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Roll No:
Application No:
Name:
Exam Date: **05-Oct-2020**
Exam Time: **15:00-18:00**
Examination: **1. Course Code - Ph.D.**
2. Field of Study - Biotechnology (SBTH)

SECTION 1 - PART I

Question No.1 (Question Id - 9)
Which of the following compounds with the given molecular formula can show metamerism ?

(A) ○ **$C_4H_{10}O$ (Correct Answer)**
(B) ○ C_2H_6O
(C) ○ C_4H_8O
(D) ○ C_6H_6O

Question No.2 (Question Id - 23)
A mass weighing 5 kg is pulled up through a rough inclined plane having an angle of 45° to the horizontal surface. If the mass has been pulled by a weightless string at an acceleration 3 cm s^{-2} and the co-efficient of friction between the mass and the plane is given by 0.25 , find the pull on the string.

(A) ○ 43.30 N
(B) ○ 43.45 kg m s^{-1}
(C) ○ 43.30 kg m s^{-1}
(D) ○ **43.45 N (Correct Answer)**

Question No.3 (Question Id - 14)
How many words can be formulated by using all the letters of 'MONDAY' when the 1st letter is not 'M' ?

(A) ○ 120
(B) ○ 720
(C) ○ 240
(D) ○ **600 (Correct Answer)**

Question No.4 (Question Id - 20)
Find the binary equivalent of the decimal number 121 :
(A) ○ **0111 1001 (Correct Answer)**
(B) ○ 0110 1001
(C) ○ 0101 1001
(D) ○ 0111 1101

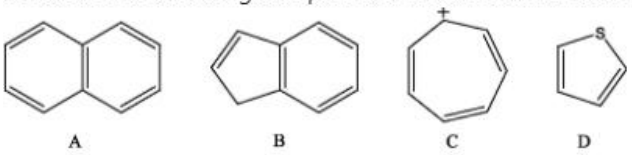
Question No.5 (Question Id - 6)
The number of electrons in carbanion is :
(A) ○ Four
(B) ○ Five
(C) ○ Six
(D) ○ **Eight (Correct Answer)**

Question No.6 (Question Id - 18)
Find the 7^{th} term of the GP series whose 1^{st} term is 2 and the common ratio 4 :
(A) ○ 16384

(B) ○ 8192
(C) ○ 131072
(D) ○ **32768 (Correct Answer)**

Question No.7 (Question Id - 10)

Which of the following compound is not an aromatic compound ?



(A) ○ Compound A
(B) ○ **Compound B (Correct Answer)**
(C) ○ Compound C
(D) ○ Compound D

Question No.8 (Question Id - 19)

Find the determinant value of the matrix $\begin{matrix} 3 & 2 & 6 \\ 8 & 4 & 2 \\ 6 & 4 & 12 \end{matrix}$:

(A) ○ 32
(B) ○ 66
(C) ○ **0 (Correct Answer)**
(D) ○ 60

Question No.9 (Question Id - 17)

Find the equation of the circle which has the center on the point of intersection of the two lines 2x + y - 1 = 0 and 2y - x + 3 = 0 and a radius of 7 units.

(A) ○ $(x + 1)^2 + (y - 1)^2 = 7^2$
(B) ○ $(x + 1)^2 + (y + 1)^2 = 7^2$
(C) ○ **$(x - 1)^2 + (y + 1)^2 = 7^2$ (Correct Answer)**
(D) ○ $(x - 1)^2 + (y - 1)^2 = 7^2$

Question No.10 (Question Id - 12)

The straight line passing through the point (5, 2) makes an angle π/4 with the straight line 2x + 3y = 1 . The equation of the first straight line is given by :

(A) ○ 5x + y + 5 = 0
(B) ○ 5y + x - 5 = 0
(C) ○ **5y - x - 5 = 0 (Correct Answer)**
(D) ○ 5x - y - 5 = 0

Question No.11 (Question Id - 13)

An equation x^2 - 12x + k = 0, has two roots where one root is double the other. The value of k in the equation is :

(A) ○ **32 (Correct Answer)**
(B) ○ 16
(C) ○ 9
(D) ○ 64

Question No.12 (Question Id - 28)

What should be the velocity of the satellite that has to be launched in the horizontal direction at a height of 600 km so that it can revolve around the earth ?

g at the height of 600 km = 7 ms^{-2} and the radius of the earth is 6400 km.

(A) ○ 700 ms^{-1}
(B) ○ **7000 ms^{-1} (Correct Answer)**
(C) ○ 4900 ms^{-1}
(D) ○ 490000 ms^{-1}

Question No.13 (Question Id - 15)

Find the value of the integral $\int_1^2 \frac{1}{x}(2x^2-3x)dx$:

(A) ○ **0 (Correct Answer)**
(B) ○ 6
(C) ○ 1
(D) ○ 9

Question No.14 (Question Id - 2)

Which of the following carbonate is more soluble in water at 298 K ?

(A) ○ Lithium carbonate
(B) ○ Sodium carbonate
(C) ○ Potassium carbonate
(D) ○ **Rubidium carbonate (Correct Answer)**

Question No.15 (Question Id - 7)

Match the following :

List - I	List - II
A. Free radical	I. sp^2 hybridised
B. Alkane	II. sp^3 hybridised
C. Alkyne	III. sp hybridised

Choose the **correct** answer from the options given below :

(A) ○ **A - I, B - II, C- III (Correct Answer)**
(B) ○ A - II, B - I, C- III
(C) ○ A - III, B - II, C- I
(D) ○ A - II, B - III, C- I

Question No.16 (Question Id - 3)

Which of the following sulphate is least soluble in water ?

(A) ○ Beryllium sulphate
(B) ○ Magnesium sulphate
(C) ○ Calcium sulphate
(D) ○ **Barium sulphate (Correct Answer)**

Question No.17 (Question Id - 11)

If 3θ = 7π, find the value of sinθ - cos (2θ) :

(A) ○ $\frac{\sqrt{3}+1}{2}$ **(Correct Answer)**
(B) ○ $\frac{-\sqrt{3}+1}{2}$
(C) ○ $\frac{-\sqrt{3}-1}{2}$
(D) ○ $\frac{\sqrt{3}-1}{2}$

Question No.18 (Question Id - 8)

The order of carbocation stability is :

(A) ◯ **Me < primary < secondary < tertiary (Correct Answer)**

(B) ◯ Me > primary > secondary > tertiary

(C) ◯ Me ≈ primary ≈ secondary < tertiary

(D) ◯ Me > primary ≈ secondary > tertiary

Question No.19 (Question Id - 29)

A condenser was designed using two glass plates having the dimension of 6 cm x 15 cm. If the relative permittivity of the glass is 7.2 and they were placed 3 mm apart calculate the capacitance of the designed capacitor. [$€_0 = 8.85 \times 10^{-12}$ Fm^{-1}]

(A) ◯ 191.16×10^{-10} F

(B) ◯ 1.9116 pF

(C) ◯ **191.16 pF (Correct Answer)**

(D) ◯ 19.116 pF

Question No.20 (Question Id - 1)

Electronegativity of an element is related to :

(A) ◯ Effective nuclear charge

(B) ◯ Size of the atom

(C) ◯ Oxidation state

(D) ◯ **Non-metallic character (Correct Answer)**

Question No.21 (Question Id - 26)

A train that was approaching towards the station at a velocity of 90 km/hr sounds a whistle with a frequency 900 Hz. What will be the apparent frequency of the whistle to a person standing at the station (Velocity of sound 332 ms^{-1}) ?

