

DU PhD in Microbiology

Topic:- MICRO PHD S2

1) Extended spectrum beta-lactamases (ESBL) do not confer resistance to

[Question ID = 1899]

1. Penicillins [Option ID = 7590]
2. Monobactams [Option ID = 7591]
3. Carbapenems [Option ID = 7592]
4. Oxyimino-cephalosporins [Option ID = 7593]

Correct Answer :-

- Carbapenems [Option ID = 7592]

2) A protein sample of 2mg/ml concentration was provided to a class. Students were asked to calculate molar concentration of the sample if molecular weight of the protein is 50 kDa. The class came up with 4 different values. Choose the correct option

1	2	3	4
40μM	4 x 10 ⁻³ M	0.04mM	4 x 10 ⁻⁵ M

[Question ID = 1900]

1. Only 2 and 3

[Option ID = 7594]

2. Only 1

[Option ID = 7595]

3. 1, 3 and 4

[Option ID = 7596]

4. Only 4

[Option ID = 7597]

Correct Answer :-

- 1, 3 and 4

[Option ID = 7596]

3) In plasmid ColE1, what would be the copy number phenotype of a mutant that carries a point mutation inactivating the promoter for RNA II?

[Question ID = 1901]

1. Lower than usual [Option ID = 7598]
2. Higher than usual [Option ID = 7599]
3. No change [Option ID = 7600]
4. Plasmid will be lost [Option ID = 7601]

Correct Answer :-

- Plasmid will be lost [Option ID = 7601]

4) In loop-mediated isothermal amplification (LAMP), the DNA polymerase has which of the following properties?

[Question ID = 1902]

1. DNA polymerase with strand displacement activity [Option ID = 7602]
2. DNA polymerase with strand replacement activity [Option ID = 7603]
3. DNA polymerase with strand editing activity [Option ID = 7604]
4. DNA polymerase with strand ligation activity [Option ID = 7605]

Correct Answer :-

- DNA polymerase with strand displacement activity [Option ID = 7602]

5) Which one of these is not a giant virus?

[Question ID = 1903]

1. Mimivirus [Option ID = 7606]
2. Mamavirus [Option ID = 7607]
3. Momovirus [Option ID = 7608]
4. Pandoravirus [Option ID = 7609]

Correct Answer :-

- Momovirus [Option ID = 7608]

6) To identify origins of replication in the genome using ORC initiator protein as a marker you would carry out:

[Question ID = 1904]

1. DNA fingerprinting [Option ID = 7610]
2. Chromatin immunoprecipitation [Option ID = 7611]
3. SAGE [Option ID = 7612]
4. RNA-seq [Option ID = 7613]

Correct Answer :-

- Chromatin immunoprecipitation [Option ID = 7611]

7) Folic acid analogs are potent inhibitors of different types of cell proliferations because of all except one of the following reasons:

[Question ID = 1905]

1. They are competitive inhibitors of dihydrofolate reductase [Option ID = 7614]
2. They inhibit completion of the purine ring to form inosine monophosphate [Option ID = 7615]
3. They inhibit the conversion of dUMP to TMP [Option ID = 7616]
4. They inhibit completion of the pyrimidine ring to form orotic acid [Option ID = 7617]

Correct Answer :-

- They inhibit completion of the pyrimidine ring to form orotic acid [Option ID = 7617]

8) During batch filtration process of a fermentation broth using a gravitational flow, the rate of flow in the column is given by which of the following expressions, where μ is liquid viscosity; L is depth of the filter bed; ΔP is pressure difference across the filter bed; A is area of the filter exposed to the liquid; and K is a system constant

[Question ID = 1906]

1. $K \cdot \mu \cdot \Delta P / A \cdot L$ [Option ID = 7618]
2. $\mu \cdot A \cdot \Delta P / K \cdot L$ [Option ID = 7619]
3. $K \cdot A \cdot \mu / L \cdot \Delta P$ [Option ID = 7620]
4. $K \cdot A \cdot \Delta P / \mu \cdot L$ [Option ID = 7621]

Correct Answer :-

- $K \cdot A \cdot \Delta P / \mu \cdot L$ [Option ID = 7621]

9) Viruses are parasites of cellular _____ machinery, whereas viroids are parasites of cellular _____ machinery

[Question ID = 1907]

1. Replication, Translation [Option ID = 7622]
2. Transcription, Translation [Option ID = 7623]
3. Transcription, Replication [Option ID = 7624]
4. Translation, Transcription [Option ID = 7625]

Correct Answer :-

- Translation, Transcription [Option ID = 7625]

10) Four proteins A, B, C and D (pI values of 5.2, 7.0, 3.7 and 9.2, respectively) are to be purified by anion exchange chromatography using Q-Sepharose column. Which statement regarding ion exchange chromatography is correct?

