Roll No:
Application No:
Name:
Exam Date: **05-Oct-2020**
Exam Time: **15:00-18:00**
Examination: **1. Course Code - M.A./M.Sc./M.C.A.**
**2. Field of Study - LIFE SCIENCE (SLSM)**

**SECTION 1 - SECTION 1**

**Question No.1 (Question Id - 16)**
Which one of the following organisms produces aflatoxin ?
(A) ◯ *Bacillus cereus*
(B) ◯ ***Aspergillus flavus* (Correct Answer)**
(C) ◯ *Rhodospirillum rubrum*
(D) ◯ *Cladosporium flavum*

**Question No.2 (Question Id - 9)**
In *Arabidopsis thaliana*, a gene called LEAFY (LFY) encodes transcription factor LFY. Plants with LFY mutation :

A. Do not make leaves beyond rosette stage.

B. They make sterile flowers.

C. They show altered phyllotaxy.

D. They show delayed flowering.

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

(A) ◯ A and C Only
(B) ◯ A and D Only
(C) ◯ B and C Only
(D) ◯ **B and D Only (Correct Answer)**

**Question No.3 (Question Id - 67)**
Which one of the following statements with respect to amphibian development is **true** ?
(A) ◯ It follows meroblastic, superficial cleavage pattern.
(B) ◯ **Gastrulation begins with invagination of bottle cells followed by the coordinated involution of mesoderm cells. (Correct Answer)**
(C) ◯ The dorsal-most vegetal (endodermal) cells mark the ‘organizer’.
(D) ◯ The ventral-most vegetal (endodermal) cells mark the ‘organizer’.

**Question No.4 (Question Id - 96)**
Among the following cells, which one is the longest living in perennial trees ?
(A) ◯ Cork cambium
(B) ◯ Phloem parenchyma
(C) ◯ **Ray parenchyma (Correct Answer)**
(D) ◯ Xylem parenchyma

**Question No.5 (Question Id - 12)**
Which of the following strains of *Escherichia* coli can function as donors of F factor :

A. $F^+$

B. Hfr

C. $F^-$

D. F’

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



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

**Question No.6 (Question Id - 48)**

Given below are two statements :

**Statement I:**

Cell cycle checkpoints are essential only when cells are stressed or damaged.

**Statement II:**

Cell cycle checkpoints may also act during a normal cell cycle to ensure proper coordination of events.

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

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

**Question No.7 (Question Id - 38)**

The below question has been dropped and full marks are awarded.

Nucleotides consist of a purine or pyrimidine base linked to the _____.

(A) ○ 1' carbon of a pentose sugar having a phosphate group on 5' carbon.
(B) ○ 2' carbon of a pentose sugar having a phosphate group on 5' carbon.
(C) ○ 5'carbon of a pentose sugar having a phosphate on either of the 5' or 3' carbon.
(D) ○ 1' carbon of a pentose sugar having a phosphate group on the 3' carbon.

**Question No.8 (Question Id - 86)**

Which of the following equation is **not** correct ?

(A) ○ $\cos^2 x + \sin^2 x = 1$
(B) ○ $\cos [\pi/2 + x] = - \sin x$
(C) ○ **$\cos [2\pi - x] = - \cos x$ (Correct Answer)**
(D) ○ $\sin [2\pi - x] = - \sin x$

**Question No.9 (Question Id - 26)**

Which of the following statements is **incorrect** :

A. Glycolysis involves conversion of a 6 carbon glucose to two molecules of 3 carbon pyruvate.

B. For each glucose molecule converted, 4 molecules of ATP is the net yield of glycolysis.

C. In eukaryotic cells, the citric acid cycle takes place in the cytosol.

D. Both NADPH and NADH are electron donors and function in interchangeable manner.

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

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

**Question No.10 (Question Id - 78)**

Match certain properties of light in **List - I** with the corresponding phenomena given in **List - II**

| List - I | List - II |
|---|---|
| A. Reflection | I. Light added to light produces darkness |
| B. Refraction | II. Change in path of light due to change in medium |
| C. Interference | III. Change in the path of the light without change in the medium |
| D. Polarization | IV. Restricting the vibrations of electric vector in a particular direction |

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

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

**Question No.11 (Question Id - 83)**

What is the value of $\int_2^3 x^2\,dx$ ?