(A) ◯ **973.29 Hz (Correct Answer)**

(B) ◯ 885.25 Hz

(C) ◯ 543.6 Hz

(D) ◯ 1025.23 Hz

Question No.22 (Question Id - 5)

Which of the following ligand can form a chelate ?

(A) ◯ Chloride

(B) ◯ Cyanide

(C) ◯ Amine

(D) ◯ **Oxalate (Correct Answer)**

Question No.23 (Question Id - 27)

A metal ball weighing 1 kg is taken out of a furnace and immersed in a copper vessel of mass 200 g containing water of mass 500 g at 40° C. If the temperature of the water rises to 50° C calculate the temperature of the furnace.

[Sp heat capacity of the metal : 168 J kg^{-1} K^{-1}, Sp heat capacity of copper : 420 J kg^{-1} K^{-1}, Sp heat capacity of the water : 4200 J kg^{-1} K^{-1}]

(A) ◯ 280°C

(B) ◯ 360°C

(C) ◯ 140°C

(D) ◯ **180°C (Correct Answer)**

Question No.24 (Question Id - 22)

A wire of length 2.5 m and a diameter of 0.5 mm is stretched by 1.4 mm when a load of 2.5 kg was hanged on it. Calculate the Young's modulus of the wire (g = 9.8 m s^{-2}) :

(A) ○ 2.23×10^{11} N

(B) ○ 2.23×10^{5} N m^{-2}

(C) ○ 2.23×10^{5} N

(D) ○ **2.23×10^{11} N m^{-2} (Correct Answer)**

Question No.25 (Question Id - 24)

A child plays with a bubble maker and blows a bubble of a diameter of 4 cm. Find the total work done if the bubble has a surface tension 0.02 N m^{-1}.

(A) ○ **2.0096×10^{-4} J (Correct Answer)**

(B) ○ 2.0096×10^{-4} N m^2

(C) ○ 1.0048×10^{-4} N m^2

(D) ○ 1.0048×10^{-4} J

Question No.26 (Question Id - 16)

The value of $\log_3 \log_2 \log_2 256$:

(A) ○ $\log_3 2$

(B) ○ $\log_2 3$

(C) ○ $2 \log_3 2$

(D) ○ **$\log_3 3$ (Correct Answer)**

Question No.27 (Question Id - 25)

A Carnot engine works as a refrigerator between the temperature 270 K and 330 K. If it receives 400 cal heat from the Freezing chamber calculate the amount of heat the engine has released to the higher temperature reservoir.

(A) ○ 488.9 kcal

(B) ○ 468.9 cal

(C) ○ **488.9 cal (Correct Answer)**

(D) ○ 468.9 kcal

Question No.28 (Question Id - 4)

Melting point (mp) of NaCl is 801 °C and LiCl is 605 °C. This could be explained based on the following reason :

(A) ○ **Reason 1 : due to partial covalent character of LiCl, the mp is lower. (Correct Answer)**

(B) ○ Reason 2 : due to partial ionic character of LiCl, the mp is lower.

(C) ○ Reason 3 : Due to lower atomic number of LiCl, the mp is lower.

(D) ○ Reason 4 : Due to smaller size of Li, the mp is lower.

Question No.29 (Question Id - 21)

The angle between the two vectors $\vec{a}=2\hat{i}+6\hat{j}$ and $\vec{b}=4\hat{i}+8\hat{j}$ is given by :

(A) ○ $\tan^{-1}$ (5/7)

(B) ○ **$\tan^{-1}$ (1/7) (Correct Answer)**

(C) ○ $\cos^{-1}\left(3/5\sqrt{2}\right)$

(D) ○ $\cos^{-1}\left(1/5\sqrt{2}\right)$

Question No.30 (Question Id - 30)

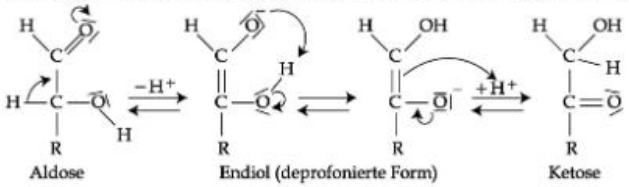
The equation of an alternating e.m.f is 25 sin 50 πt. The mean value and the rms value are given by :

(A) ◯ E mean = 31.84 V E rms = 17.68 V
(B) ◯ E mean = 15.92 V E rms = 35.36 V
(C) ◯ E mean = 31.84 V E rms = 35.36 V
(D) ◯ **E mean = 15.92 V E rms = 17.68 V (Correct Answer)**

SECTION 2 - PART II

Question No.1 (Question Id - 146)

The following reaction is an example of which type of metabolic reaction.



(A) ◯ Group Transfer Reaction
(B) ◯ **Isomerization (Correct Answer)**
(C) ◯ Rearrangement
(D) ◯ Elimination

Question No.2 (Question Id - 53)

The dissociation constant for the binding of ligand A to a protein P was observed to be 0.001 M at 37°C. The free energy change upon binding of A to P would be nearly :

(A) ◯ - 1.0 kcal/mol
(B) ◯ - 1.8 kcal/mol
(C) ◯ + 2.4 kcal/mol
(D) ◯ **- 4.2 kcal/mol (Correct Answer)**

Question No.3 (Question Id - 87)

Which of these immunoglobulins can form a dimer ?

(A) ◯ IgG
(B) ◯ **IgA (Correct Answer)**
(C) ◯ IgM
(D) ◯ IgD

Question No.4 (Question Id - 134)

Del factor in sterilization process is a measure of :

(A) ◯ **Fractional reduction in viable organism count (Correct Answer)**
(B) ◯ Fractional increase in viable organism count
(C) ◯ Fractional activation energy of the process
(D) ◯ Fractional reduction in nutrient degradation constant

Question No.5 (Question Id - 128)

The database used in tblastX consists of :

(A) ◯ Protein
(B) ◯ **DNA (Correct Answer)**
(C) ◯ RNA
(D) ◯ None of the above

Question No.6 (Question Id - 93)

Which one of the following lipids can be expected to be preferentially associated with lipid rafts ?

