluorescence will be emitted

   [Option ID = 4930]
3. Red fluorescence will be emitted in dotted structures in the cytoplasm

   [Option ID = 4931]
4. Red fluorescence will be emitted only at the periphery of the cell.

   [Option ID = 4932]

Correct Answer :-

- Red fluorescence will be emitted throughout the cell

   [Option ID = 4929]

7) In induced pluripotent stem cells:

[Question ID = 1234]

1. Somatic cells are transduced with viral vectors coding for transcription factors that induce a pluripotent state in the recipient cells [Option ID = 4933]
2. Germ cells are transformed and passaged continuously in culture to maintain a state conducive to future pluripotent cell formation [Option ID = 4934]
3. Somatic cells are continuously cultured to generate a cell line that is mutagenized to produce pluripotent cells when required [Option ID = 4935]
4. Oncogenes are added to embryonic stem cells to help them retain stemness for prolonged cultures. [Option ID = 4936]

Correct Answer :-

- Somatic cells are continuously cultured to generate a cell line that is mutagenized to produce pluripotent cells when required [Option ID = 4935]

8) A protein X is active when phosphorylated on Thr residue. You wish to mimic this phosphorylation by mutating Thr to another residue. Which one of these residues will you mutate Thr into?

[Question ID = 1235]

1. His [Option ID = 4937]
2. Tyr [Option ID = 4938]
3. Glu [Option ID = 4939]
4. Gly [Option ID = 4940]

Correct Answer :-

- Glu [Option ID = 4939]

9) You have isolated a hypothetical protein X. When X is run on a gel filtration column, the apparent size of the protein is 80 kDa. When X is run on an SDS-PAGE with 2-mercaptoethanol present in the loading buffer, the size is around 40 kDa.

[Question ID = 1236]

1. X is a monomer with at least one disulfide bond and a molecular weight of 40 kDa. [Option ID = 4941]
2. X is a monomer with at least one disulfide bond and a molecular weight of 80 kDa. [Option ID = 4942]
3. X is a dimer of two units of X held together by electrostatic interactions with a molecular weight of 80 kDa per monomeric unit. [Option ID = 4943]
4. X is a dimer of two units held together by disulfide bond(s) with a molecular weight of 40 kDa per monomeric unit. [Option ID = 4944]

Correct Answer :-

- X is a monomer with at least one disulfide bond and a molecular weight of 80 kDa. [Option ID = 4942]

10) In the following table, List I has different nucleic acids and List II has certain base modifications. Match the components from the List I with those in the List II

modifications. Match the components from the List I with those in the List II.

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List I	List II
A. DNA	I. 7-methylguanosine (m7G)
B. tRNA	II. 5-methylcytosine (m5C)
C. mRNA	III. Pseudouridine (ψ)

Choose the correct answer from the options given below:

[Question ID = 1237]
1. A - I, B - II, C - III [Option ID = 4945]
2. A - III, B - II, C - I [Option ID = 4946]
3. A - II, B - I, C - III [Option ID = 4947]
4. A - II, B - III, C - I [Option ID = 4948]

Correct Answer :-
- A - III, B - II, C - I [Option ID = 4946]

---

11) If a single-stranded DNA sequence of 250 nucleotides consists of 30% thymine, the number of Adenine, Guanine, Thymine and Cytosine nucleotides present in it are:

[Question ID = 1238]
1. 75, 50, 75, 50 [Option ID = 4949]
2. 75, 75, 50, 50 [Option ID = 4950]
3. 50, 50, 75, 75 [Option ID = 4951]
4. Cannot be calculated [Option ID = 4952]

Correct Answer :-
- 50, 50, 75, 75 [Option ID = 4951]

---

12) Pyruvate decarboxylase catalyses the decarboxylation of pyruvic acid to acetaldehyde and carbon dioxide. Its action depends on cofactors thiamine pyrophosphate (TPP) and magnesium. In this process, the role of TPP in the initial step is to act as a:

[Question ID = 1239]
1. Thiolate anion

   [Option ID = 4953]
2. Carbanion

   [Option ID = 4954]
3. Carbocation

   [Option ID = 4955]
4. π electron donor

   [Option ID = 4956]

Correct Answer :-
- Thiolate anion

   [Option ID = 4953]

---

13) Baeyer-Villiger monooxygenases (BVMOs) are flavin-dependent enzymes that catalyse oxidations. Which one of the following oxidation is NOT carried out by BVMOs?
[Question ID = 1240]
1. Sulfoxidations (conversion of sulphides to sulphoxides) [Option ID = 4957]
2. N-oxidations (amines to N-oxides) [Option ID = 4958]
3. Ketones and cyclic ketones to esters and lactones [Option ID = 4959]
4. Aldehydes to carboxylic acids [Option ID = 4960]

Correct Answer :-
- Ketones and cyclic ketones to esters and lactones [Option ID = 4959]

---

14) Which one of the following is a malnutrition disease?
[Question ID = 1241]
1. Marasmus [Option ID = 4961]
2. Hepatitis [Option ID = 4962]
3. Ketosis [Option ID = 4963]
4. Arthritis [Option ID = 4964]

Correct Answer :-
- Ketosis [Option ID = 4963]

15) The fragments obtained from a Sanger sequencing experiment are as follows:

5´ – GAATTA – 3´
5´ – GAATTAT – 3´
5´ – GAATTATC – 3´
5´ – GAATTATCA – 3´
5´ – GAATTATCAC – 3´

Please identify the template sequence from the above given data:

[Question ID = 1242]

1. 5´ – GAATTATCAC – 3´ [Option ID = 4965]
2. 3´ – GAATTATCAC – 5´ [Option ID = 4966]
3. 5´ – CACTATTAAG – 3´ [Option ID = 4967]
4. 3´ – CTTAATAGTG – 5´ [Option ID = 4968]

Correct Answer :-

- 3´ – GAATTATCAC – 5´ [Option ID = 4966]

16) Which one of the following is NOT true for local alignment of protein sequences?

[Question ID = 1243]

1. It is generally used for analyzing distantly related sequences [Option ID = 4969]
2. It looks for regions/blocks of high similarity between the two sequences [Option ID = 4970]
3. Gap penalty is not used for insertions and deletions [Option ID = 4971]
4. Smith-Waterman algorithm is used to locally align the two sequences [Option ID = 4972]

Correct Answer :-

- It looks for regions/blocks of high similarity between the two sequences [Option ID = 4970]

17) Following is a table in which the List I contains names of various steps of gene expression and in List II are the enzymes associated with those. Match the components of List I with those in List II.

List I	List II
A. Epigenetic regulation	I. Endonuclease
B. DNA repair	II. Histone methyltransferase
C. Transcription	III. eIF2 Kinase
D. Translation	IV. RNA polymerase

Choose the correct answer from the options given below:

[Question ID = 1244]

1. A – III, B – II, C – IV, D – I [Option ID = 4973]
2. A – II, B – IV, C – I, D – III [Option ID = 4974]
3. A – II, B – I, C – IV, D – III [Option ID = 4975]
4. A – IV, B – III, C – II, D – I [Option ID = 4976]

Correct Answer :-

- A – II, B – I, C – IV, D – III [Option ID = 4975]

18) What is the pH of a mixture of 0.042 M NaH_2PO_4 and 0.42 M Na_2HPO_4 (pKa = 6.86)?

[Question ID = 1245]

1. 6.86 [Option ID = 4977]
2. 5.86 [Option ID = 4978]
3. 7.86 [Option ID = 4979]
4. 4.86 [Option ID = 4980]

Correct Answer :-

- 5.86 [Option ID = 4978]

19) Cellulose is a polymer of glucose which is made by _____ glycosidic bond.

[Question ID = 1246]

1. ¤(1 → 2) linkage [Option ID = 4981]
2. ¤(1 → 4) linkage [Option ID = 4982]
3. ¤(1 → 6) linkage [Option ID = 4983]
4. α(1 → 4) linkage [Option ID = 4984]

Correct Answer :-

- ¤(1 → 4) linkage [Option ID = 4982]

20) Which one of the following defines the ψ angle in the protein backbone?

[Question ID = 1247]

1. N-Cα-C-N

[Option ID = 4985]

2. Cα-C-N-C

[Option ID = 4986]

3. C-N-Cα-C

[Option ID = 4987]

4. N-Cα-C-O

[Option ID = 4988]

Correct Answer :-

- C-N-Cα-C

[Option ID = 4987]

---

21) Which one of the following is used to validate the secondary structure of proteins?

[Question ID = 1248]

1. Neural network [Option ID = 4989]
2. Ramachandran plot [Option ID = 4990]
3. Sigma plot [Option ID = 4991]
4. Dot plot [Option ID = 4992]

Correct Answer :-

- Neural network [Option ID = 4989]

---

22) Genes that are related through gene duplication events are:

[Question ID = 1249]

1. Orthologs [Option ID = 4993]
2. Homologs [Option ID = 4994]
3. Analogs [Option ID = 4995]
4. Paralogs [Option ID = 4996]

Correct Answer :-

- Analogs [Option ID = 4995]

---

23) A geneticist interested in immune function induces random mutations in a number of specific genes in mice and then determines which of the resulting mutant mice have impaired immune function. This approach is an example of:

[Question ID = 1250]

1. Forward genetics [Option ID = 4997]
2. Reverse genetics [Option ID = 4998]
3. Neither forward nor reverse genetics [Option ID = 4999]
4. Both forward and reverse genetics [Option ID = 5000]

Correct Answer :-

- Neither forward nor reverse genetics [Option ID = 4999]

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24) A scientist chose Nickel – NTA affinity chromatography to purify a recombinant protein. Which one of the following tag was present in his recombinant protein?