[Question ID = 1908]

1. Anion exchanger should be used at a pH lower than pI of the desired protein [Option ID = 7626]
2. At pH 9.0, proteins A and C will be deprotonated while proteins B and D will be protonated [Option ID = 7627]
3. Protein C will be protonated at pH 9.0 [Option ID = 7628]
4. Cation exchanger is more suitable for Protein C since it will be protonated at acidic pH [Option ID = 7629]

Correct Answer :-

- Protein C will be protonated at pH 9.0 [Option ID = 7628]

11) In liquid-liquid extraction of product from the fermentation broth, a very high value of partition coefficient (K) implies

[Question ID = 1909]

1. Extraction of product is difficult [Option ID = 7630]
2. Extraction of product is easy [Option ID = 7631]
3. Co-current multistage systems required for product extraction [Option ID = 7632]
4. Counter-current multistage systems required for product extraction [Option ID = 7633]

Correct Answer :-

- Extraction of product is easy [Option ID = 7631]

12) Viroids are known to:

[Question ID = 1910]

1. Infect only animals, and classified in two families [Option ID = 7634]
2. Infect only animals, and classified in three families [Option ID = 7635]
3. Infect only plants, and classified in two families [Option ID = 7636]
4. Infect only plants, and classified in three families [Option ID = 7637]

Correct Answer :-

- Infect only plants, and classified in two families [Option ID = 7636]

13) Base excision repair involves

[Question ID = 1911]

1. Hydrolysis of phosphodiester bonds on either side of the modified nucleotide, followed by repair [Option ID = 7638]
2. Excision of the modified nucleotide by glycosylases followed by repair [Option ID = 7639]
3. Enzymatically unmodifying the modified nucleotide [Option ID = 7640]
4. Double strand breaks on either side of the modified nucleotide followed by repair [Option ID = 7641]

Correct Answer :-

- Excision of the modified nucleotide by glycosylases followed by repair [Option ID = 7639]

14) Calculate the minimum amount of glucose needed to produce 15 g of E. coli cells using glucose as sole carbon source assuming the chemical formula of E. coli is $\text{CH}_{1.8}\text{O}_{0.5}\text{N}_{0.2}$

[Question ID = 1912]

1. 15.00 g [Option ID = 7642]
2. 14.634 g [Option ID = 7643]
3. 18.293 g [Option ID = 7644]
4. 30.293 g [Option ID = 7645]

Correct Answer :-

- 18.293 g [Option ID = 7644]

15) The precursor for histidine ring is provided from

[Question ID = 1913]

1. EMP pathway [Option ID = 7646]
2. TCA pathway [Option ID = 7647]
3. Pentose phosphate pathway [Option ID = 7648]
4. Glyoxylate pathway [Option ID = 7649]

Correct Answer :-

- Pentose phosphate pathway [Option ID = 7648]

16) In terms of affinity and avidity of the interaction of virus with host cell receptor, in general these interactions are of:

[Question ID = 1914]

1. Low affinity and Low avidity [Option ID = 7650]
2. Low affinity and High avidity [Option ID = 7651]
3. High affinity and Low avidity [Option ID = 7652]
4. High affinity and High avidity [Option ID = 7653]

Correct Answer :-

- Low affinity and High avidity [Option ID = 7651]

17) Which of the following is not a plant-based sweetener?

[Question ID = 1915]

1. Brazzein [Option ID = 7654]
2. Thaumatin [Option ID = 7655]
3. Monellin [Option ID = 7656]
4. Aspartame [Option ID = 7657]

Correct Answer :-

- Aspartame [Option ID = 7657]

18) Dr. Har Gobind Khorana developed a method to synthesize long RNA molecules consisting of short defined sequence repeated many times in order to help unravel the genetic code. Which combination of different triplets would occur in a synthetic RNA comprising of a chain of UUAC repeats?