(A) ◯ Phosphatidylethanolamine
(B) ◯ Phosphatidic acid
(C) ◯ Lysophosphatidic acid

(D) ○ **Glycolipids (Correct Answer)**

Question No.7 (Question Id - 79)

How does genetically wall-less bacteria mycoplasma stain with Gram stain ?

(A) ○ Gram positive

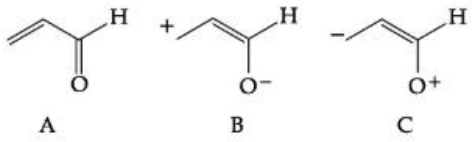
(B) ○ **Gram negative (Correct Answer)**

(C) ○ Pseudo Gram Positive

(D) ○ No color

Question No.8 (Question Id - 40)

In the following resonance structures, which statement is correct with respect to stability ?



A B C

(A) ○ **Form A is more stable than the others (Correct Answer)**

(B) ○ Form B is more stable than the others

(C) ○ Form C is more stable than the others

(D) ○ All forms are equally stable. Because these are resonance forms.

Question No.9 (Question Id - 100)

Given below are two statements :

Statement I :

High cholesterol in the blood contributes to the formation of atherosclerosis plaques in the blood vessels

Statement II :

Individuals with defective LDL receptor gene have increased risk of a heart attack

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

(A) ○ **Both Statement I and Statement II are correct (Correct Answer)**

(B) ○ Both **Statement I** and **Statement II** are incorrect

(C) ○ **Statement I** is correct but **Statement II** is incorrect

(D) ○ **Statement I** is incorrect but **Statement II** is correct

Question No.10 (Question Id - 137)

In the cross-flow filtration technique, the flow of liquid across the membrane is not affected by :

(A) ○ Temperature

(B) ○ Viscosity

(C) ○ Pressure

(D) ○ **Gravitational constant (Correct Answer)**

Question No.11 (Question Id - 125)

Given below are two statements, one is labelled as **Assertion A** and the other is labelled as **Reason R**

Assertion A :

HMM is more sensitive than PSI-BLAST

Reason R :

PSI-BLAST specify a full probabilistic model which makes it slow

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

(A) ◯ Both **A** and **R** are true and **R** is the correct explanation of **A**
(B) ◯ Both **A** and **R** are true but **R** is not the correct explanation of **A**
(C) ◯ **A is true but R is false (Correct Answer)**
(D) ◯ **A** is false but **R** is true

Question No.12 (Question Id - 145)

In the arginine biosynthesis pathway shown below, mutant will not be able to catalyse that specific step depicted with the respective arrow. Which mutant will grow in the presence of Ornithine ?

Precursor → Ornithine → Citrulline → Arginine
Mutant 1 Mutant 2 Mutant 3

(A) ◯ **Mutant 1 (Correct Answer)**
(B) ◯ Mutant 2
(C) ◯ Mutant 3
(D) ◯ Mutant 2 and 3

Question No.13 (Question Id - 148)
The energy required to destabilize existing chemical bonds is called _____ energy.

(A) ◯ **activation (Correct Answer)**
(B) ◯ destabilization
(C) ◯ kinetic
(D) ◯ free

Question No.14 (Question Id - 130)
The broad subject area that captures and visualizes the sequence variation that occurs in homologous DNA, RNA, or protein molecules :

(A) ◯ Maximum parsimony
(B) ◯ Sequence Alignment
(C) ◯ Structural Bioinformatics
(D) ◯ **Molecular Phylogeny (Correct Answer)**

Question No.15 (Question Id - 77)
Thermoplasma can grow at high temperature over 85°C because their membranes are stable due to presence of :

(A) ◯ Bilayer of C_{20} diethers
(B) ◯ **C_{40} tetraether monolayer (Correct Answer)**
(C) ◯ C_{20} diester hydrocarbon chains
(D) ◯ C_{40} tetraester hydrocarbon

Question No.16 (Question Id - 81)
Which cytokine plays a role in both the innate and adaptive immunity ?
(A) ◯ TNF
(B) ◯ IL-2
(C) ◯ IL-12
(D) ◯ **IFN-γ (Correct Answer)**

Question No.17 (Question Id - 89)
Which of the following constitutes a part of both the innate and adaptive immunity ?
(A) ◯ T cell
(B) ◯ B cell
(C) ◯ NK cells
◯

(D) **Macrophages (Correct Answer)**

Question No.18 (Question Id - 140)

For the production of recombinant protein at industrial scale using microbial systems, which of the following strategies is not well suited to achieve higher expression yields ?

(A) ○ Use of strong and inducible promoters
(B) ○ **Use of strong terminator (Correct Answer)**
(C) ○ Use of codon optimization strategy
(D) ○ Use of high cell density cultivation strategy

Question No.19 (Question Id - 86)

The immunoglobulin fold consists of a pair of :

(A) ○ α-helices
(B) ○ **β-sheets (Correct Answer)**
(C) ○ disordered loops
(D) ○ α-helix and β-sheet

Question No.20 (Question Id - 37)

Which of the following is a Lewis acid ?

(A) ○ **BF_3 (Correct Answer)**
(B) ○ HCl
(C) ○ CH_3CO_2H
(D) ○ $C_6H_5CO_2H$

Question No.21 (Question Id - 104)

Cellular nucleases break an ester bonds present in a :

(A) ○ Phosphomonodiester bond
(B) ○ **Phosphodiester bond (Correct Answer)**
(C) ○ Phosphotriester bond
(D) ○ Nucleoside unit

Question No.22 (Question Id - 121)

Orthologous sequences are defined as :

(A) ○ Homologous sequences in the same species which have similar and often redundant functions
(B) ○ Homologous sequences that share little amino acid identity but share great structural similarity
(C) ○ Homologous sequences in the same species that arose through gene duplication
(D) ○ **Homologous sequences in different species that share an ancestral gene (Correct Answer)**

Question No.23 (Question Id - 91)

Which one of the following properties of a lipid molecule has a major influence on the curvature of the membrane ?

(A) ○ Cross section area of the head group of the lipid molecule
(B) ○ **Ratio of the cross section area of the head group to acyl chains (Correct Answer)**
(C) ○ Length of the acyl chains
(D) ○ Saturation of the acyl chains

Question No.24 (Question Id - 82)

The events in the generation of T cell dependent antibody responses are :

A. T : B cell interaction

B. Antigen taken up by dendritic cells and presented to T_H cells

C. B cell differentiation: IgG secretion and Isotype switching

D. Activated T_H cells migrate to the follicle following a chemical gradient

E. Activated B cells migrate back to the follicle. Germinal centers are formed within the follicles and are the sites of affinity maturation and memory B cell generation.