[Question ID = 1251]

1. Glutathione-S-transferase [Option ID = 5001]
2. Flag [Option ID = 5002]
3. Maltose binding protein [Option ID = 5003]
4. Hexa-histidine [Option ID = 5004]

Correct Answer :-

- Flag [Option ID = 5002]

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25) During eukaryotic replication, _____ degrades the RNA primer by 5' – 3' exonuclease activity.

[Question ID = 1252]

1. RNAseH1 [Option ID = 5005]
2. FEN-1 [Option ID = 5006]
3. Topoisomerase IIB [Option ID = 5007]
4. DNA polymerase V [Option ID = 5008]

Correct Answer :-

- FEN-1 [Option ID = 5006]

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26) The presence of Cardiolipin is a characteristic of the membrane of:

[Question ID = 1253]

1. Endoplasmic reticulum [Option ID = 5009]
2. Lysosomes [Option ID = 5010]

3. Myelin sheets [Option ID = 5011]
4. Mitochondria [Option ID = 5012]

Correct Answer :-

- Myelin sheets [Option ID = 5011]

27) The enzyme used to prevent unwanted self-ligation of DNA molecules during cloning experiments is:

[Question ID = 1254]
1. Alkaline phosphatase [Option ID = 5013]
2. Terminal phosphatase [Option ID = 5014]
3. Reverse transcriptase [Option ID = 5015]
4. Terminal peroxidase [Option ID = 5016]

Correct Answer :-

- Alkaline phosphatase [Option ID = 5013]

28) In genomics, a contig means:

[Question ID = 1255]
1. A set of overlapping fragments that form a continuous stretch of DNA [Option ID = 5017]
2. A set of molecular markers used in genetic mapping [Option ID = 5018]
3. A small DNA fragment used in next-generation sequencing [Option ID = 5019]
4. A set of fragments generated through digestion with restriction enzymes [Option ID = 5020]

Correct Answer :-

- A small DNA fragment used in next-generation sequencing [Option ID = 5019]

29) The hypochromic effect is used to estimate the melting temperature for double-stranded DNA. It arises because:

[Question ID = 1256]
1. Double stranded DNA is more colourful than single stranded DNA [Option ID = 5021]
2. Stacked bases in double stranded DNA absorb less UV light than unstacked base in single stranded DNA [Option ID = 5022]
3. Double stranded DNA absorbs more UV light than single stranded DNA [Option ID = 5023]
4. Double stranded DNA is less colourful than single stranded DNA [Option ID = 5024]

Correct Answer :-

- Double stranded DNA absorbs more UV light than single stranded DNA [Option ID = 5023]

30) Gel filtration chromatography separates proteins on the basis of:

[Question ID = 1257]
1. Charge [Option ID = 5025]
2. Hydrodynamic volume [Option ID = 5026]
3. Affinity tag [Option ID = 5027]
4. Hydrophobicity [Option ID = 5028]

Correct Answer :-

- Hydrodynamic volume [Option ID = 5026]

31) Fake medicines are a nuisance that shatter the faith of patients in medicine and enhance the emergence of drug resistance. A medicine is likely to be fake if:

[Question ID = 1258]
1. HPLC retention time (RT) of standard and test sample is same [Option ID = 5029]
2. Same peak intensity and same retention time are not observed on injection of equal amount of the test and standard sample on HPLC [Option ID = 5030]
3. Melting point of standard and test are same [Option ID = 5031]
4. R_f of standard and test sample on TLC is same [Option ID = 5032]

Correct Answer :-

- Same peak intensity and same retention time are not observed on injection of equal amount of the test and standard sample on HPLC [Option ID = 5030]

32) Chip-on-chip, a technique that combines chromatin immune precipitation with microarrays, is used to identify:

[Question ID = 1259]
1. Protein-coding regions in the genome [Option ID = 5033]
2. Transcription factor binding regions in the promoters [Option ID = 5034]
3. Protein motifs involved in protein-protein interaction [Option ID = 5035]
4. micro-RNA coding genes [Option ID = 5036]

Correct Answer :-

- Protein motifs involved in protein-protein interaction [Option ID = 5035]

33) You have an assay method that can estimate compound A upto level 10 mg/ml. If you need to modify it so that you can estimate 0.1 mg/ml, you need to improve upon the:

[Question ID = 1260]
1. Specificity [Option ID = 5037]
2. Sensitivity [Option ID = 5038]
3. Accuracy [Option ID = 5039]

4. Reactivity [Option ID = 5040]

Correct Answer :-

- Specificity [Option ID = 5037]

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34) A 20-mer peptide composed of all 20 coded standard amino acids was hydrolyzed with 6N HCl. However, only 17 amino acids were detected when the hydrolysate was analyzed by chromatography. The three missing amino acids will be:

[Question ID = 1261]

1. Glu, Asp, Tyr

   [Option ID = 5041]
2. Glu, Asp, Trp

   [Option ID = 5042]
3. Gln, Asn, Trp

   [Option ID = 5043]
4. Tyr, Trp, Phe

   [Option ID = 5044]

Correct Answer :-

- Gln, Asn, Trp

   [Option ID = 5043]

---

35) Which one of the following is the most effective reducing agent of disulfide bonds in proteins?
[Question ID = 1262]

1. Dithiothreitol [Option ID = 5045]
2. 2-mercaptoethanol [Option ID = 5046]
3. Ethanethiol [Option ID = 5047]
4. Ethanol [Option ID = 5048]

Correct Answer :-

- Ethanethiol [Option ID = 5047]

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36) Digitalis is used for the treatment of congestive heart failure because:
[Question ID = 1263]

1. It can dissolve clots to release congestion [Option ID = 5049]
2. It can increase the volume of the heart chambers [Option ID = 5050]
3. It can increase the force of contraction of heart muscle [Option ID = 5051]
4. It clears the lungs to release congestion [Option ID = 5052]

Correct Answer :-

- It can increase the volume of the heart chambers [Option ID = 5050]

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37) Peroxisomes are different from mitochondria and chloroplast mainly because they are:
[Question ID = 1264]

1. Surrounded by double membrane [Option ID = 5053]
2. Surrounded by single membrane and contain genome [Option ID = 5054]
3. Surrounded by single membrane [Option ID = 5055]
4. Not the major sites of oxygen utilization [Option ID = 5056]

Correct Answer :-

- Surrounded by single membrane and contain genome [Option ID = 5054]

---

38) Copy number variation (CNV) signifies:

[Question ID = 1265]

1. A short (1- 4 nucleotide) highly polymorphic DNA sequence, widely distributed in the genome

   [Option ID = 5057]
2. Increase in the number of some of the chromosomes

   [Option ID = 5058]
3. DNA segments > 1 Kb repeated multiple times in the genome

   [Option ID = 5059]
4. Series of short tandem repeat sequences (10 – 100 nucleotides) occurring frequently in the genome

   [Option ID = 5060]

Correct Answer :-

- DNA segments > 1 Kb repeated multiple times in the genome

   [Option ID = 5059]

---

39) Which one among the following is NOT a characteristic of an "Enhancer"?

[Question ID = 1266]
1. Its function is independent of its location in the genome [Option ID = 5061]
2. Its function is independent of its orientation in genome [Option ID = 5062]
3. It is transcribed to form enhancer RNA [Option ID = 5063]
4. It is conserved in evolution [Option ID = 5064]

Correct Answer :-
- Its function is independent of its location in the genome [Option ID = 5061]

40) The enzyme that plays a key role in glucose homeostasis is:
[Question ID = 1267]
1. Hexokinase [Option ID = 5065]
2. Glucokinase [Option ID = 5066]
3. Fructokinase [Option ID = 5067]
4. Galactokinase [Option ID = 5068]

Correct Answer :-
- Fructokinase [Option ID = 5067]

41) Prokaryotic ribosomes bind to which one of the following:
[Question ID = 1268]
1. Kozak sequence [Option ID = 5069]
2. Shine-Dalgarno sequence [Option ID = 5070]
3. Ori sequence [Option ID = 5071]
4. Promoter sequence [Option ID = 5072]

Correct Answer :-
- Ori sequence [Option ID = 5071]

42) Which one of the following components of an enveloped virus particle is NOT encoded by the viral genome?