[Question ID = 1916]

1. UUA and CUU [Option ID = 7658]
2. UUA, UAC and ACU [Option ID = 7659]
3. UUA, UAC, ACU and CUU [Option ID = 7660]
4. UUA, UAC and CUU [Option ID = 7661]

Correct Answer :-

- UUA, UAC, ACU and CUU [Option ID = 7660]

19) Stoke's shift of the fluorochrome is a key parameter for fluorescence detection. Stoke's shift is

[Question ID = 1917]

1. The emission light intensity of different fluorochromes [Option ID = 7662]
2. Difference in emission wavelength of different fluorochromes [Option ID = 7663]
3. The difference between excitation and emission wavelength of a fluorochrome [Option ID = 7664]
4. The excitation/absorption wavelength maxima of different fluorochromes [Option ID = 7665]

Correct Answer :-

- The difference between excitation and emission wavelength of a fluorochrome [Option ID = 7664]

20) Which of the following does not come under physico-mechanical methods of cell disruption?

[Question ID = 1918]

1. Liquid and solid shear [Option ID = 7666]
2. Agitation with abrasives [Option ID = 7667]
3. Ultrasonication and freeze-thawing [Option ID = 7668]
4. Enzyme and detergent treatment [Option ID = 7669]

Correct Answer :-

- Enzyme and detergent treatment [Option ID = 7669]

21) The relationship between genomes of helper virus and satellite virus is best explained as:

[Question ID = 1919]

1. Satellite virus originated from helper virus [Option ID = 7670]
2. Helper virus originated from satellite virus [Option ID = 7671]
3. Satellite virus genome sequence has no homology to helper virus genome sequence [Option ID = 7672]
4. Satellite virus genome sequence has approx. 50% similarity to helper virus genome sequence [Option ID = 7673]

Correct Answer :-

- Satellite virus genome sequence has no homology to helper virus genome sequence [Option ID = 7672]

22) The 0.5 ml of a protein sample A was diluted with 1.5 ml water. To 1ml of this diluted solution, 4 ml of biuret reagent was added. The color thus developed was found to have an absorbance of 0.24 at 540nm. Calculate the protein concentration in sample A (assuming that the protein has an extinction coefficient a^{1mg} of 0.06 using the same protocol)

[Question ID = 1920]

1. 160 mg/ml [Option ID = 7674]
2. 120 mg/ml [Option ID = 7675]
3. 16 mg/ml [Option ID = 7676]
4. 12 mg/ml [Option ID = 7677]

Correct Answer :-

- 16 mg/ml [Option ID = 7676]

23) According to Stoke's law, the rate of sedimentation of spherical particles suspended in a fluid of Newtonian viscosity characteristics is proportional to:

[Question ID = 1921]

1. Square of the diameter of the particles [Option ID = 7678]
2. Diameter of the particles [Option ID = 7679]
3. Half of the diameter of the particles [Option ID = 7680]
4. Cube of the diameter of the particles [Option ID = 7681]

Correct Answer :-

- Square of the diameter of the particles [Option ID = 7678]

24) Thiosulfate Citrate Bile Salt (TCBS) agar is highly selective for the isolation of *V. cholerae* and *V. parahaemolyticus* as well as other *Vibrio* species because:

[Question ID = 1922]

1. It contains high concentrations of sodium thiosulfate and sodium citrate to inhibit the growth of enterobacteria
[Option ID = 7682]
2. Inhibition of Gram-negative bacteria is achieved by the incorporation of ox gall
[Option ID = 7683]
3. Saccharose (sucrose) is excluded as a fermentable carbohydrate
[Option ID = 7684]
4. The acidic pH of the medium enhances the recovery of *V. cholerae* and inhibits the growth of others
[Option ID = 7685]

Correct Answer :-

- It contains high concentrations of sodium thiosulfate and sodium citrate to inhibit the growth of enterobacteria
[Option ID = 7682]

25) The bacterial cells maintain their integrity when exposed to hypo- osmotic environment by:

[Question ID = 1924]