Choose the **correct** order of sequence of the events from the options given below :

(A) ◯ **BDACE (Correct Answer)**
(B) ◯ BADCE
(C) ◯ BDCAE
(D) ◯ BCADE

Question No.25 (Question Id - 44)
Which of the following is a high-through put approach used widely in studying biology ?

(A) ◯ **Mass Spectrometry (Correct Answer)**
(B) ◯ Gene knockout
(C) ◯ Side-directed mutagenesis
(D) ◯ Gel filtration

Question No.26 (Question Id - 31)
For an element which of the following property is not a measurable quantity ?

(A) ◯ **Electronegativity (Correct Answer)**
(B) ◯ Electron gain enthalpy
(C) ◯ Ionization potential
(D) ◯ Atomic radius

Question No.27 (Question Id - 110)
DNA rolling circular amplification machinery is mainly utilized for replication of :

(A) ◯ Fungal genome
(B) ◯ Animal genome
(C) ◯ Plant genome
(D) ◯ **Phage genome (Correct Answer)**

Question No.28 (Question Id - 66)
Which of the following molecule is known as the glucose sensor ?
(A) ◯ Hexokinase
(B) ◯ Glucokinase
(C) ◯ **Phosphorylase (Correct Answer)**
(D) ◯ Phosphorylase kinase

Question No.29 (Question Id - 69)
The most abundant organic compound in the biosphere is :
(A) ◯ **Cellulose (Correct Answer)**
(B) ◯ Keratin
(C) ◯ Glycogen
(D) ◯ Glucose

Question No.30 (Question Id - 32)
Which of the following hydroxide is amphoteric in nature ?
(A) ◯ **Beryllium hydroxide (Correct Answer)**
(B) ◯ Magnesium hydroxide
(C) ◯ Calcium hydroxide
(D) ◯ Barium hydroxide

Question No.31 (Question Id - 132)
Determine the specific growth rate (μ) of the microorganism having a doubling time of 45 minutes :

(A) ○ $0.75\ h^{-1}$
(B) ○ $0.52\ h^{-1}$
(C) ○ **$0.92\ h^{-1}$ (Correct Answer)**
(D) ○ $1.54\ h^{-1}$

Question No.32 (Question Id - 46)
A 10 mg/ml solution of a protein in buffer at pH 7 was diluted 100 fold with the same buffer and its absorbance measured using UV spectrophotometer to cross-check for dilution. If the molecular weight of the protein is 10kDa, the concentration of the solution in mM units would be :

(A) ○ **0.01 mM (Correct Answer)**
(B) ○ 0.1 mM
(C) ○ 1.0 mM
(D) ○ 10.0 mM

Question No.33 (Question Id - 111)
Bacterial conjugation facilitates transfer of :
(A) ○ Parental single-stranded DNA
(B) ○ **Newly synthesized single-stranded DNA (Correct Answer)**
(C) ○ Double stranded DNA
(D) ○ DNA-RNA hybrid

Question No.34 (Question Id - 131)
The acetone-butanol fermentation process is catalyzed by which of the following microorganism ?

(A) ○ ***Clostridium acetobutylicum* (Correct Answer)**
(B) ○ *Clostridium botulinum*
(C) ○ *Clostridium difficile*
(D) ○ *Clostridium tetani*

Question No.35 (Question Id - 133)
In Monod Batch kinetic equation, the substrate utilization constant (Ks) is numerically equal to substrate concentration, when :

(where μ is the specific growth rate and μ_{max} is maximum specific growth rate)

(A) ○ **μ is half of μ_{max} (Correct Answer)**
(B) ○ μ is equal to μ_{max}
(C) ○ μ is twice of μ_{max}
(D) ○ μ is always independent of μ_{max}

Question No.36 (Question Id - 88)
A scientist raised antibodies “X” and “Y” against the same antigen. He observed that antibody “X” detected the antigen by immunoblotting (western blot) alone and antibody “Y” detected the antigen by immunoprecipitation alone. The reason for such a differential reactivity of the two antibodies is :

(A) ○ **Antibody “X” recognizes linear epitopes only**
Antibody “Y” recognizes conformational epitopes (Correct Answer)
(B) ○ Antibody “X” recognizes conformational epitopes only
Antibody “Y” recognizes linear epitopes
(C) ○ During western blotting, conformational epitopes of the antigen get exposed
(D) ○ Linear epitopes of an antigen are cleaved during immunoprecipitation

Question No.37 (Question Id - 51)

After over-expression of a disulphide bonded mammalian protein in *E. coli*, it was observed that the protein formed inclusion body aggregates. The aggregates could be effectively converted to native soluble form of the protein by solubilization with urea and dithiothreitol followed by refolding with a buffer containing :

(A) ◯ reduced form of glutathione
(B) ◯ oxidized form of glutathione
(C) ◯ mercaptoethanol
(D) ◯ **both reduced and oxidized forms of glutathione (Correct Answer)**

Question No.38 (Question Id - 55)

A mutation in sialyl transferase does not affect its *in vitro* binding to the substrate and product formation. How do you think the mutation might affect the enzyme ?

(A) ◯ Lowering the K_m
(B) ◯ Increasing the V_{max}
(C) ◯ Limiting substrate availability due to non-functional Golgi transporter
(D) ◯ **Affecting localization of sialyltransferase to Golgi (Correct Answer)**

Question No.39 (Question Id - 139)

The complete stoppage of ethanol production during fermentation after sparging oxygen in culture broth is known as :

(A) ◯ **Pasteur effect (Correct Answer)**
(B) ◯ Crabtree effect
(C) ◯ Concerted-control effect
(D) ◯ Plackett-Burman effect

Question No.40 (Question Id - 142)

Which of the following reagents are not used in a recovery process of the intracellular microbial product from cellular biomass ?

(A) ◯ Sodium dodecyl sulfate
(B) ◯ Sodium Hydroxide
(C) ◯ **Sodium carbonate (Correct Answer)**
(D) ◯ Lysozyme

Question No.41 (Question Id - 45)

A highly sensitive technique for analyzing the dissociation constant of protein-protein interactions is :

(A) ◯ Immunoprecipitation
(B) ◯ **Surface Plasmon Resonance (Correct Answer)**
(C) ◯ Yeast Two Hybrid
(D) ◯ ELISA

Question No.42 (Question Id - 43)

To remove the non-specific background or increase stringency in a PCR reaction, we could do the following :

(A) ◯ Increase denaturation temperature
(B) ◯ **Increase annealing temperature (Correct Answer)**
(C) ◯ Increase extension temperature
(D) ◯ Increase extension time

Question No.43 (Question Id - 97)

A part of a protein has the following amino acid sequence :
HTDPP**KKK**SYFVMNDSST**RR**VGCL
Based on the presence of bold and underlined amino-acids, the protein is likely to localize to which of the following organelles ?