[Question ID = 1269]
1. Structural proteins

   [Option ID = 5073]
2. Envelope lipids

   [Option ID = 5074]
3. Non- structural proteins

   [Option ID = 5075]
4. Capsid proteins

   [Option ID = 5076]

Correct Answer :-
- Envelope lipids

   [Option ID = 5074]

43) A student clones a gene of interest within the ampicillin resistance gene of pBR322 vector for transformant selection, the student will use:

[Question ID = 1270]
1. Ampicillin plates

   [Option ID = 5077]
2. Tetracycline plates

   [Option ID = 5078]
3. Both Ampicillin plates and Tetracycline plates

   [Option ID = 5079]
4. Neither Ampicillin plates nor Tetracycline plates

   [Option ID = 5080]

Correct Answer :-
- Tetracycline plates

   [Option ID = 5078]

44) The consequences of a DNA base change in a mutation are maximum, if the base change is located in the:

[Question ID = 1271]
1. First or second position of a codon

   [Option ID = 5081]
2. Third position of a codon

[Option ID = 5082]
3. Middle of an intron

[Option ID = 5083]
4. Repetitive DNA elements

[Option ID = 5084]

Correct Answer :-

- Middle of an intron

[Option ID = 5083]

45) The Telomerase enzyme is a:

[Question ID = 1272]
1. RNA-dependent RNA Polymerase

[Option ID = 5085]
2. DNA-dependent DNA Polymerase

[Option ID = 5086]
3. Reverse Transcriptase

[Option ID = 5087]
4. DNA-dependent RNA Polymerase

[Option ID = 5088]

Correct Answer :-

- RNA-dependent RNA Polymerase

[Option ID = 5085]

46) Though DNA and RNA are nucleic acids, isolating RNA in the laboratory requires extreme precautions and pre-preparations than isolating DNA. This could be because:
[Question ID = 1273]
1. There is lesser RNA content per cell than DNA [Option ID = 5089]
2. RNA is smaller in size than DNA [Option ID = 5090]
3. RNA is more prone to hydrolysis than DNA [Option ID = 5091]
4. RNA molecules tend to form RNA-RNA hybrids [Option ID = 5092]

Correct Answer :-

- RNA is more prone to hydrolysis than DNA [Option ID = 5091]

47) Type IIP restriction endonucleases will always:
[Question ID = 1274]
1. Cleave outside the recognition sequence [Option ID = 5093]
2. Generate blunt ends [Option ID = 5094]
3. Recognize palindromic sequence [Option ID = 5095]
4. Bind to double strand RNA [Option ID = 5096]

Correct Answer :-

- Recognize palindromic sequence [Option ID = 5095]

48) Given below are two statements: one is labelled as Assertion A and the other is labelled as Reason R.
Assertion A: Ionizing radiation can cause damage to the DNA
Reason R: Ionizing radiation generates free radicals
In light of the above statements, choose the most appropriate answer from the options given below:
[Question ID = 1275]
1. Both A and R are true and R is the correct explanation of A [Option ID = 5097]
2. Both A and R are true but R is NOT the correct explanation of A [Option ID = 5098]
3. A is true but R is false [Option ID = 5099]
4. A is false but R is true [Option ID = 5100]

Correct Answer :-

- Both A and R are true but R is NOT the correct explanation of A [Option ID = 5098]

49) Lysosomal lumen is maintained at an acidic pH by:

[Question ID = 1276]
1. H$^+$ ATPase that pumps H$^+$ ions into lysosomes

[Option ID = 5101]
2. H$^+$ ATPase that pumps H$^+$ out of lysosomes

[Option ID = 5102]
3. *de novo* generation of H$^+$ ions in the lysosomes

[Option ID = 5103]

4. Specialized luminal proteins that lower the pH

[Option ID = 5104]

Correct Answer :-

- H$^+$ ATPase that pumps H$^+$ out of lysosomes

[Option ID = 5102]

50) Which one among the following is a nuclease?
[Question ID = 1277]
1. DNase I [Option ID = 5105]
2. Ligase [Option ID = 5106]
3. Polymerase [Option ID = 5107]
4. Helicase [Option ID = 5108]

Correct Answer :-

- Polymerase [Option ID = 5107]

51) Which one of the following statements is NOT common between oxidative phosphorylation and photophosphorylation?
[Question ID = 1278]
1. Generation of ATP [Option ID = 5109]
2. Involvement of electron transport [Option ID = 5110]
3. Involvement of a kinase [Option ID = 5111]
4. Involvement of oxygen [Option ID = 5112]

Correct Answer :-

- Involvement of electron transport [Option ID = 5110]

52) Which one of the following combinations signify similar function?
[Question ID = 1279]
1. Cytochrome and cryptochrome [Option ID = 5113]
2. Cryptochrome and phytochrome [Option ID = 5114]
3. Fluorochrome and cytochrome [Option ID = 5115]
4. Cryptochrome and flurochrome [Option ID = 5116]

Correct Answer :-

- Cryptochrome and phytochrome [Option ID = 5114]

53) E class homeotic genes in *Arabidopsis thaliana* are involved in the formation of:

[Question ID = 1280]
1. Sepals & petals

[Option ID = 5117]
2. Floral meristem

[Option ID = 5118]
3. Petals and carpels

[Option ID = 5119]
4. Shoot apical meristem

[Option ID = 5120]

Correct Answer :-

- Petals and carpels

[Option ID = 5119]

54) When the critical night length in winters is disrupted by a pulse of red light followed by a pulse of far red light:
[Question ID = 1281]
1. Short-day plants will flower and long-day plants will not flower [Option ID = 5121]
2. Long-day plants will flower and short-day plants will not flower [Option ID = 5122]
3. Both long-day and short day plants will flower [Option ID = 5123]
4. None of the plants will flower [Option ID = 5124]

Correct Answer :-

- Short-day plants will flower and long-day plants will not flower [Option ID = 5121]

55) A plant species nearing its extinction due to viral infection has been chosen for micropropagation by tissue culture. Which explants will be the most appropriate to produce virus-free plants?
A. Shoot apical meristem
B. Stem
C. Leaf disc
D. Root tip.

Choose the most appropriate answer from the options given below:

[Question ID = 1282]

1. A only [Option ID = 5125]
2. A and C [Option ID = 5126]
3. C only [Option ID = 5127]
4. B and D [Option ID = 5128]

Correct Answer :-

- C only [Option ID = 5127]

56) The rice blast fungus *Magnaporthe grisea*, invades rice plants in a manner typical of many foliar pathogens by producing specialized infection structures called:

[Question ID = 1283]

1. Sporangia [Option ID = 5129]
2. Appressoria [Option ID = 5130]
3. Infection tube [Option ID = 5131]
4. Mycota [Option ID = 5132]

Correct Answer :-

- Infection tube [Option ID = 5131]

57) The first alkaloid to be isolated and characterized from plants is:

[Question ID = 1284]

1. Morphine [Option ID = 5133]
2. Caffeine [Option ID = 5134]
3. Cocaine [Option ID = 5135]
4. Quinine [Option ID = 5136]

Correct Answer :-

- Caffeine [Option ID = 5134]

58) Seeds of *Arabidopsis thaliana* placed on Murashige and Skoog (MS) media without any hormones germinates faster than in the medium that contains:

[Question ID = 1285]

1. Auxin

   [Option ID = 5137]
2. Cytokinin

   [Option ID = 5138]
3. Abscisic acid

   [Option ID = 5139]
4. Jasmonic acid

   [Option ID = 5140]

Correct Answer :-

- Cytokinin

   [Option ID = 5138]

59) Which one of the following is a non-climacteric fruit?

[Question ID = 1286]

1. Tomato (*Solanum lycopersicum*) [Option ID = 5141]
2. Wild banana (*Musa balbisiana*) [Option ID = 5142]
3. Wild strawberry (*Fragaria vesca*) [Option ID = 5143]
4. Jackfruit (*Artocarpus heterophyllus*) [Option ID = 5144]

Correct Answer :-

- Wild strawberry (*Fragaria vesca*) [Option ID = 5143]

60) Which one of the following statements are TRUE for gibberellins?

A. Gibberellins promote seed germination
B. Gibberellins cannot stimulate leaf growth
C. Gibberellins cannot stimulate stem growth
D. Gibberellins can be exogenously used to increase plant growth
E. GA3 is predominantly used in agronomic and horticultural practices

Choose the most appropriate answer from the options given below:

[Question ID = 1287]

1. A, B and C only

[Option ID = 5145]
2. A, D and E only

[Option ID = 5146]
3. A, C and E only

[Option ID = 5147]
4. B, C and D only

[Option ID = 5148]

Correct Answer :-

- A, B and C only

[Option ID = 5145]

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61) Which one of the following is not a secondary metabolite?
[Question ID = 1288]
1. Flavonoids [Option ID = 5149]
2. Acetyl-CoA [Option ID = 5150]
3. Coumarins [Option ID = 5151]
4. Squalene [Option ID = 5152]

Correct Answer :-

- Coumarins [Option ID = 5151]

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62) Which one of the following classes of compounds is generally accumulated as an anti-herbivore response in plants?
[Question ID = 1289]
1. Tannins [Option ID = 5153]
2. Alkaloids [Option ID = 5154]
3. Glucose [Option ID = 5155]
4. Sucrose [Option ID = 5156]

Correct Answer :-

- Glucose [Option ID = 5155]

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63) Which one of these polysaccharides is induced after a pathogen or microbial attack?
[Question ID = 1290]
1. Pectin [Option ID = 5157]
2. Cellulose [Option ID = 5158]
3. Callose [Option ID = 5159]
4. Arabinoxylan [Option ID = 5160]

Correct Answer :-

- Cellulose [Option ID = 5158]

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64) The GA2-oxidase gene from bean is overexpressed in a wheat plant by genetic engineering. Which one of the following phenotypes correctly describes the resultant transgenic plant?
[Question ID = 1291]
1. The plant will be shorter than the wild type [Option ID = 5161]
2. The plant will be taller than the wild type [Option ID = 5162]
3. The height of the plant will not be affected [Option ID = 5163]
4. The plant will not survive [Option ID = 5164]

Correct Answer :-

- The plant will be taller than the wild type [Option ID = 5162]

---

65) The T-DNA of *Agrobacterium* must be cut out from its circular plasmid for its transfer into plant cells. Which one of the following Vir proteins are involved in this process?