1. Accumulating osmolytes [Option ID = 7690]
2. Overexpressing aquaporins [Option ID = 7691]
3. Opening mechanosensitive channels [Option ID = 7692]
4. accumulating potassium and glutamate [Option ID = 7693]

Correct Answer :-

- Opening mechanosensitive channels [Option ID = 7692]

26) Which growth medium is used to differentiate *Shigella* and *Salmonella* from other pathogens

[Question ID = 1925]

1. Thiosulfate Citrate Bile Salt (TCBS) Agar

[Option ID = 7694]

2. MacConkey agar

[Option ID = 7695]

3. Mannitol salt agar (MSA)

[Option ID = 7696]

4. Hektoen enteric Agar

[Option ID = 7697]

Correct Answer :-

- Hektoen enteric Agar

[Option ID = 7697]

27) The human genome was sequenced by:

[Question ID = 1926]

1. Chromosome walking [Option ID = 7698]

2. Chromosome jumping [Option ID = 7699]

3. Shotgun sequencing [Option ID = 7700]

4. Primer walking [Option ID = 7701]

Correct Answer :-

- Shotgun sequencing [Option ID = 7700]

28) The conversion of pyruvate to acetyl CoA and CO₂

[Question ID = 1927]

1. Is reversible [Option ID = 7702]

2. Involves the participation of lipoic acid [Option ID = 7703]

3. Is activated when pyruvate dehydrogenase complex is phosphorylated by a protein kinase in the presence of ATP [Option ID = 7704]

4. Depends on the coenzyme biotin [Option ID = 7705]

Correct Answer :-

- Involves the participation of lipoic acid [Option ID = 7703]

29) The fully automated microbial identification system OMNILOG utilizes growth based technology which is based on

[Question ID = 1928]

1. Oxidation of Sunset Yellow FCF azo dye due to bacterial growth resulting in formation of orange color [Option ID = 7706]

2. Reduction of the tetrazolium dye due to increased cell respiration resulting in formation of a purple color [Option ID = 7707]

3. Oxidation of the tetrazolium dye due to increased cell respiration resulting in formation of a purple color [Option ID = 7708]

4. Reduction of Sunset Yellow FCF azo dye due to bacterial growth resulting in formation of orange color [Option ID = 7709]

Correct Answer :-

- Reduction of the tetrazolium dye due to increased cell respiration resulting in formation of a purple color [Option ID = 7707]

30) You wish to purify a protein by hydrophobic interaction chromatography using octylsepharose column. As per the known protocol, the protein can be eluted from the column using 2M ammonium sulphate ((NH₄)₂SO₄). However, (NH₄)₂SO₄ is currently not available in your laboratory and you are advised to use sodium sulphate Na₂SO₄ instead. What is the molarity of Na₂SO₄ required to elute the protein?

[Question ID = 1929]

1. Molarity of Na₂SO₄ should be higher than (NH₄)₂SO₄ [Option ID = 7710]

2. Molarity of Na₂SO₄ should be lower than (NH₄)₂SO₄ [Option ID = 7711]

3. Molarity of Na₂SO₄ should be same as that of (NH₄)₂SO₄ [Option ID = 7712]

4. Na₂SO₄ cannot be used to replace (NH₄)₂SO₄ as Na₂SO₄ is a neutral salt while (NH₄)₂SO₄ is an acidic salt [Option ID = 7713]

Correct Answer :-

- Molarity of Na₂SO₄ should be same as that of (NH₄)₂SO₄ [Option ID = 7712]

31) Which of the following is not a heme-containing ligninolytic enzyme?

[Question ID = 1930]

1. Manganese Peroxidase [Option ID = 7714]

2. Versatile Peroxidase [Option ID = 7715]

3. DyP-type Peroxidase [Option ID = 7716]

4. Laccase [Option ID = 7717]

Correct Answer :-

- Laccase [Option ID = 7717]

32) If probability of developing resistance against one drug is 10⁻⁴ and against another drug is 10⁻⁶, then probability of development of resistance against both will be:

[Question ID = 1931]

1. 10⁻²⁴ [Option ID = 7718]

2. 10⁻² [Option ID = 7719]

3. $10^{-1.5}$ [Option ID = 7720]
4. 10^{-10} [Option ID = 7721]

Correct Answer :-

- 10^{-10} [Option ID = 7721]

33) A protein X was found to be of molecular weight 100 kDa by gel filtration analysis. When it was resolved on SDS-PAGE two bands of sizes 50 kDa and 25 kDa were observed. Which of the following statements is incorrect?