(A) ○ Endoplasmic reticulum
(B) ○ Lysosomes
(C) ○ Peroxisomes
(D) ○ **Nucleus (Correct Answer)**

Question No.44 (Question Id - 123)
As the E-value of a BLAST search becomes smaller :
(A) ○ The value K also becomes smaller
(B) ○ **The score tends to be larger (Correct Answer)**
(C) ○ The probability P tends to be larger
(D) ○ The extreme value distribution becomes less skewed

Question No.45 (Question Id - 80)
A researcher wants to express a recombinant protein in the outer membrane of bacteria. Which of the following promoter will be most suitable ?

(A) ○ O-antigen
(B) ○ Lipid A
(C) ○ **Porin (Correct Answer)**
(D) ○ Lipoprotein

Question No.46 (Question Id - 47)
The value of the dihedral angle Ψ (psi) in a peptide is given by rotation around :

(A) ○ N - C^{α} bond
(B) ○ **C^{α} - C' bond (Correct Answer)**
(C) ○ C'- N bond
(D) ○ C = O bond

Question No.47 (Question Id - 116)
A transcription process is mainly controlled by the interaction of :
(A) ○ Cis-acting factors
(B) ○ Tran-acting factors
(C) ○ Cytoplasmic proteins and small molecules
(D) ○ **Both Cis-acting and trans-acting factors (Correct Answer)**

Question No.48 (Question Id - 49)
Collagen is rich in proline amino acid residues and adopts a Polyproline - II type of secondary structure. Such a structure can form only in :

(A) ○ aqueous environment with cis-peptide bonds
(B) ○ non-aqueous environment with trans-peptide bonds
(C) ○ **aqueous environment with trans-peptide bonds (Correct Answer)**
(D) ○ non-aqueous environment with cis-peptide bonds

Question No.49 (Question Id - 35)
Which of the following species is highly nucleophilic ?
(A) ○ OH^-
(B) ○ OCH_3^-
(C) ○ **CH_3^- (Correct Answer)**
(D) ○ NH_2^-

Question No.50 (Question Id - 75)
Nanobacteria range from _____ in size.
(A) ○ 0.5 to 1 μm

(B) ○ 1 to 2 µm
(C) ○ **0.2 to < 0.05 µm (Correct Answer)**
(D) ○ 0.3 to 0.5 µm

Question No.51 (Question Id - 101)
The linking number of DNA can be changed ± 1 by

(A) ○ Breaking DNA strand
(B) ○ Rejoining the broken ends
(C) ○ **Breaking the bonds, rotation by 360^{o} and rejoining the broken ends (Correct Answer)**
(D) ○ Alteration of the molecular weight of DNA

Question No.52 (Question Id - 84)
Super antigens are bacterial or viral proteins that bind simultaneously to the :
(A) ○ **V_{β} domain of TCR and α-chain of MHC II (Correct Answer)**
(B) ○ V_{β} domain of TCR and β-chain of MHC II
(C) ○ V_{α} domain of TCR and α-chain of MHC II
(D) ○ V_{α} domain of TCR and β-chain of MHC II

Question No.53 (Question Id - 114)
The SOS system in response to DNA damage is triggered by :
(A) ○ RecBCD complex
(B) ○ RecE
(C) ○ **RecA protein (Correct Answer)**
(D) ○ RecA and RecE protein complex

Question No.54 (Question Id - 144)
In *Corynebacterium glutamicum*, the deficiency of α-ketoglutarate dehydrogenase leads to the accumulation of which of the following compound under biotin limiting conditions ?

(A) ○ Aspartate
(B) ○ **Glutamate (Correct Answer)**
(C) ○ Citrate
(D) ○ Succinate

Question No.55 (Question Id - 96)
Which one of the following will be expected to happen upon opening of the Cl^- channels ?

(A) ○ No effect on the excitability of the membrane
(B) ○ Membrane will be easier to depolarize
(C) ○ **Membrane will be harder to depolarize (Correct Answer)**
(D) ○ Equal amount of K^+ will flow in reverse direction to Cl^-

Question No.56 (Question Id - 56)
Suppose the forward rate constant for the conversion of substrate to product is 10^{-4}/sec in absence of enzyme and the reverse rate constant for the conversion of product to substrate is 10^{-6}/sec. What will be the equilibrium concentration of the product in relation to the substrate ?

(A) ○ Product is 100 times less than substrate
(B) ○ **Product is 100 times more than substrate (Correct Answer)**
(C) ○ Product is $1/100^{th}$ times more than substrate
(D) ○ Product is $1/100^{th}$ times less than substrate

Question No.57 (Question Id - 92)
The below question has been dropped and full marks are awarded.

Plasma membrane lipids are extracted from 10^6 cells of diameter 1 μm. If these extracted lipids are spread on water, what will be the expected area that will be covered assuming the cells are spherical in shape ?

(A) ○ 3.14×10^{-3} mm^2
(B) ○ 3.14×10^{-6} mm^2
(C) ○ 6.28×10^{-3} mm^2
(D) ○ 6.28×10^{-6} mm^2

Question No.58 (Question Id - 71)
Cataract formation during galactosemia is due to the formation of _____ in the eye.

(A) ○ Galactose
(B) ○ **Galacticol (Correct Answer)**
(C) ○ Glucose
(D) ○ Fructose

Question No.59 (Question Id - 57)

In an enzymatic reaction following Michaelis-Menten equation, under what conditions is K_m equal to the dissociation constant.

$$E+S \underset{K_{-1}}{\overset{K_1}{\rightleftharpoons}} ES \xrightarrow{K_2} E+P$$

(A) ○ **$K_2 << K_{-1}$ (Correct Answer)**
(B) ○ $K_2 = K_{-1}$
(C) ○ $K_2 >> K_{-1}$
(D) ○ $K_2 > K_1$

Question No.60 (Question Id - 147)
ATP is a high energy molecule due to its :
(A) ○ **Phosphoanhydride bond (Correct Answer)**
(B) ○ Phosphoester bond
(C) ○ Phosphodiester bond
(D) ○ Ribose sugar

Question No.61 (Question Id - 98)

Match **List I** with **List II** :

List - I	List - II
A. Clathrin	I. GTPase
B. COPI	II. Sar I
C. COPII	III. Golgi to ER
D. ARF	IV. Early endosome to golgi

Choose the **correct** answer from the options given below :

(A) ○ A - II, B - III, C - I, D - IV
(B) ○ A - III, B - II, C - IV, D - I
(C) ○ **A - IV, B - III, C - II, D - I (Correct Answer)**
(D) ○ A - IV, B - I, C - II, D - III

Question No.62 (Question Id - 34)
Which of the following is not an electrolyte ?
(A) ○ **Urea (Correct Answer)**

(B) ○ Acetic acid
(C) ○ Sodium bromide
(D) ○ Ammonia

Question No.63 (Question Id - 50)
A number of proteins are known to be involved in age - related neurodegenerative diseases such as Alzheimer's and Parkinson's. The amyloid plaques and fibrillatory tangles observed after the autopsy of patients having these diseases were observed to be rich in :