[Question ID = 1292]
1. Vir A / Vir C

[Option ID = 5165]
2. Vir B6 / Vir B7

[Option ID = 5166]
3. Vir D1 / Vir D2

[Option ID = 5167]
4. Vir E2 / Vir G

[Option ID = 5168]

Correct Answer :-

- Vir D1 / Vir D2

[Option ID = 5167]

66) Lateral roots initiate from:
[Question ID = 1293]
1. Root epidermis [Option ID = 5169]
2. Pericycle [Option ID = 5170]
3. Endodermis [Option ID = 5171]
4. Root apical meristem [Option ID = 5172]

Correct Answer :-
- Root epidermis [Option ID = 5169]

67) Which one of the following is NOT a characteristic feature of skotomorphogenic development?
[Question ID = 1294]
1. Long hypocotyls [Option ID = 5173]
2. Apical hook [Option ID = 5174]
3. Closed cotyledons [Option ID = 5175]
4. Expanded leaves [Option ID = 5176]

Correct Answer :-
- Closed cotyledons [Option ID = 5175]

68) Which one of the following can be used as a selection marker for developing transgenic plants?
[Question ID = 1295]
1. Hygromycin phosphotransferase [Option ID = 5177]
2. □-glucoronidase [Option ID = 5178]
3. □-galactosidase [Option ID = 5179]
4. Green fluorescent protein [Option ID = 5180]

Correct Answer :-
- □-galactosidase [Option ID = 5179]

69) Which one of the following treatments is required for flowering in a winter annual type of *Arabidopsis* plants?
[Question ID = 1296]
1. Prolonged cold period [Option ID = 5181]
2. A short pulse of cold temperature [Option ID = 5182]
3. A short pulse of high temperature [Option ID = 5183]
4. High expression of Flowering Locus C (FLC) gene [Option ID = 5184]

Correct Answer :-
- A short pulse of cold temperature [Option ID = 5182]

70) Which one of the following statements are TRUE regarding specialized embryonic structures peculiar to the grass family?

A. The cotyledon has been modified by evolution to form an absorptive organ called coleoptile

B. Scutellum forms the interphase between the embryo and the starchy endosperm tissue

C. Coleoptile covers and protect the first leaves while buried beneath the soil

D. The base of the hypocotyl has elongated to form a protective sheath around the radicle called the scutellum

Choose the most appropriate answer from the options given below:

[Question ID = 1297]
1. A and C only

[Option ID = 5185]
2. A and D only

[Option ID = 5186]
3. B and C only

[Option ID = 5187]
4. C and D only

[Option ID = 5188]

Correct Answer :-
- A and D only

[Option ID = 5186]

71) Two immobilized enzyme columns with equal enzyme loading and same column volume are run at the same feed rate and same inlet substrate concentration. It is observed that the taller and thinner column gives better conversion. This demonstrates that:
[Question ID = 1298]
1. Immobilized enzyme has internal pore diffusion which reduces the enzymatic conversion rate [Option ID = 5189]
2. Immobilized enzyme has external diffusion which reduces the enzymatic conversion rate [Option ID = 5190]
3. Column packing efficiency is not good [Option ID = 5191]
4. Enzyme deactivation is taking place [Option ID = 5192]

Correct Answer :-

- Column packing efficiency is not good [Option ID = 5191]

72) In a two stage CSTR in series, the first reactor runs at a dilution rate D1 $< \mu_{max}$ and the inlet substrate concentration (S_0) is two-times greater than K_s, then:

[Question ID = 1299]

1. Washout will take place when $D_2 < \mu_{max}$ in the second reactor

   [Option ID = 5193]
2. Washout will take place when $D_2 > \mu_{max}$ in the second reactor

   [Option ID = 5194]
3. Washout will take place when $D_2 = \mu_{max}$ in the second reactor

   [Option ID = 5195]
4. Washout will never takes place

   [Option ID = 5196]

Correct Answer :-

- Washout will take place when $D_2 < \mu_{max}$ in the second reactor

  [Option ID = 5193]

73) To have an extended late log/ stationary phase so that secondary metabolites may be produced, you will prefer to use:
[Question ID = 1300]

1. Batch reactor [Option ID = 5197]
2. Plug flow reactor [Option ID = 5198]
3. Fed batch reactor [Option ID = 5199]
4. Fluidized bed reactor [Option ID = 5200]

Correct Answer :-

- Fed batch reactor [Option ID = 5199]

74) Given the pseudoplastic rheology of fungal fermentation broth, we can expect that:
[Question ID = 1301]

1. The viscosity of the fungal broth to be uniformly high in the culture [Option ID = 5201]
2. The viscosity of the fungal broth to be uniformly low in the culture [Option ID = 5202]
3. The viscosity to be higher near the impeller but low near the walls of the bioreactor [Option ID = 5203]
4. The viscosity to be low near the impeller but high near the walls of the reactor [Option ID = 5204]

Correct Answer :-

- The viscosity to be higher near the impeller but low near the walls of the bioreactor [Option ID = 5203]

75) Given below are two statements: one is labelled as Assertion A and the other is labelled as Reason R
Assertion A: In a plate & frame filter operated under constant pressure, the filtrate flow rate declines with time
Reason R: In a plate & frame filter operated under constant pressure, the filtrate cake builds up on the filter membrane
In light of the above statements, choose the most appropriate answer from the options given below:
[Question ID = 1302]

1. A & R are both true and A is due to R [Option ID = 5205]
2. A & R are both true but A is NOT due to R [Option ID = 5206]
3. A is true but R is false [Option ID = 5207]
4. A is false but R is true [Option ID = 5208]

Correct Answer :-

- A & R are both true but A is NOT due to R [Option ID = 5206]

76) Scaling up a reactor while keeping the power consumption per unit volume constant will lead to:
[Question ID = 1303]

1. Increase in RPM of the impeller of the larger reactor [Option ID = 5209]
2. Decrease in RPM of the impeller of the larger reactor [Option ID = 5210]
3. Holding the RPM of the impeller at the same value [Option ID = 5211]
4. Increasing or decreasing the RPM of the impeller depending on the type of impeller [Option ID = 5212]

Correct Answer :-

- Decrease in RPM of the impeller of the larger reactor [Option ID = 5210]

77) In a fed batch culture the feed rate of concentrated substrate is increased with time while the RPM of the impeller is kept constant. You will most likely observe one of the following:
[Question ID = 1304]

1. A decline in the D.O. values of the culture [Option ID = 5213]
2. An increase in the D.O. values of the culture [Option ID = 5214]
3. No change in the D.O. values of the culture [Option ID = 5215]
4. An oscillation in the D.O. values of the culture [Option ID = 5216]

Correct Answer :-

- No change in the D.O. values of the culture [Option ID = 5215]

78) In an anaerobic fermentation producing ethanol, the ethanol yield (Yp/s) -

[Question ID = 1305]

1. Increases with increasing biomass yield (Yx/s)

[Option ID = 5217]

2. Decreases with increasing biomass yield (Yx/s)

[Option ID = 5218]

3. Is independent of biomass yield (Yx/s)

[Option ID = 5219]

4. Initially increases & then decreases with increasing biomass yield (Yx/s)

[Option ID = 5220]

Correct Answer :-

- Increases with increasing biomass yield (Yx/s)

[Option ID = 5217]

79) Doubling the substrate concentration in the inlet of a CSTR (with cells following Monod growth kinetics) will, after reaching the new steady state, lead to:

[Question ID = 1306]

1. Higher substrate concentration but unchanged biomass concentration in the outlet [Option ID = 5221]
2. Higher biomass concentration but unchanged substrate concentration in the outlet [Option ID = 5222]
3. Higher substrate & biomass concentration in the outlet [Option ID = 5223]
4. Unchanged substrate & biomass concentration in the outlet [Option ID = 5224]

Correct Answer :-

- Higher substrate & biomass concentration in the outlet [Option ID = 5223]

80) If 180 gm of glucose is consumed during cell growth and 132 gm of carbon dioxide is produced, then the fractional carbon flux towards biomass (assuming no product is formed and glucose is the sole carbon source) is:

[Question ID = 1307]

1. 0.5

[Option ID = 5225]

2. 132/180

[Option ID = 5226]

3. 48/180

[Option ID = 5227]

4. 2 /15

[Option ID = 5228]

Correct Answer :-

- 48/180

[Option ID = 5227]

81) *S. cerevisiae* produces ethanol at a yield of 0.5 g/g glucose. The strain ferments 20g/l glucose in 24 hours. Calculate productivity of ethanol in this fermentation.