[Question ID = 1932]

1. The protein comprises of two subunit types of sizes 50 kDa and 25 kDa [Option ID = 7722]
2. The protein is a heterodimeric protein. [Option ID = 7723]
3. The protein is trimeric in nature [Option ID = 7724]
4. Gel filtration analysis allows the determination of native molecular weight of a protein [Option ID = 7725]

Correct Answer :-

- The protein is a heterodimeric protein. [Option ID = 7723]

34) Which archaea phylum is considered as a link between archaea and eukaryotes?

[Question ID = 1933]

1. Aigarchaeota [Option ID = 7726]
2. Lokiarchaeota [Option ID = 7727]
3. Crenarchaeota [Option ID = 7728]
4. Thaumarchaeota [Option ID = 7729]

Correct Answer :-

- Lokiarchaeota [Option ID = 7727]

35) Why is it necessary to wash the plate repeatedly during different steps of ELISA?

[Question ID = 1934]

1. It is necessary to keep the wells of ELISA plate always clean for test to work [Option ID = 7730]
2. It is necessary to wash away all bound antigens and antibodies [Option ID = 7731]
3. It is necessary to wash away all unbound antigens and antibodies [Option ID = 7732]
4. It is necessary as a good lab practice [Option ID = 7733]

Correct Answer :-

- It is necessary to wash away all bound antigens and antibodies [Option ID = 7731]

36) An E. coli mutant which had three deletions and had lost pyruvate kinase, PEP synthetase, and pyruvate phosphate dikinase activities, was obtained. Which of the following enzyme activities is/are essential for the mutant to grow on succinate via gluconeogenic pathway?

[Question ID = 1935]

1. PEP carboxylase and Pyruvate carboxylase [Option ID = 7734]
2. PEP carboxykinase only [Option ID = 7735]
3. PEP carboxykinase and Fumarate reductase [Option ID = 7736]
4. PEP carboxylase and malic enzyme [Option ID = 7737]

Correct Answer :-

- PEP carboxykinase only [Option ID = 7735]

37) The refractory gold ore is naturally resistant to recovery by standard

[Question ID = 1936]

1. Cyanidation and carbon adsorption processes [Option ID = 7738]
2. Hydrolysis and carbon adsorption processes [Option ID = 7739]
3. Oxidation and carbon adsorption processes [Option ID = 7740]
4. Roasting and carbon adsorption processes [Option ID = 7741]

Correct Answer :-

- Cyanidation and carbon adsorption processes [Option ID = 7738]

38) DMSO is used as a cryoprotective agent in freezing media because:

[Question ID = 1937]

1. It helps to prevent water crystals from forming inside the cells which can burst cell membranes [Option ID = 7742]
2. It can be utilized as nutrient source by cells thereby preventing cell death [Option ID = 7743]
3. It can cause cell cycle arrest thereby preventing cell growth during freezing, and improving cell survival [Option ID = 7744]
4. It is a good solvent for all types of cells and is very cheap [Option ID = 7745]

Correct Answer :-

- It helps to prevent water crystals from forming inside the cells which can burst cell membranes [Option ID = 7742]

39) Two proteins have been identified to interact with each other. To identify the domains via which they interact one would carry out:

[Question ID = 1938]

1. Yeast reverse hybrid [Option ID = 7746]
2. Yeast one hybrid [Option ID = 7747]

3. Two dimensional gel electrophoresis [Option ID = 7748]
4. FISH [Option ID = 7749]

Correct Answer :-

- Yeast reverse hybrid [Option ID = 7746]

40) An alkaline phosphatase from *Bacillus cereus* had a K_m of 50 mM and V_{max} of 10 μ moles/mg/min when using the substrate *p*-nitrophenyl phosphate. An error prone PCR was set up with an aim to obtain a catalytically more efficient enzyme. As a result of random mutagenesis, four different mutants, A, B, C and D were obtained. The mutants exhibited the following kinetic parameters with *p*-nitrophenyl phosphate as substrate. Which mutant(s) has a catalytic efficiency better than the native protein?