(A) ○ α-helical structure
(B) ○ random coil structure
(C) ○ **cross-beta structure (Correct Answer)**
(D) ○ coiled-coil structure

Question No.64 (Question Id - 109)
Eukaryotic licencing factor controls :
(A) ○ DNA recombination in the cells
(B) ○ **DNA replication in the cells (Correct Answer)**
(C) ○ DNA repair inside the cells
(D) ○ DNA mutation inside the cells

Question No.65 (Question Id - 108)
Nucleosome of the chromatin are modified :
(A) ○ **Covalently (Correct Answer)**
(B) ○ Non-covalently
(C) ○ Physical alteration
(D) ○ Covalently and non-covalently

Question No.66 (Question Id - 48)
Several proteins can be denatured by 6M guanidine hydrochloride. Such a process of denaturation by guanidine hydrochloride is expected to affect :

(A) ○ electrostatic interactions only
(B) ○ both electrostatic and hydrophobic interactions
(C) ○ intra-peptide hydrogen bonding only
(D) ○ **electrostatic, hydrophobic, and hydrogen bonding interactions (Correct Answer)**

Question No.67 (Question Id - 41)
The mole fraction of water in 20% ethylene glycol ($C_2H_6O_2$) solution is :

(A) ○ 0.068
(B) ○ 0.68
(C) ○ **0.932 (Correct Answer)**
(D) ○ 0.32

Question No.68 (Question Id - 74)
Almost all activated carriers that act as co-enzymes are derived from :
(A) ○ Proteins
(B) ○ Minerals
(C) ○ **Vitamins (Correct Answer)**
(D) ○ Carbohydrates

Question No.69 (Question Id - 85)
The co-stimulatory molecular interaction that provides a crucial Signal 2 for activation of naive CD4 + and CD8+ T cells is :

(A) ○ TCR - MHC/Ag

(B) ○ CD40 - CD40L
(C) ○ **B7 - CD28 (Correct Answer)**
(D) ○ IgG - FcR

Question No.70 (Question Id - 67)
Triose Phosphate Isomerase has a critical role to play in glycolysis because it :

A. Salvages a 3-carbon fragment

B. Displays great catalytic process

C. Suppresses an undesired side reaction of the decomposition of the enediol intermediate into methyl glyoxal and orthophosphate

D. Catalyzes isomerization of 3-phosphoglycerate to 2-phosphoglycerate

Choose the **most appropriate** answer from the given options below :

(A) ○ A only
(B) ○ A and B only
(C) ○ C and D only
(D) ○ **A, B and C only (Correct Answer)**

Question No.71 (Question Id - 118)

The condensation of chromosome is regulated by :

(A) ○ **SMC proteins during mitosis (Correct Answer)**
(B) ○ MCM proteins during mitosis
(C) ○ SMC and MCM proteins
(D) ○ SMC and DNA ligases

Question No.72 (Question Id - 68)
Mammals cannot digest wood because they lack :
(A) ○ Proteinase K
(B) ○ Amylase
(C) ○ Glycosyl transferase
(D) ○ **Cellulases (Correct Answer)**

Question No.73 (Question Id - 126)
The Feng-Dolittle approach “Once a gap, always a gap” is implemented in :
(A) ○ Interactive Approach
(B) ○ PSI-BLAST
(C) ○ **Progressive Alignment Approach (Correct Answer)**
(D) ○ BLAST

Question No.74 (Question Id - 39)
Which of the following is an electrophile ?
(A) ○ **BF_3 (Correct Answer)**
(B) ○ NH_3
(C) ○ H_2O
(D) ○ CH_3OH

Question No.75 (Question Id - 127)
Which of the following database can be used to access text information about human diseases ?

(A) ○ EST
(B) ○ PDB

(C) ○ **OMIM (Correct Answer)**
(D) ○ HTGS

Question No.76 (Question Id - 103)
The ChiP-seq allows delineating DNA - protein interaction sites for a given protein :
(A) ○ Across the specific chromosomes of a cell
(B) ○ Only certain fragment of the DNA
(C) ○ **Across the entire genome of a cell (Correct Answer)**
(D) ○ Only for set of the genes

Question No.77 (Question Id - 113)
DNA base excision repair system is initiated by :
(A) ○ DNA Phosphodiesterase
(B) ○ **DNA Glycosylases (Correct Answer)**
(C) ○ DNA Ligases
(D) ○ DNA Exonucleases

Question No.78 (Question Id - 120)
Phosphatases breaks the ester bond in :
(A) ○ **Phosphomonoester bond (Correct Answer)**
(B) ○ Phosphodiester bond
(C) ○ Phosphotriester bond
(D) ○ Both Phosphodiester and phosphotriester bond

Question No.79 (Question Id - 72)
The low affinity of glucokinase compared to hexokinase in the liver ensures :
(A) ○ **glucose will not be wasted when it is abundant (Correct Answer)**
(B) ○ glucose will not be wasted when it is scarce
(C) ○ glucose is available for glycolysis in liver
(D) ○ glycogen breakdown

Question No.80 (Question Id - 36)
The general geometry of a carbocation is :
(A) ○ Square planar
(B) ○ **Trigonal planar (Correct Answer)**
(C) ○ Tetrahedral
(D) ○ Linear

Question No.81 (Question Id - 136)
The plot of shear stress against shear rate for a fluid of Newtonian properties can be used for the measurement of :

(A) ○ **Viscosity of the fluid (Correct Answer)**
(B) ○ Molar concentration of the fluid
(C) ○ Normality of the fluid
(D) ○ Superficial velocity of the fluid

Question No.82 (Question Id - 78)
The navigation ability of birds, tuna, dolphins and many aquatic bacteria is due to the presence of :

(A) ○ Organic inclusion bodies
(B) ○ Cyanophysin granules
(C) ○ **Magnetosomes (Correct Answer)**
(D) ○ Gas vacuoles

Question No.83 (Question Id - 106)
Array comparative genomic hybridization method enable to study the detection of :

(A) ◯ Alteration of gene number between two DNA samples
(B) ◯ **Change of copy number between two DNA samples (Correct Answer)**
(C) ◯ Change of gene and copy number occurring in two DNA samples
(D) ◯ Change of base pair number occurring in two DNA samples

Question No.84 (Question Id - 102)
n-COVID 19 is a :
(A) ◯ Viroids
(B) ◯ **Positive-stranded RNA virus (Correct Answer)**
(C) ◯ DNA virus
(D) ◯ A protein body with heritable properties

Question No.85 (Question Id - 54)
At the mid-point of denaturation of calf thymus DNA, which was observed to be 80°C, the free energy change associated with helix to coil transition would be :

(A) ◯ **0 kcal/mol (Correct Answer)**
(B) ◯ - 80 kcal/mol
(C) ◯ 100 kcal/mol
(D) ◯ 353 kcal/mol

Question No.86 (Question Id - 62)
Which of the following inhibitors, do you think, are the most effective enzyme inhibitors that directly inhibit the enzyme catalysis ?