[Question ID = 1308]

1. 0.416 g/l/h

[Option ID = 5229]

2. 0.833 g/l/h

[Option ID = 5230]

3. 108 g/l

[Option ID = 5231]

4. 20 g/l

[Option ID = 5232]

Correct Answer :-

- 0.833 g/l/h

[Option ID = 5230]

82) *E. coli* was grown aerobically in batch fermentation. The initial concentration of cells was 1x 10^3/ml and it reached

1x10⁶/ml in 10 hours. Calculate specific growth rate.

[Question ID = 1309]
1. 0.69 h^{-1}

   [Option ID = 5233]
2. 0.3 h^{-1}

   [Option ID = 5234]
3. 3 h^{-1}

   [Option ID = 5235]
4. 10^3 h^{-1}

   [Option ID = 5236]

Correct Answer :-

- 0.3 h^{-1}

   [Option ID = 5234]

83) **In a fed batch process with a non-growth product formation kinetics given by q$_P$ = β (a constant), in order to maximize product concentration and enhance metabolic flux towards product formation, you will:**

[Question ID = 1310]
1. Maintain lowest possible μ

   [Option ID = 5237]
2. Maintain highest possible μ

   [Option ID = 5238]
3. Maintain a slowly declining μ

   [Option ID = 5239]
4. Maintain a slowly increasing μ

   [Option ID = 5240]

Correct Answer :-

- Maintain a slowly declining μ

   [Option ID = 5239]

84) **Given that Power number is constant; then increasing the RPM of the impeller 3-fold will increase the power consumption due to agitation by:**
[Question ID = 1311]
1. 3-fold [Option ID = 5241]
2. 9-fold [Option ID = 5242]
3. 27-fold [Option ID = 5243]
4. 81-fold [Option ID = 5244]

Correct Answer :-

- 9-fold [Option ID = 5242]

85) **If the maintenance coefficient (m) is significantly high, then with reduction in specific growth rate:**
[Question ID = 1312]
1. Biomass yield increases [Option ID = 5245]
2. Biomass yield decreases [Option ID = 5246]
3. Biomass yield remains constant [Option ID = 5247]
4. Sum of biomass & product yield remain constant [Option ID = 5248]

Correct Answer :-

- Biomass yield decreases [Option ID = 5246]

86) **Increasing the agitation in a reactor increases oxygen transfer primarily because:**
[Question ID = 1313]
1. Gas hold up decreases [Option ID = 5249]
2. Good mixing takes place [Option ID = 5250]
3. Specific surface area of bubbles increases [Option ID = 5251]
4. Microbial cells move more energetically coming closer to gas bubbles [Option ID = 5252]

Correct Answer :-

- Specific surface area of bubbles increases [Option ID = 5251]

87) **In a continuous culture of *Saccharomyces cerevisiae*, the cell density is 30 gL^{-1} (DCW), the dilution rate (D) is 0.4 h^{-1} and substrate uptake rate (q) is 18 gL^{-1} h^{-1}. The cell yield coefficient Yx/s will be:**

[Question ID = 1314]

1. 0.67

   [Option ID = 5253]
2. 0.50

   [Option ID = 5254]
3. 0.45

   [Option ID = 5255]
4. 0.32

   [Option ID = 5256]

Correct Answer :-

- 0.67

  [Option ID = 5253]

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88) Aqueous two phase partitioning (ATPS) is used for the recovery of an enzyme from the cell free culture filtrate on addition of PEG-2000 and dextran. The mixture separates into two phases with a partition coefficient for the enzyme = 4.2. The maximum possible enzyme recovery, when the volume ratio of the upper to lower phases is 5.0 will be:

[Question ID = 1315]
1. 95% [Option ID = 5257]
2. 85% [Option ID = 5258]
3. 76% [Option ID = 5259]
4. 68% [Option ID = 5260]

Correct Answer :-

- 76% [Option ID = 5259]

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89) A fermentation medium is being cooled from 70▯ to 32▯ in a double pipe heat exchanger. Cooling fluid flowing counter-currently with this stream is heated from 20▯ to 46▯ . The log mean temperature difference (in ▯) for the two streams is:

[Question ID = 1316]
1. 12.6 [Option ID = 5261]
2. 4.8 [Option ID = 5262]
3. 8.5 [Option ID = 5263]
4. 17.3 [Option ID = 5264]

Correct Answer :-

- 8.5 [Option ID = 5263]

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90) For reactions catalysed by an enzyme following Michaelis Menten Kinetics, the elasticity of the reaction velocity with respect to substrate:

[Question ID = 1317]
1. Increases with increase in substrate concentration [Option ID = 5265]
2. Decreases with increase in substrate concentration [Option ID = 5266]
3. Remains unchanged on change in substrate concentration [Option ID = 5267]
4. Increases and then declines with increase in substrate concentration [Option ID = 5268]

Correct Answer :-

- Decreases with increase in substrate concentration [Option ID = 5266]

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91) Given below are two statements: one is labelled as Assertion A and the other is labelled as Reason R

Assertion A: Gene Sequences are aligned using identity matrices instead of substitution matrices

Reason R: The four bases in DNA cannot be replaced with each other

In light of the above statement, choose the correct answer from the options given below:

[Question ID = 1318]
1. Both A and R are true and R is the correct explanation of A [Option ID = 5269]
2. Both A and R are true but R is not the correct explanation of A [Option ID = 5270]
3. A is true but R is false [Option ID = 5271]
4. A is false but R is true [Option ID = 5272]

Correct Answer :-

- Both A and R are true but R is not the correct explanation of A [Option ID = 5270]

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92)

Match the components of List I with List II

List I		List II	
A.	Sequence alignment	I.	PUBMED
B.	Structural alignment	II.	BLAST
C.	Fold prediction	III.	ROSETTA
D.	Review of literature	IV.	DALI

[Question ID = 1319]
1. A-II, B-III , C-IV, D-I [Option ID = 5273]
2. A-II, B-IV, C-III, D-I [Option ID = 5274]
3. A-I, B-IV, C-III, D-II [Option ID = 5275]
4. A-II, B-III, C-IV, D-I [Option ID = 5276]

Correct Answer :-
- A-I, B-IV, C-III, D-II [Option ID = 5275]

93) Which one of the statements relating to properties and structures of two proteins is most appropriate?
[Question ID = 1320]
1. Two proteins with very similar secondary structures will have similar tertiary structures [Option ID = 5277]
2. Two proteins with very similar secondary structures will have similar stability [Option ID = 5278]
3. Two proteins with very similar tertiary structures will be localized to similar compartments inside the cell [Option ID = 5279]
4. Two proteins with very simple tertiary structures will have very similar secondary structures [Option ID = 5280]

Correct Answer :-
- Two proteins with very similar secondary structures will have similar tertiary structures [Option ID = 5277]

94) Trp florescence can be used to study protein folding and unfolding. Which properties of Trp are critical in ensuring that this can be used for studying the process?

[Question ID = 1321]
1. Trp is an environment sensitive fluorophore which is typically buried in a folded protein

   [Option ID = 5281]
2. Trp is a positively charged amino acid

   [Option ID = 5282]
3. Trp in the only amino acid present in most of the proteins

   [Option ID = 5283]
4. Trp is a better hydrogen bond acceptor than most other amino acids

   [Option ID = 5284]

Correct Answer :-
- Trp in the only amino acid present in most of the proteins

   [Option ID = 5283]

95) Given below are two statements:
Statement I: The peptide bond is a planar bond
Statement II: The Ramachandran Plot describes Omega Torsion Angles in proteins
In light of the above statements, choose the most appropriate answer from the options given below
[Question ID = 1322]
1. Both Statement I and Statement II are correct [Option ID = 5285]
2. Both Statement I and Statement II are incorrect [Option ID = 5286]
3. Statement I is correct and Statement II is incorrect [Option ID = 5287]
4. Statement II is correct and Statement I is incorrect [Option ID = 5288]

Correct Answer :-
- Statement I is correct and Statement II is incorrect [Option ID = 5287]

96) Protein folding is highly cooperative. Which one of the following statement define this cooperativity?
[Question ID = 1323]
1. If one proteins chain folds, it facilitates the folding of a nearby chain [Option ID = 5289]
2. If one protein unfolds, it forces a nearby protein to unfold too [Option ID = 5290]
3. Many molecules of polypeptides come together to fold at the same time [Option ID = 5291]
4. The protein chain completely unfolds if key interactions are broken in an "all or none" manner [Option ID = 5292]

Correct Answer :-
- If one protein unfolds, it forces a nearby protein to unfold too [Option ID = 5290]

97) Given below are two statements:

Statement I: Serine is part of a catalytic triad in proteases that also includes histidine and aspartic acid.
Statement II: Catalytic triads are responsible for peptide hydrolysis.