Mutants	K_m (mM)	V_{max} (μ moles/mg/min)
A	18	09
B	75	25
C	84	21
D	48	08

[Question ID = 1939]

1. B and C

[Option ID = 7750]

2. A, B and C

[Option ID = 7751]

3. Only B

[Option ID = 7752]

4. Only A

[Option ID = 7753]

Correct Answer :-

- A, B and C

[Option ID = 7751]

41) The term 'multiplicity of infection' in virology refers to:

[Question ID = 1940]

1. Number of virions infected per cell [Option ID = 7754]
2. Number of virions added per cell [Option ID = 7755]
3. Number of virions used in the experiment [Option ID = 7756]
4. Number of virions added per well of a 6 well plate [Option ID = 7757]

Correct Answer :-

- Number of virions added per cell [Option ID = 7755]

42) Sterilization is carried out in a fermentation vessel of 100 dm³, containing 10⁵ organisms/cm³. The acceptable contamination risk of 1 in 100 batches is affordable. Calculate the Del factor required for the sterilization process

[Question ID = 1942]

1. 13.82 [Option ID = 7762]
2. 27.63 [Option ID = 7763]
3. 41.45 [Option ID = 7764]
4. 55.26 [Option ID = 7765]

Correct Answer :-

- 27.63 [Option ID = 7763]

43) In a *Saccharomyces cerevisiae* driven fermentation process to convert glucose to ethanol, what is the maximum theoretical yield of ethanol when 500 grams of total glucose is utilized during the fermentation process?

[Question ID = 1944]

1. 250 grams

[Option ID = 7770]

2. 255 grams

[Option ID = 7771]

3. 500 grams

[Option ID = 7772]

4. 555 grams

[Option ID = 7773]

Correct Answer :-

- 255 grams

44) The specific product formation rate of a microorganism is represented by which of the following mathematical expressions, where X is biomass, q_p is specific product formation rate, S is substrate, P is product, and μ is specific growth rate?

[Question ID = 1946]

1. $q_p = 1/P \cdot (dX/dt)$ [Option ID = 7778]
2. $q_p = 1/\mu \cdot (dP/dt)$ [Option ID = 7779]
3. $q_p = 1/p \cdot (dS/dt)$ [Option ID = 7780]
4. $q_p = 1/X \cdot (dP/dt)$ [Option ID = 7781]

Correct Answer :-

- $q_p = 1/X \cdot (dP/dt)$ [Option ID = 7781]

45) In a continuous stirred tank reactor (CSTR) operation of E. coli, the following process parameters were obtained at a dilution rate of $0.3h^{-1}$ in terms of biomass yield coefficients. Calculate the maintenance requirement of the system. ($Y^O_{x/s}$ Observed yield = 0.50 g/g Dry cell weight; $Y^t_{x/s}$ True yield = 0.38 g/g Dry cell weight)

[Question ID = 1948]

1. 0.0189 g/g Dry cell weight [Option ID = 7786]
2. 0.189 g/g Dry cell weight [Option ID = 7787]
3. 1.89 g/g Dry cell weight [Option ID = 7788]
4. 18.9 g/g Dry cell weight [Option ID = 7789]

Correct Answer :-

- 0.189 g/g Dry cell weight [Option ID = 7787]

46) Based on results of the complementation tests carried out with mutants (shown below), how many genes are there in the pathway?

	1	2	3	4	5	6
1	-	+	-	-	+	+
2		-	+	+	+	+
3			-	-	+	+
4				-	+	+
5					-	-
6						-

[Question ID = 3846]

1. 6 [Option ID = 15378]
2. 4 [Option ID = 15379]
3. 3 [Option ID = 15380]
4. 2 [Option ID = 15381]

Correct Answer :-

- 3 [Option ID = 15380]

47) The double-stranded bacterial DNA sequence depicting nucleotides 1-75 (shown below) encodes for Protein Z. The bold underlined G/C (top strand/bottom strand) base pair indicates the transcription start site, and transcription proceeds from left to right. What will be the effect of a mutation that results in the addition of an A/T base pair after base pair 14?