(A) ◯ Suicide Inhibitors
(B) ◯ Group Specific Inhibitors
(C) ◯ Affinity Label Inhibitors
(D) ◯ **Transition State Analogs (Correct Answer)**

Question No.87 (Question Id - 119)
Lampbrush chromosome is a :
(A) ◯ Meiotic trivalent
(B) ◯ **Meiotic half-bivalents (Correct Answer)**
(C) ◯ Meiotic hexavalent
(D) ◯ Meiotic tetravalent

Question No.88 (Question Id - 76)
Sterol-like compounds present in most bacterial membranes are :

(A) ◯ Cholesterol
(B) ◯ **Hopanoids (Correct Answer)**
(C) ◯ Glycerolipids
(D) ◯ Squalene

Question No.89 (Question Id - 135)
In a microbial fermentation process, an increase in agitation rate (rpm) :
(A) ◯ **Increases the surface area of the air bubble (Correct Answer)**
(B) ◯ Decreases the surface area of the air bubble
(C) ◯ Increases the surface area of microbial cells
(D) ◯ Decreases the surface area of microbial cells

Question No.90 (Question Id - 64)
Calculate K_{eq} and ΔG_0' for the reaction
Glucose 1 phosphate ↔ *Glucose 6 phosphate*
After reactant and products were mixed and allowed to reach equilibrium at 25°C, the concentration of each was measured : Glucose 1 phosphate = 0.01 M
Glucose 6 Phosphate = 0.19 M

(A) ○ **K_{eq} = 19 and $\Delta G_0'$ = - 7.3 kJ/mol (Correct Answer)**
(B) ○ K_{eq} = 19 and $\Delta G_0'$ = + 7.3 kJ/mol
(C) ○ K_{eq} = 19 and $\Delta G_0'$ = 1.5 kcal/mol
(D) ○ K_{eq} = 19 and $\Delta G_0'$ = - 1.5 kcal/mol

Question No.91 (Question Id - 42)
The pH of 1.0 x 10^{-8} M solution of HCl is :

(A) ○ **6.98 (Correct Answer)**
(B) ○ 7.02
(C) ○ 3.49
(D) ○ 1.25

Question No.92 (Question Id - 150)
Enzymes :
(A) ○ make endergonic reactions proceed spontaneously
(B) ○ **lower the activation energy of a reaction (Correct Answer)**
(C) ○ are not very specific in their choice of substrates
(D) ○ are needed in large quantities because they are used up during catalysis

Question No.93 (Question Id - 99)
Which one of the following post-translational modifications cannot be done by the endoplasmic reticulum ?

(A) ○ Isomerization of prolines
(B) ○ Formation of disulfide bonds
(C) ○ **Addition of Galactose to glycoproteins (Correct Answer)**
(D) ○ Assembly of protein complexes

Question No.94 (Question Id - 70)
A specialized lipid molecule located in the ER membrane involved in protein glycosylation is :

(A) ○ **Dolichol Phosphate (Correct Answer)**
(B) ○ Cholesterol
(C) ○ Carnitine
(D) ○ Palmitic acid

Question No.95 (Question Id - 117)
RNA polymerase I controls synthesis of :
(A) ○ **rRNA (Correct Answer)**
(B) ○ 5S rRNA
(C) ○ tRNA
(D) ○ mRNA

Question No.96 (Question Id - 115)
The supercoiling of polynucleotide is an essential process of :
(A) ○ Translation
(B) ○ **Transcription (Correct Answer)**
(C) ○ Post-transcription
(D) ○ Post-translation

Question No.97 (Question Id - 65)
The reductive power required for Fatty Acid biosynthesis is provided by :
(A) ○ NADH
(B) ○ **NADPH (Correct Answer)**

(C) ○ $FADH_2$

(D) ○ ATP

Question No.98 (Question Id - 94)

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

Assertion A :

β-barrel proteins can be selective for the molecules they allow to be transported across the membrane.

Reason R :

β-barrel proteins are made of multiple antiparallel b-sheets that roll up to form a cylindrical structure.

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

(A) ○ Both **A** and **R** are correct and **R** is the correct explanation of **A**

(B) ○ **Both A and R are correct but R is NOT the correct explanation of A (Correct Answer)**

(C) ○ **A** is correct but **R** is not correct

(D) ○ **A** is not correct but **R** is correct

Question No.99 (Question Id - 149)

If ΔG is said to be positive, it means :

(A) ○ H is lower

(B) ○ reactants contain more energy than the product does

(C) ○ S in the system is higher

(D) ○ **products of the reaction contain more energy than the reactants (Correct Answer)**

Question No.100 (Question Id - 124)

Given below are two statements, one is labelled as **Assertion A** and the other is labelled as **Reason R**

Assertion A:

PSI-BLAST is more sensitive at detecting significantly related aligned residues than PAM or BLOSUM matrices

Reason R:

PSI-BLAST are position specific in nature

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

(A) ○ **Both A and R are true and R is the correct explanation of A (Correct Answer)**

(B) ○ Both **A** and **R** are true but **R** is not the correct explanation of **A**

(C) ○ **A** is true but **R** is fasle

(D) ○ **A** is false but **R** is true

Question No.101 (Question Id - 122)

In terms of O-notation (called “big - Oh notation”), Smith-Waterman pairwise algorithm requires _____ steps.

(A) ○ **$O(m^2n)$ (Correct Answer)**

(B) ○ $O(mn^2)$

(C) ○ $O(mn)$

(D) ○ $O(m^3n)$

Question No.102 (Question Id - 38)

The order of priority for IUPAC nomenclature is :

○

(A) **acid > anhydride > aldehyde > alkane (Correct Answer)**
(B) ○ alkane > anhydride > aldehyde > acid
(C) ○ alkane > anhydride > acid > aldehyde
(D) ○ anhydride > aldehyde > acid > alkane

Question No.103 (Question Id - 95)
Upon entering the cells, glucose molecules are rapidly converted into glucose-6-phosphate (G6P). Assume that glucose can enter the cells only by diffusion and extracellular concentration of glucose is not changed. Under these conditions, it can be expected that :

(A) ○ Once enough G6P is accumulated in the cell, glucose will not diffuse into the cells

(B) ○ Conversion of glucose to G6P will enhance the diffusion rate of glucose into the cells
(C) ○ **G6P will have no effect on diffusion rate of glucose into the cells (Correct Answer)**
(D) ○ G6P will have to diffuse out in order for glucose to diffuse into the cells

Question No.104 (Question Id - 73)
The number of which GLUT transporter in the plasma membrane increases rapidly in the presence of insulin ?