In light of the above statements, choose the most appropriate answer from the options given below

[Question ID = 1324]

1. Both statement I and statement II are correct

   [Option ID = 5293]
2. Both statement I and statement II are incorrect

   [Option ID = 5294]
3. Statement I is correct and statement II is incorrect

   [Option ID = 5295]
4. Statement II is correct and statement I is incorrect

   [Option ID = 5296]

Correct Answer :-
- Both statement I and statement II are incorrect

   [Option ID = 5294]

98) If two sequences are 1 PAM apart, then they will be:

[Question ID = 1325]
1. 99% identical amino acid residues

   [Option ID = 5297]
2. 99% similar nucleotide bases

   [Option ID = 5298]
3. 1% identical amino acid residues

   [Option ID = 5299]
4. 1% similar nucleotide bases

   [Option ID = 5300]

Correct Answer :-
- 1% identical amino acid residues

   [Option ID = 5299]

99) Contact map distance matrix of a protein provides a two-dimensional view of a three-dimensional structure of a protein. How can you obtain a proper three-dimensional structure from the contact map?

[Question ID = 1326]
1. Directly from the contact map by mapping the distance on the sequence

   [Option ID = 5301]
2. Using contact map along with computational modelling techniques like simulated annealing

   [Option ID = 5302]
3. Using the contact map to generate Ramachandran plot for the protein which will provide the 3D structure

   [Option ID = 5303]
4. The contact map and secondary structure prediction tools are simultaneously used to generate the 3D structure

   [Option ID = 5304]

Correct Answer :-
- Directly from the contact map by mapping the distance on the sequence

   [Option ID = 5301]

100) Which one of the following is true about Phylograms and Cladograms?
[Question ID = 1327]
1. Phylograms show common ancestry but not time [Option ID = 5305]
2. Branches of cladograms are proportional to evolutionary time [Option ID = 5306]
3. Cladograms show common ancestry but not time [Option ID = 5307]
4. There is no difference between cladograms and phylograms [Option ID = 5308]

Correct Answer :-
- Cladograms show common ancestry but not time [Option ID = 5307]

101) Two sequences PLAVAV and PLLV were aligned using Needleman-Wunsch algorithm with the scores, match = 1, mismatch = -1, gap initiation = -1, gap elongation = - 2. The alignment with the best score according to this algorithm will be:

[Question ID = 1328]
1. PLAVAV
   PLLV--

   [Option ID = 5309]
2. PLAVAV
   PLL--V

[Option ID = 5310]

3. `PLAVAV`
   `PL-LV-`

[Option ID = 5311]

4. `PLAVAV`
   `PL-L-V`

[Option ID = 5312]

Correct Answer :-

- `PLAVAV`
  `PL-LV-`

[Option ID = 5311]

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102) CASP judges one of the following:
[Question ID = 1329]

1. Quality of protein structures [Option ID = 5313]
2. Techniques of protein structure prediction [Option ID = 5314]
3. Experimental techniques of structure determination [Option ID = 5315]
4. Suitability of drug [Option ID = 5316]

Correct Answer :-

- Techniques of protein structure prediction [Option ID = 5314]

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103) A protein sequence was isolated from a novel source. During an initial sequence similarity search through BLAST, no homologous sequence was identified. A further BLAST search should be run by changing the scoring matrix to:
[Question ID = 1330]

1. BLOSUM80 [Option ID = 5317]
2. BLOSUM62 [Option ID = 5318]
3. PAM250 [Option ID = 5319]
4. PSSM [Option ID = 5320]

Correct Answer :-

- BLOSUM62 [Option ID = 5318]

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104) The *in vitro* ADMET analysis cannot provide information about:

[Question ID = 1331]

1. Blood – brain barrier penetrability

   [Option ID = 5321]
2. Adverse reaction to the drug

   [Option ID = 5322]
3. Metabolic Stability

   [Option ID = 5323]
4. Cytochrome P450 inhibition

   [Option ID = 5324]

Correct Answer :-

- Metabolic Stability

  [Option ID = 5323]

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105) K-tuple method is associated with:
[Question ID = 1332]

1. Multiple sequence alignment [Option ID = 5325]
2. Dynamic programming [Option ID = 5326]
3. Dot matrix [Option ID = 5327]
4. Sequence similarity [Option ID = 5328]

Correct Answer :-

- Multiple sequence alignment [Option ID = 5325]

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106) The motif D-[TS]-x(2)-{GH}-L motif will have sequence:
[Question ID = 1333]

1. DSARRL [Option ID = 5329]
2. DSRRGL [Option ID = 5330]
3. DTRRHL [Option ID = 5331]
4. DRRRRL [Option ID = 5332]

Correct Answer :-

- DTRRHL [Option ID = 5331]

107) How many atomic positions are required to measure a dihedral angle?

[Question ID = 1334]

1. Two [Option ID = 5333]
2. Three [Option ID = 5334]
3. Four [Option ID = 5335]
4. Five [Option ID = 5336]

Correct Answer :-

- Four [Option ID = 5335]

108) Which one of the following will be used to assess structural similarity of biomolecules?

[Question ID = 1335]

1. E-value [Option ID = 5337]
2. P-Value [Option ID = 5338]
3. Root mean square deviation [Option ID = 5339]
4. Standard deviation [Option ID = 5340]

Correct Answer :-

- P-Value [Option ID = 5338]

109) A profile can be generated from a multiple sequence alignment by obtaining position specific preference (or probability) of each amino acid. This can be used to identify homologs. However, the key difference between a profile alignment like this and Hidden Markov Model (HMM) is:

[Question ID = 1336]

1. HMM has the option to introduce gaps with position specific gap penalties [Option ID = 5341]
2. HMM can find more remote homologs using PSI-BLAST [Option ID = 5342]
3. HMM is independent of a multiple sequence alignment [Option ID = 5343]
4. HMM does not generate a profile of position specific probabilities [Option ID = 5344]

Correct Answer :-

- HMM can find more remote homologs using PSI-BLAST [Option ID = 5342]

110) You have purified a protein X and observed the following-

A. When run on a native PAGE, it gives rise to a single band.

B. When run on a non-reducing SDS-PAGE, you obtain two bands-corresponding to 40kDa and 60kDa.

C. When run on a reducing SDS page you get three bands- corresponding to 60kDa, 30kDa, and 10kDa.

What can you conclude about the purified protein X?

[Question ID = 1337]

1.　　　　X is a complex of 3 polypeptide chains all of which are linked to each other by disulfide bonds [Option ID = 5345]
2.　　　　X contains at least 3 polypeptide chains that from a complex [Option ID = 5346]
3.　　　　X contains 2 polypeptide chains that form a complex [Option ID = 5347]
4.　　　　X has 3 polypeptide that have intramolecular disulfide bonds [Option ID = 5348]

Correct Answer :-

-　　　　X contains 2 polypeptide chains that form a complex [Option ID = 5347]

111) What types of bonds generally stabilize the antigen-antibody interaction?

[Question ID = 1338]

1. Weak hydrogen bonds and Van der Waal forces

    [Option ID = 5349]
2. Covalent bonds and hydrogen bonds

    [Option ID = 5350]
3. Disulphide bonds

    [Option ID = 5351]
4. Glycosidic bonds

    [Option ID = 5352]

Correct Answer :-

- Weak hydrogen bonds and Van der Waal forces

    [Option ID = 5349]

112) Tay-Sachs disease is a:

[Question ID = 1339]

1. Sex-linked inherited disorder [Option ID = 5353]
2. Trinuceotide repeat disorder [Option ID = 5354]
3. Autosomal recessive genetic disorder [Option ID = 5355]
4. Transposition disorder [Option ID = 5356]

Correct Answer :-

- Autosomal recessive genetic disorder [Option ID = 5355]

113) "Dysbiosis" is a term associated with:
[Question ID = 1340]
1. Genome [Option ID = 5357]
2. Proteome [Option ID = 5358]
3. Microbiome [Option ID = 5359]
4. Metabolome [Option ID = 5360]

Correct Answer :-
- Microbiome [Option ID = 5359]

114) Single chain variable fragment (ScFV) are fusion proteins composed of:
[Question ID = 1341]
1. V_H + V_L (joined by a flexible linker) [Option ID = 5361]
2. V_H only [Option ID = 5362]
3. V_L only [Option ID = 5363]
4. F_C region [Option ID = 5364]

Correct Answer :-
- V_H only [Option ID = 5362]

115) Human embryonic stem cells (hESCs) can be obtained from:
[Question ID = 1342]
1. Morula stage [Option ID = 5365]
2. Trophoblast of blastocyst [Option ID = 5366]
3. Inner cell mass of blastocyst [Option ID = 5367]
4. Teratoma [Option ID = 5368]

Correct Answer :-
- Trophoblast of blastocyst [Option ID = 5366]

116) Which gene is often been inserted in an adenoviral vector to treat cancer by suicide gene therapy?
[Question ID = 1343]
1. HSV-TK [Option ID = 5369]
2. IL-2 [Option ID = 5370]
3. GM-CSF [Option ID = 5371]
4. VSV-G [Option ID = 5372]

Correct Answer :-
- GM-CSF [Option ID = 5371]

117) Which one of the following is the most common adjuvant composed of water in oil emulsion with *Mycobacterium tuberculosis* components?
[Question ID = 1344]
1. Incomplete Freund's adjuvant [Option ID = 5373]
2. Complete Freund's adjuvant [Option ID = 5374]
3. Alum [Option ID = 5375]
4. Montanide [Option ID = 5376]

Correct Answer :-
- Complete Freund's adjuvant [Option ID = 5374]

118) Karyogram of an individual shows presence of 45 chromosomes (44+X) and one sex chromosome is missing. The individual has a female appearance and dwarfism. Which of the following is the most probable condition associated with this individual?
[Question ID = 1345]
1. Klienfelter's syndrome [Option ID = 5377]
2. Turner's syndrome [Option ID = 5378]
3. Down's syndrome [Option ID = 5379]
4. Edward's syndrome [Option ID = 5380]

Correct Answer :-
- Turner's syndrome [Option ID = 5378]

119) Match the components of List I with those in the List II.