(A) ○ 7/3
(B) ○ **19/3 (Correct Answer)**
(C) ○ 5
(D) ○ 9

**Question No.12 (Question Id - 43)**

Which of the following statements regarding DNA as a genetic material are **true** :

A. DNA replication is semiconservative.

B. DNA replication is discontinuous in both strands.

C. The coding sequences or expressed sequences are called introns.

D. Eukaryotic DNA is polycistronic.

E. The DNA dependent DNA polymerase catalyses polymerization in 5'-3' direction.

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

(A) ○ A, B, E Only
(B) ○ A, B, C Only
(C) ○ A, B, C, D Only
(D) ○ **A, E Only (Correct Answer)**

**Question No.13 (Question Id - 39)**

During DNA replication, RNA primer is removed by :

(A) ○ 3' exonuclease of DNA polymerase I
(B) ○ **Ribonuclease H (Correct Answer)**
(C) ○ Ribonuclease A
(D) ○ ∈ (epsilon) subunit of DNA Polymerase III

**Question No.14 (Question Id - 87)**

Find the equation of a curve passing through the point ( - 2, 3), given that the slope of the tangent to the curve at any point (x, y) is $2x/y^2$.

(A) ○ **$y = [3x^2 + 15]^{1/3}$ (Correct Answer)**
(B) ○ $y = [3x + 15]^{1/3}$
(C) ○ $y = [3x^2 + 15]^{1/2}$
(D) ○ $y = [3x^3 + 15]^{1/3}$

**Question No.15 (Question Id - 93)**

Arrange the following in the decreasing order of the amount of water absorbed or excreted in alimentary canal.

(A) ○ Colon > ilium > jejunum > faeces
(B) ○ **Jejunum > ilium > colon > faeces (Correct Answer)**
(C) ○ Faeces > jejunum > ilium > colon
(D) ○ Colon > jejunum > ilium > faeces

**Question No.16 (Question Id - 89)**

A committee of 3 persons is to be constituted from a group of 2 men and 3 women. How many combinations are possible for making a committee which would consist of 1 man and 2 women ?

(A) ○ 3
(B) ○ 4
(C) ○ **6 (Correct Answer)**
(D) ○ 7

**Question No.17 (Question Id - 95)**

Insulin facilitates the entry of glucose into :

(A) ○ Mucosa of small intestine
(B) ○ Neurons in the cerebral cortex
(C) ○ Renal tubular cells
(D) ○ **Skeletal muscles (Correct Answer)**

**Question No.18 (Question Id - 80)**

Which of the following expression is the **correct** ?

(A) ○ Universal gas constant (R)=8.3145 $cal.K^{-1}.mol^{-1}$.
(B) ○ **Boltzmann Constant ($k_B$)=1.3807x10$^{-23}$ $J.K^{-1}$. (Correct Answer)**
(C) ○ Planck's constant (ħ)=6.6261x10$^{-23}$ J.s.
(D) ○ Avogadro's number (N)=6.0221x10$^{34}$ $molecules.mol^{-1}$.

**Question No.19 (Question Id - 5)**

Match the descriptions given in **(List - I)** with the terms given in **(List - II)**.

| List - I | List - II |
|---|---|
| A. Gravity sensing amyloplast | I. Statoliths |
| B. Gravity sensing cells | II. Starch sheath |
| C. Gravity sensing tissue | III. Statocytes |
| D. Gravity sensing organ | IV. Roots |

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

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

**Question No.20 (Question Id - 58)**

Which of the following are characteristic attributes of innate immune responses ?

A. It is the first line of defence.

B. It involves antigen-specific receptors.

C. It is non-specific.

D. It shows variable response.

E. It shows the same response every time.

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



(A) ◯ A, B and C Only
(B) ◯ **A, C and E Only (Correct Answer)**
(C) ◯ B, C and D Only
(D) ◯ B, D and E Only

**Question No.21 (Question Id - 15)**
Which of the following statements are **TRUE** ?

A. All bacteria have circular chromosome.

B. Bacteria can have circular or linear chromosome.

C. Bacteria can have more than one chromosome.

D. Bacterial chromosome is separated from the rest of the cytoplasm by the nuclear membrane.

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

(A) ◯ A and B Only
(B) ◯ A and C Only
(C) ◯ **B and C Only (Correct Answer)**
(D) ◯ B and D Only

**Question No.22 (Question Id - 1)**
Which plant family contributes to the highest calorific value to human diet ?
(A) ◯ ***Poaceae* (Correct Answer)**
(B) ◯ *Agaricaceae*
(C) ◯ *Brassicaceae*
(D) ◯ *Fabaceae*

**Question No.23 (Question Id - 32)**
Given below are two statements : one is labelled as **Assertion A** and the other is labelled as **Reason R**.