(A) ○ GLUT 1
(B) ○ GLUT 2
(C) ○ GLUT 3
(D) ○ **GLUT 4 (Correct Answer)**

Question No.105 (Question Id - 63)
The uncompetitive inhibitor (A) and non-competitive inhibitor (B) bind to an enzyme site different than substrate binding site. How the enzyme kinetics is altered in the presence of these inhibitors ?

A. K_m is unaltered and V_{max} is reduced by A

B. K_m is lowered and V_{max} is unchanged by B

C. Both K_m and V_{max} are lowered by A

D. K_m is unaltered and V_{max} is reduced by B

E. K_m is increased and V_{max} is reduced by both A and B inhibitors

Choose the **correct** answer from the options given below :

(A) ○ A only
(B) ○ **C and D only (Correct Answer)**
(C) ○ B and E only
(D) ○ E only

Question No.106 (Question Id - 107)
Organelle genome of mitochondria and chloroplast shows :
(A) ○ **Non-mendelian genetic inheritance patterns (Correct Answer)**
(B) ○ Mendelian genetic inheritance patterns
(C) ○ No genetic inheritance patterns
(D) ○ Both mendelian and non-mendelian pattern

Question No.107 (Question Id - 129)
Given below are two statements, one is labelled as **Assertion A** and the other is labelled as **Reason R**

Assertion A :

Refseq provides the best representative sequence for each transcript produced by a gene

Reason R :

Refseq contains non-redundant information

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

(A) ◯ Both **A** and **R** are true and **R** is the correct explanation of **A**
(B) ◯ **Both A and R are true but R is not the correct explanation of A (Correct Answer)**
(C) ◯ **A** is true but **R** is false
(D) ◯ **A** is false but **R** is true

Question No.108 (Question Id - 143)
Which of the following method is not used to measure the volumetric mass transfer coefficient (k_La) of a fermenter ?

(A) ◯ Sulfite oxidation method
(B) ◯ Static method of gassing out
(C) ◯ Dynamic method of gassing out
(D) ◯ **Carbon oxidation method of gassing in and gassing out (Correct Answer)**

Question No.109 (Question Id - 138)
For the recovery of Penicillin G from the fermentation broth, which of the following technique is used to achieve maximum recovery yields ?

(A) ◯ Co-current liquid-liquid extraction technique
(B) ◯ **Counter-current liquid-liquid extraction technique (Correct Answer)**
(C) ◯ Rotatory vacuum filtration technique
(D) ◯ Continuous centrifugation technique

Question No.110 (Question Id - 105)
DNA shuttle vector can be replicated in :
(A) ◯ One type of host cell
(B) ◯ **Multiple type of host cell (Correct Answer)**
(C) ◯ In vitro
(D) ◯ Both in vivo and in vitro

Question No.111 (Question Id - 52)
Reduced form of glutathione is used by living systems for the reductions of proteins. The chemical glutathione is :

(A) ◯ an amino acid
(B) ◯ a dipeptide of glutamic acid and cysteine
(C) ◯ **a tripeptide of glutamic acid, cysteine and glycine (Correct Answer)**
(D) ◯ a tetrapeptide of 2 glutamic acid units and 2 cysteins

Question No.112 (Question Id - 141)
To calculate the maintenance coefficient (m) of a fermentation process using an ideal CSTR operation, which of the following process parameter is not required ?

(A) ◯ Theoretical biomass yield ($Y^t_{x/s}$)
(B) ◯ Observed biomass yield ($Y^o_{x/s}$)
(C) ◯ Dilution rate of CSTR at which it is operated (D)
(D) ◯ **Theoretical oxygen mass transfer coefficient (K_La) (Correct Answer)**

Question No.113 (Question Id - 59)

Why do allosteric enzymes exhibit sigmoidal plots of reaction velocity V_0 vs Substrate concentration ?

(A) ◯ Binding of substrate molecule to enzyme is slow initially

(B) ◯ Dissociation constant of enzyme and substrate is high initially

(C) ◯ **Regulatory molecules bind specifically to other sites than catalytic sites (Correct Answer)**

(D) ◯ Lag period due to reduced availability of substrate molecules

Question No.114 (Question Id - 60)

Consider an enzyme with a K_m of 10^{-4} M. In presence of an inhibitor at a concentration of 2×10^{-3} M that is bound to enzyme, K_i of the enzyme is 10^{-3} M and apparent K_m is 3×10^{-4} M. How the inhibitor is inhibiting the enzyme activity ?

(A) ◯ **Competitive Inhibition (Correct Answer)**

(B) ◯ Non-competitive Inhibition

(C) ◯ Uncompetitive Inhibition

(D) ◯ Irreversible Inhibition

Question No.115 (Question Id - 90)

β_2 - microglobulin is part of which of the following :

(A) ◯ **MHC Class I (Correct Answer)**

(B) ◯ MHC Class II

(C) ◯ TCR (T cell receptor)

(D) ◯ BCR (B cell receptor)

Question No.116 (Question Id - 61)

A researcher identified a new enzyme A which has similar catalytic triad as chymotrypsin with Ser, His, and Asp in the catalytic core. How can he be sure that these 3 amino acid participate in the reaction catalysis ?

(A) ◯ Using enzyme inhibitor to inhibit enzyme activity

(B) ◯ Enzyme substrate Interaction Study

(C) ◯ **Site directed mutagenesis followed by activity assessment (Correct Answer)**

(D) ◯ Co-localization studies

Question No.117 (Question Id - 33)

Which of the following is the most fundamental property of an atom ?

(A) ◯ **Atomic number (Correct Answer)**

(B) ◯ Valence electron

(C) ◯ Atomic radius

(D) ◯ Charge of the atom

Question No.118 (Question Id - 112)

The lambda DNA recombination operates in :

(A) ◯ **An intasome (Correct Answer)**

(B) ◯ Proteasome

(C) ◯ In viroids

(D) ◯ In vitro

Question No.119 (Question Id - 83)

The primary events in CTL mediated killing of target cells are :

A. CTL dissociation

B. Conjugate formation

C. CTL cytoplasmic rearrangement

D. Target cell destruction

E. Membrane attack

Choose the **correct** order of sequence of the events from the options given below :

(A) ◯ ABCDE
(B) ◯ **BCEAD (Correct Answer)**
(C) ◯ BCAED
(D) ◯ BEACD

Question No.120 (Question Id - 58)

In an enzymatic reaction, when substrate concentration is much less than K_m then the rate of reaction followed is represented by :

(A) ◯ Zero Order Kinetics
(B) ◯ **First Order Kinetics (Correct Answer)**
(C) ◯ Pseudo first Order Kinetics
(D) ◯ Reaction rate is half its maximal value

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