List I	List II
A. Idiopathic thrombocytopenic purpura (ITP)	I. Thyroid
B. Hashimoto's Disease	II. Gut
C. Celiac Disease	III. Brain

D. Huntington Disease	IV. Platelets

Choose the correct answer from the options given below:

[Question ID = 1346]
1. A - I, B - III, C - II, D - IV [Option ID = 5381]
2. A - II, B - I, C - IV, D - III [Option ID = 5382]
3. A - IV, B - I, C - II, D - III [Option ID = 5383]
4. A - III, B - IV, C - II, D - I [Option ID = 5384]

Correct Answer :-
- A - IV, B - I, C - II, D - III [Option ID = 5383]

120) Which family does HIV belong to?
[Question ID = 1347]
1. Retroviridae [Option ID = 5385]
2. Rhabdoviridae [Option ID = 5386]
3. Togaviridae [Option ID = 5387]
4. Paramyxoviridae [Option ID = 5388]

Correct Answer :-
- Retroviridae [Option ID = 5385]

121) Kuru disease in human is caused by:
[Question ID = 1348]
1. Bacteria [Option ID = 5389]
2. Virus [Option ID = 5390]
3. Prions [Option ID = 5391]
4. Mycoplasma [Option ID = 5392]

Correct Answer :-
- Prions [Option ID = 5391]

122) Which statement is TRUE for pathogenicity islands?
[Question ID = 1349]
1. These are large segments of bacterial genome encoding virulence factors [Option ID = 5393]
2. They generate signals that activate global response regulators [Option ID = 5394]
3. They interfere with the antibody response of the host [Option ID = 5395]
4. They coordinate gene expression to make the biofilm [Option ID = 5396]

Correct Answer :-
- They interfere with the antibody response of the host [Option ID = 5395]

123) Which one of the following diseases can be treated with dopamine producing neurons generated from stem cells?
[Question ID = 1350]
1. Parkinson's disease [Option ID = 5397]
2. Alzheimer's disease [Option ID = 5398]
3. Amyotrophic lateral sclerosis [Option ID = 5399]
4. Brain tumor [Option ID = 5400]

Correct Answer :-
- Alzheimer's disease [Option ID = 5398]

124) Protein A, which has strong affinity for Fc region of immunoglobulin, is extracted from:
[Question ID = 1351]
1. *Saccharomyces cerevisae* [Option ID = 5401]
2. *Staphylococcus aureus* [Option ID = 5402]
3. *Staphlyococcus pyogenes* [Option ID = 5403]
4. *Staphylococcus sanjuis* [Option ID = 5404]

Correct Answer :-
- *Staphylococcus aureus* [Option ID = 5402]

125) Which one of the following diseases is caused due to a point mutation in the coding region of the associated gene?
[Question ID = 1352]
1. α-thalassemia [Option ID = 5405]
2. ▯-thalassemia [Option ID = 5406]
3. Sickle cell anemia [Option ID = 5407]
4. Hemolytic anemia [Option ID = 5408]

Correct Answer :-
- Sickle cell anemia [Option ID = 5407]

126) Double pain sensation that is occasionally felt following painful stimulation of the skin is due to:
[Question ID = 1353]
1. Repetition of the painful stimulus [Option ID = 5409]
2. Presence of dual pain pathways [Option ID = 5410]
3. Perception of pain at two different higher centers [Option ID = 5411]
4. Application of two painful stimuli simultaneously at two different sites [Option ID = 5412]

Correct Answer :-
- Repetition of the painful stimulus [Option ID = 5409]

127) Interneurons:
[Question ID = 1354]
1. Provide communication between the central ends of afferent neurons [Option ID = 5413]
2. Provide communication between dendrites of the efferent neurons [Option ID = 5414]
3. Influence the rate of discharge from the alpha motor neurons [Option ID = 5415]
4. Participate in ascending sensory pathways [Option ID = 5416]

Correct Answer :-
- Influence the rate of discharge from the alpha motor neurons [Option ID = 5415]

128) The hypothalamus protects the body against hypoglycemia by:
[Question ID = 1355]
1. Inhibiting insulin release [Option ID = 5417]
2. Increasing glucagon release [Option ID = 5418]
3. Increasing thyroxin release [Option ID = 5419]
4. Increasing epinephrine release [Option ID = 5420]

Correct Answer :-
- Increasing thyroxin release [Option ID = 5419]

129) Chemical transmitters in basal ganglia include all the following, EXCEPT:
[Question ID = 1356]
1. GABA [Option ID = 5421]
2. Dopamine [Option ID = 5422]
3. Glutamate [Option ID = 5423]
4. Glycine [Option ID = 5424]

Correct Answer :-
- Dopamine [Option ID = 5422]

130) Which one of the statements is TRUE regarding chemical synapses in the nervous system?
[Question ID = 1357]
1. Allow diffusion of chemical substances form the presynaptic neuron into the postsynaptic neuron [Option ID = 5425]
2. Allow transmission of potential changes in one direction only; from the presynaptic to the postsynaptic neurons [Option ID = 5426]
3. Have potential-gated ionic channels [Option ID = 5427]
4. Are more numerous in the peripheral nervous system than the central nervous system [Option ID = 5428]

Correct Answer :-
- Allow transmission of potential changes in one direction only; from the presynaptic to the postsynaptic neurons [Option ID = 5426]

131) Given below are two statements:

Statement I: Tissues that are non-regenerative, such as neurons in the brain, do have stem cells.
Statement II: Tissue localization does not necessarily mean lineage commitment and reduced potency, as liver stem cells can generate neurons.

In light of the above statements, choose the most appropriate answer from the options given below:

[Question ID = 1358]
1. Both statement I and II are correct

   [Option ID = 5429]
2. Both statement I and II are incorrect

   [Option ID = 5430]
3. Statement I is correct but statement II is incorrect

   [Option ID = 5431]
4. Statement I is incorrect but statement II is correct

   [Option ID = 5432]

Correct Answer :-
- Statement I is correct but statement II is incorrect

132) Given below are two statements: one is labelled as Assertion A and another one is labelled as Reason R

Assertion A: It is essential that the animal cell cultures be maintained in antibiotic free conditions otherwise cryptic contaminations will persist

Reason R: The constant use of antibiotics favours development of chronic contamination. Many organisms are inhibited but not killed by antibiotics, which may resurface when conditions are favourable.

In light of the above statements, choose the correct answer from the options below:

[Question ID = 1359]

1. Both A and R is true and R is the correct explanation of A [Option ID = 5433]
2. Both A and R is true and R is NOT the correct explanation of A [Option ID = 5434]
3. A is true but R is false [Option ID = 5435]
4. A is false but R is true [Option ID = 5436]

Correct Answer :-

- Both A and R is true and R is the correct explanation of A [Option ID = 5433]

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133) Match the components of List I with List II.

List I (Inducers of cell differentiation)		List II (Cell type)
A. Hydrocortisone	I.	Neuroblastoma
B. Retinoids	II.	Endothelium
C. Prolactin	III.	Glia, glioma
D. Interferon - γ	IV.	Mammary epithelium

Choose the correct answer from the options given below:

[Question ID = 1360]

1. A-I , B- III , C – II , D – IV [Option ID = 5437]
2. A -III , B – II , C – IV , D – I [Option ID = 5438]
3. A – II, B – I , C – IV , D – III [Option ID = 5439]
4. A – I , B – II , C – III , D – IV [Option ID = 5440]

Correct Answer :-

- A – II, B – I , C – IV , D – III [Option ID = 5439]

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134) Match the components of List I with List II.

List I (Techniques)	List II (Used in)
A. Mosaic Spheroids	I. 3D aggregate of cells
B. Microcarrier matrix	II. Microgravity cell growth environment
C. Organoids	III. Bystander effects
D. Rotatory cell culture system	IV. 3D growth environment

Choose the correct answer from the options given below:

[Question ID = 1361]

1. A-I , B- II , C – IV , D – III [Option ID = 5441]
2. A -II , B – II , C – III , D – IV [Option ID = 5442]
3. A – III, B – IV , C – I , D – II [Option ID = 5443]
4. A – IV , B – III , C – II , D – I [Option ID = 5444]

Correct Answer :-

- A – III, B – IV , C – I , D – II [Option ID = 5443]

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135) What is the role of macrophage activating factor (MAF) in an animal cell culture media?