**Assertion A :**

The partial diploid $lacI^+\ lacO^+\ lacZ^+ / lacI^+\ lacO^c\ lacZ^-$ constitutively produces β-galactosidase.

**Reason R :**

Lac O is a *cis*-acting DNA element.

In the light of the above statements, 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
(D) ◯ **A is false but R is true (Correct Answer)**

**Question No.24 (Question Id - 61)**
$TH_1$ and $TH_2$ subset differentiation are mediated by cytokines as described below :
(A) ◯ IL12, IFNγ for TH1 and IL2 for TH2
(B) ◯ **IL12, IFNγ for TH1 and IL4 for TH2 (Correct Answer)**
(C) ◯ IL4 for TH1 and IL12 and IFNγ for TH2
(D) ◯ IL4 for TH1 and IFNγ for TH2

**Question No.25 (Question Id - 75)**
What is the energy of electromagnetic wave with the wavelength of 80 m ? (where planck's constant $\hbar = 6.6 \times 10^{-34}$ J.s)

(A) ○ $6.2 \times 10^{-23}$ eV

(B) ○ $8 \times 10^{8}$ eV

(C) ○ $2.4 \times 10^{-20}$ eV

(D) ○ **$1.6 \times 10^{-8}$ eV (Correct Answer)**

**Question No.26 (Question Id - 45)**

A bacteriophage of genome size of 3000 bp was found to code for 5 unique polypeptides of 500, 300, 200, 150, 100 amino acids. This would suggest that the :

(A) ○ **phage has overlapping ORFs. (Correct Answer)**

(B) ○ phage mRNA is spliced.

(C) ○ phage genome has repetitive sequence.

(D) ○ phage proteins are phosphorylated.

**Question No.27 (Question Id - 42)**

Protein synthesis occurs with high fidelity. Assuming that the incorrect amino acids are inserted at the rate of approximately $10^{-3}$. What is the probability that a polypeptide of 300 amino acids has exactly the same as that specified by the mRNA ?

(A) ○ **3/4 (Correct Answer)**

(B) ○ 1/3

(C) ○ 1/2

(D) ○ 1/5

**Question No.28 (Question Id - 3)**

Which of the following are micronutrients for plant ?

(A) ○ Chlorine and magnesium

(B) ○ **Iron and chlorine (Correct Answer)**

(C) ○ Iron and phosphorus

(D) ○ Sulphur and phosphorus

**Question No.29 (Question Id - 22)**

Following are certain statements regarding the synthesis of NADH and NADPH. Identify the correct statement :

(A) ○ NADPH is produced in the TCA cycle and NADH is produced in the Pentose phosphate pathway.

(B) ○ **NADH is produced in the TCA cycle and NADPH is produced in the Pentose phosphate pathway. (Correct Answer)**

(C) ○ Both NADH and NADPH are produced in the TCA cycle but only NADH is produced in the Pentose phosphate pathway.

(D) ○ NADH and NADPH are produced in both TCA cycle and Pentose phosphate pathway.

**Question No.30 (Question Id - 2)**

The deadly disease of rust in wheat is caused by :

(A) ○ *Pleurotus ostreatus*

(B) ○ ***Puccinia graminis* (Correct Answer)**

(C) ○ *Giberella fuzikuroi*

(D) ○ *Claviceps purpurea*

**Question No.31 (Question Id - 92)**

Neck vertebrae in all birds are :

A. fixed in number

B. variable in number

C. fused

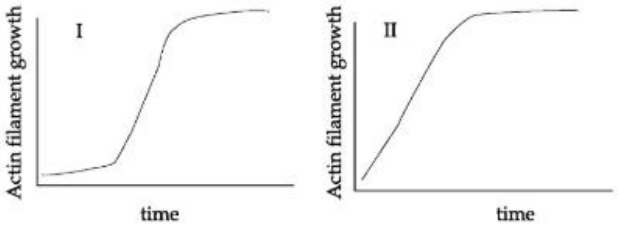
D. membranous and calcified

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

(A) ◯ A and C Only
(B) ◯ B and D Only
(C) ◯ A Only
(D) ◯ **B Only (Correct Answer)**