5'	1	11	21	31	
	GTGTCGGT	AAATATTGTA	GATGCGATAT	ACCCGGCAGT	
3'	CACAGCCCA	TTATAACACT	CTACGCTATA	TGGGCCGCTCA	
	41	51	61	71	
	CGTATGCACA	TGCTTCGTAA	ACGAGTCGAC	ACTAA - 3'	
	GCATACGTGT	ACGAAGCATT	TGCTCAGCTG	TGATT -5'	

[Question ID = 3847]

1. Transcription will fail to initiate [Option ID = 15382]
2. Translation will fail to initiate [Option ID = 15383]
3. Transcription and translation will both initiate but the mRNA will be one nucleotide longer and due to frameshift the protein will have an altered amino acid sequence [Option ID = 15384]
4. Transcription and translation will both initiate but the mRNA will be one nucleotide longer while the protein will remain unchanged [Option ID = 15385]

Correct Answer :-

- Transcription and translation will both initiate but the mRNA will be one nucleotide longer while the protein will remain unchanged [Option ID = 15385]

48) A gene is to be amplified for ultimately cloning it into the BamHI and EcoRV sites of a plasmid vector. However, BamHI and EcoRV sites cannot be inserted at the ends of the adaptor primers being used for amplification as the gene has both these restriction sites. No sites for any of the enzymes listed below (other than BamHI and EcoRV) were present in the gene. Which enzyme sites would you insert in the adaptor primers to carry out a successful cloning? Arrowheads indicate site of cleavage.

BamHI: 5' G↓GATCC-3'
 EcoRV: 5' GAT↓ATC-3'
 HindIII: 5' A↓AGCTT-3'
 PvuII: 5' CAG↓CTG-3'
 BglII: 5' A↓GATCT-3'
 Sall: 5' G↓TCGAC-3'
 XbaI: 5' T↓CTAGA-3'

[Question ID = 3848]

1. BglII and HindIII [Option ID = 15386]
2. BglII and PvuII [Option ID = 15387]
3. Sall and XbaI [Option ID = 15388]
4. HindIII and PvuII [Option ID = 15389]

Correct Answer :-

- BglII and PvuII [Option ID = 15387]

49) The double-stranded bacterial DNA sequence depicting nucleotides 1-75 (shown below) encodes for Protein Z. The bold underlined G/C (top strand/bottom strand) base pair indicates the transcription start site, and transcription proceeds from left to right. What will be the effect of a mutation that results in the substitution of base pair G/C at the 24th position with base pair A/T?

```

1      11      21      31
5'- GTGTCGGTGT AATATTGTGA GATGCGATAT ACCCGGCAGT
3'- CACAGCCCA TTATAACT CTACGCTATA TGGGCCGTCA

41      51      61      71
CGTATGCACA TGCTTCGTAA ACGAGTCGAC ACTAA - 3'
GCATACGTGT ACGAAGCATT TGCTCAGCTG TGATT -5'
  
```

[Question ID = 3849]

1. Translation will not initiate [Option ID = 15390]
2. The protein will have an altered amino acid sequence due to base substitution [Option ID = 15391]
3. The mutation will be a silent mutation [Option ID = 15392]
4. Transcription will terminate prematurely [Option ID = 15393]

Correct Answer :-

- Translation will not initiate [Option ID = 15390]

50) The double-stranded bacterial DNA sequence depicting nucleotides 1-75 (shown below) encodes for Protein Z. The bold underlined G/C (top strand/bottom strand) base pair indicates the transcription start site, and transcription proceeds from left to right. What will be the effect of a mutation that results in the substitution of base pair T/A at the 45th position with base pair G/C?

```

1      11      21      31
5'- GTGTCGGTGT AATATTGTGA GATGCGATAT ACCCGGCAGT
3'- CACAGCCCA TTATAACT CTACGCTATA TGGGCCGTCA

41      51      61      71
CGTATGCACA TGCTTCGTAA ACGAGTCGAC ACTAA - 3'
GCATACGTGT ACGAAGCATT TGCTCAGCTG TGATT -5'
  
```

[Question ID = 3850]

1. The mutation will have no effect [Option ID = 15394]
2. Translation will not occur [Option ID = 15395]
3. Translation will occur but the protein will have an altered amino acid sequence due to base substitution [Option ID = 15396]
4. Translation will occur but a truncated protein will be formed [Option ID = 15397]

Correct Answer :-

- Translation will occur but a truncated protein will be formed [Option ID = 15397]