[Question ID = 1362]

1. Epithelial cell mitogen [Option ID = 5445]
2. Antiviral [Option ID = 5446]
3. Support growth of activated T cells [Option ID = 5447]
4. Inhibits differentiation of embryonic stem cells [Option ID = 5448]

Correct Answer :-

- Antiviral [Option ID = 5446]

136) Common indicators of water pollution with enteropathogens are following EXCEPT -
[Question ID = 1363]
1. *E. coli* [Option ID = 5449]
2. *Streptococcus spp.* [Option ID = 5450]
3. *Clostridium spp.* [Option ID = 5451]
4. *Bacillus spp.* [Option ID = 5452]

Correct Answer :-

- *Streptococcus spp.* [Option ID = 5450]

137) The first U.S patent for a GM organism was awarded to Dr. A. M. Chakrabarty for his work on one of the following:

[Question ID = 1364]
1. *Pseudomonas* engineered to degrade petroleum

[Option ID = 5453]
2. *Pseudomonas* engineered to produce petrol

[Option ID = 5454]
3. *E. coli* engineered to produce insulin

[Option ID = 5455]
4. Yeast engineered to produce Hepatitis B vaccine

[Option ID = 5456]

Correct Answer :-

- *E. coli* engineered to produce insulin

[Option ID = 5455]

138) The suitable method for treatment of municipal waste water and aqueous hazardous waste, which have less than 1% of suspended solids is:
[Question ID = 1365]
1. Activated sludge process [Option ID = 5457]
2. Trickling filter [Option ID = 5458]
3. Lagoons & ponds [Option ID = 5459]
4. Bioreactors [Option ID = 5460]

Correct Answer :-

- Activated sludge process [Option ID = 5457]

139) Nitrification during nitrogen cycle is the production of:
[Question ID = 1366]
1. Nitrates [Option ID = 5461]
2. Nitric oxide [Option ID = 5462]
3. Nitrogen [Option ID = 5463]
4. Ammonium [Option ID = 5464]

Correct Answer :-

- Nitrogen [Option ID = 5463]

140) Match the components of List I with List II.

List I		List II	
A. Legume	I.	Frankia	
B. Azolla	II.	Azorhizobium	
C. Sugarcane	III.	Anabaena	
D. Actinorhizal	IV.	Acetobacter	

Choose the correct answer from the options given below:

[Question ID = 1367]
1. A-II, B-IV, C-I, D-III

[Option ID = 5465]
2. A-II, B-III, C-I, D-IV

[Option ID = 5466]
3. A-II, B-III, C-IV, D-I

[Option ID = 5467]
4. A-I, B-III, C-II, D-IV

[Option ID = 5468]

Correct Answer :-

- A-II, B-III, C-IV, D-I

[Option ID = 5467]

141)

Match the components of List I with List II.

List I (Marine Enzymes)		List II (Source)
A. Chitinolytic enzymes	I.	Digestive tracts of fish, shellfish, squid liver, octopus saliva
B. Gastric proteases	II.	Pyloric ceca, pancreatic tissues, intestines of sardine, cod & salmon
C. Polyphenol oxidases	III.	Fish viscera from fishery sources
D. Serine and cysteine proteases	IV.	Crustaceans

Choose the correct answer from the options given below:

[Question ID = 1368]
1. A-I, B-III, C-IV, D-II [Option ID = 5469]
2. A-II, B-III, C-IV, D-I [Option ID = 5470]
3. A-I, B-II, C-III, D-IV [Option ID = 5471]
4. A-IV, B-III, C-II, D-I [Option ID = 5472]

Correct Answer :-

- A-II, B-III, C-IV, D-I [Option ID = 5470]

142) Given below are two statements:
Statement I: Humans mainly obtain DHA and EPA by consuming fish whereas fish in turn obtain PUFAs from microalgae.
Statement II: Microalgae derived DHA and EPA can be used as a supplement for people who do not consume fish and seafood.
In light of the above statements, choose the most appropriate answer from the options given below:
[Question ID = 1369]
1. Both Statement I and II are correct [Option ID = 5473]
2. Both Statement I and II are incorrect [Option ID = 5474]
3. Statement I is correct but statement II is incorrect [Option ID = 5475]
4. Statement I is incorrect but statement II is correct [Option ID = 5476]

Correct Answer :-

- Both Statement I and II are incorrect [Option ID = 5474]

143) Given below are two statements:
Statement I: Xenobiotic pollutants are biomagnified and accumulate in marine organisms.
Statement II: Pollutants can be quantified in tissue samples from key marine animals living in the environment where pollution monitoring is in place.
In light of the above statements, choose the most appropriate answer from the options given below:
[Question ID = 1370]
1. Both Statement I and II are correct [Option ID = 5477]
2. Both Statement I and II are incorrect [Option ID = 5478]
3. Statement I is correct but statement II is incorrect [Option ID = 5479]
4. Statement I is incorrect but statement II is correct [Option ID = 5480]

Correct Answer :-

- Statement I is correct but statement II is incorrect [Option ID = 5479]

144) Brine shrimp assay involves one of the following:
[Question ID = 1371]
1. Testing effect of increasing salinity on survival of shrimp [Option ID = 5481]
2. Testing the toxicity of anticancer molecules using eggs of brine shrimp [Option ID = 5482]
3. Testing effect of decreasing salinity on growth of shrimp [Option ID = 5483]
4. Testing effect of changing salinity on nutritional content of shrimp [Option ID = 5484]

Correct Answer :-

- Testing effect of increasing salinity on survival of shrimp [Option ID = 5481]

145) Strong adhesives can be prepared using the constituents of one of the following:

[Question ID = 1372]
1. Tentacles of hydra [Option ID = 5485]
2. Base of sea anemone [Option ID = 5486]
3. Byssus generated by sea mussel [Option ID = 5487]
4. Platform generated by sea urchin [Option ID = 5488]

Correct Answer :-
- Byssus generated by sea mussel [Option ID = 5487]

146) Match the components of List I with List II.

List I		List II
A. Rhodopsin	I.	Vitamin-C
B. Tocopherol	II.	Vitamin-A
C. Isoflavonoids	III.	Vitamin-E
D. Ascorbic acid	IV.	Soybean

Choose the correct answer from the options given below:

[Question ID = 1373]
1. A-I, B-II, C-IV, D-III [Option ID = 5489]
2. A-IV, B-III, C-II, D-I [Option ID = 5490]
3. A-II, B-III, C-IV, D-I [Option ID = 5491]
4. A-II, B-I, C-IV, D-III [Option ID = 5492]

Correct Answer :-
- A-II, B-III, C-IV, D-I [Option ID = 5491]

147) Which one of the following is NOT a fermented food?
[Question ID = 1374]
1. Sauerkraut [Option ID = 5493]
2. Cheese [Option ID = 5494]
3. Salami [Option ID = 5495]
4. Milk cream [Option ID = 5496]

Correct Answer :-
- Cheese [Option ID = 5494]

148) Given below are two statements: one is labelled as Assertion A and another one is labelled as Reason R
Assertion A: Within a few hours after an animal is killed, rigor mortis sets in with a contraction of muscle fibres and an increasing toughness of the meat.
Reason R: The loss of glycogen and disappearance of ATP from the muscles are observed in freshly killed animals.
In light of the above statements, choose the correct answer from the options below:
[Question ID = 1375]
1. Both A and R is true and R is the correct explanation of A [Option ID = 5497]
2. Both A and R is true and R is NOT the correct explanation of A [Option ID = 5498]
3. A is true but R is false [Option ID = 5499]
4. A is false but R is true [Option ID = 5500]

Correct Answer :-
- Both A and R is true and R is NOT the correct explanation of A [Option ID = 5498]

149) Which one of the following methods of controlling microbial contamination is the least preferred in food processing?
[Question ID = 1376]
1. Pasteurization [Option ID = 5501]
2. Autoclaving [Option ID = 5502]
3. Dry heat [Option ID = 5503]
4. Preservatives [Option ID = 5504]

Correct Answer :-
- Dry heat [Option ID = 5503]

150) Spirulina is considered as a super food for human consumption because it contains:

[Question ID = 1377]
1. All known proteins, carbohydrates and lipids

[Option ID = 5505]
2. All dietary phytochemicals

[Option ID = 5506]

3. All essential amino acids vitamins and fatty acids

   [Option ID = 5507]
4. No heavy metals or anti-nutritive compounds

   [Option ID = 5508]

Correct Answer :-

- All dietary phytochemicals

   [Option ID = 5506]

3. All essential amino acids vitamins and fatty acids

   [Option ID = 5507]
4. No heavy metals or anti-nutritive compounds

   [Option ID = 5508]

Correct Answer :-

- All dietary phytochemicals

   [Option ID = 5506]