**Question No.32 (Question Id - 52)**

When Gita did actin polymerization experiments she found the pattern as seen in Figure I. But when she added another protein X, the pattern changed to as seen in Figure II. The name of the protein is :




(A) ◯ Actopheren
(B) ◯ **Arp 2/3 (Correct Answer)**
(C) ◯ Profilin
(D) ◯ Cofilin

**Question No.33 (Question Id - 63)**

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

**Assertion A :**

DNA vaccine utilizes plasmid DNA encoding antigenic proteins that are injected directly into the muscles of the recipient.

**Reason R :**

The DNA is taken up by the dendritic cells and is able to induce both cell mediated and humoral immune response.

In the light of the above statements, 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 false
(D) ◯ **A** is false but **R** is true

**Question No.34 (Question Id - 54)**

In the severe haemolytic disease of the newborn called erythroblastosis fetalis which diagnostic test can be used to detect anti-Rh antibodies in mother's serum ?

(A) ◯ Direct Coombs Test
(B) ◯ **Indirect Coombs Test (Correct Answer)**
(C) ◯ Rocket Immunoelectrophoresis
(D) ◯ Western blotting

**Question No.35 (Question Id - 59)**

Which of the following statements about the complement fixation are **true** ?

A. C3 convertase in alternative pathway is C3bBb.

B. C3 convertase in classical pathway is C4b2a.

C. Both lectin pathway and alternative pathway are initiated by binding to C1q.

D. C1s has substrate C4 only.

E. C1q and C1s bind to Fc region of immune complex and induce conformation change in C1r.

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

(A) ○ A Only
(B) ○ **A, B Only (Correct Answer)**
(C) ○ A, B, C, E Only
(D) ○ A, B, D Only

**Question No.36 (Question Id - 37)**

Match the following description of the list of terms :

| List - I | List - II |
|---|---|
| A. BOD | I. Natural aging of a lake |
| B. Pioneer species | II. Biological Oxygen Demand |
| C. Eutrophication | III. Species that invade bare areas |
| D. Saprophytes | IV. Fungi |

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

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

**Question No.37 (Question Id - 91)**

Which of the following is the principal buffer in interstitial fluid ?

(A) ○ **Carbonic acid (Correct Answer)**
(B) ○ Haemoglobin
(C) ○ Other proteins
(D) ○ $H_2PO_4$

**Question No.38 (Question Id - 90)**

Identify the **correct** statement regarding haemoglobin.

(A) ○ $CO_2$ and CO bind to the same site on haemoglobin.
(B) ○ $CO_2$ and $O_2$ bind to the same site on haemoglobin.
(C) ○ **$O_2$ and CO bind to the same site on haemoglobin. (Correct Answer)**
(D) ○ $O_2$ and CO bind to different sites on haemoglobin.

**Question No.39 (Question Id - 6)**

Match the type of water movement **(List - I)** with their corresponding mode of transport **(List - II)** :

| List - I | List - II |
|---|---|
| A. Apoplastic movement | I. From protoplast to protoplast via plasmodesmata |
| B. Symplastic movement | II. Via cell walls |
| C. Transcellular movement | III. Via hydathodes |
| D. Guttation movement | IV. From cell to cell with water passing through plasma membrane and tonoplasts |

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

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

**Question No.40 (Question Id - 85)**

What is the correct answer of the following integrals ?

$\int[(1 - \sin x)/\cos^2 x]\, dx.$

(A) ○ **tan x - sec x + C (Correct Answer)**
(B) ○ sec x - tan x + C
(C) ○ sin x - cos x + C
(D) ○ cos x - sin x + C

**Question No.41 (Question Id - 25)**

It appears that a signalling protein has a serine residue at position 96 that is phosphorylated upon the activation of the signal. To confirm this, you plan to replace it by another amino acid so that it loses its function (loss of function mutation). Which of the following amino acid would be of your choice for its replacement ?

(A) ○ Threonine
(B) ○ **Alanine (Correct Answer)**
(C) ○ Glycine
(D) ○ Aspartic acid

**Question No.42 (Question Id - 62)**

Antigen pulsed peritoneal macrophages were taken from mouse strain $H2^b$ and antigen primed T cells from mouse strain $H2^k$ were added in the same well. T cell proliferation was assessed.

(A) ○ **T cell proliferation will not occur. (Correct Answer)**
(B) ○ T cell proliferation will occur.
(C) ○ T cell proliferation will occur only if there is stimulation along with adjuvants.
(D) ○ Cannot assess with the given information since type of antigen is not specified.

**Question No.43 (Question Id - 76)**

A radio transmitter operates at a frequency of 500 kHz with a power of 8 kw. How many photons are emitted per second (given Planck's constant $\hbar = 6.6 \times 10^{-34}$ J.S) ?

(A) ○ $8 \times 10^{16}$
(B) ○ $3 \times 10^{21}$
(C) ○ **$2.4 \times 10^{32}$ (Correct Answer)**
(D) ○ $6.6 \times 10^{34}$

**Question No.44 (Question Id - 14)**

Match the organisms **(List - I)** with the corresponding diseases they cause **(List - II)**.

| List - I | List - II |
|---|---|
| A. *Escherichia coli* | I. Urinary tract infection |
| B. *Streptococcus pyogenes* | II. Sore throat |
| C. *Shigella flexneri* | III. Gas gangrene |
| D. *Clostridium perfringens* | IV. Bacillary dysentry |

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

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

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

**Question No.45 (Question Id - 88)**
Which of the following is correct for the following differential equation

$xy[d^2y/dx^2] + x[dy/dx]^2 - y[dy/dx] = 0.$

(A) ◯ The highest order derivative present in the differential equation is dy/dx, so its order is one.
(B) ◯ **The highest order derivative present in the differential equation is $d^2y/dx^2$, so its order is two. (Correct Answer)**
(C) ◯ The highest order derivative present in the differential equation is $dy/dx^2$, so its order is one.
(D) ◯ The highest order derivative present in the differential equation is $dy^2/dx^2$, so its order is one.

**Question No.46 (Question Id - 30)**
In cats curled ears result from allele $Cu^+$ which is dominant over cu (normal ears). The allele B (black body) is dominant over *b* (gray body). A gray cat homozygous for curled ears was mated with a black cat homozygous for normal ears. The F1 progeny all had black body and curled ears. One of the F1 progeny was mated with a cat homozygous both for black body and normal ears. Which of the following statements is TRUE regarding the progeny of this cross ?

A. The ratio of curled ears to normal ears will be 3 : 1

B. The ratio of black body to gray body will be 1 : 1

C. The ratio of curled ears to normal ears will be 1 : 1

D. The ratio of black body to gray body will be 3 : 1

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

(A) ◯ A and B Only
(B) ◯ **B and C Only (Correct Answer)**
(C) ◯ C and D Only
(D) ◯ A and D Only

**Question No.47 (Question Id - 72)**

Match the disease **(List - I)** and the respective causal agents **(List - II)**.

| List - I | List - II |
|---|---|
| A. Acquired Immunodeficiency Syndrome | I. Protozoa |
| B. Malaria | II. Rhinovirus |
| C. Common Cold | III. Bacteria |
| D. Pneumonia | IV. Retrovirus |

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

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

**Question No.48 (Question Id - 36)**
Which one of the following sentences is not related to the beta diversity ?

A. Beta diversity is high when there are differences in the number of species along the geographical or environmental gradient.

B. Beta diversity is low when same number of species is found across the environmental gradient.

C. Genetic diversity within a species is used to measure the beta diversity.

D. Beta diversity measures the number of species in a large region.



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

(A) ○ A Only
(B) ○ B Only
(C) ○ **C and D Only (Correct Answer)**
(D) ○ B and D Only

**Question No.49 (Question Id - 65)**

Match the following cleavage pattern **(List - I)** with their examples **(List - II)**.

| List - I | List - II |
|---|---|
| A. Radial | I. Tunicates |
| B. Rotational | II. Nematodes |
| C. Bilateral | III. Drosophila |
| D. Superficial | IV. Echinoderms |

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

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

**Question No.50 (Question Id - 84)**

In a population, 240 individuals had been exposed to the pesticide $A_1$, 100 individuals had been exposed to the pesticide $A_2$ and 60 individuals had been exposed to both the pesticides $A_1$ and $A_2$. Which of the following statement is correct ?

(A) ○ The number of individuals exposed to pesticide $A_1$ but not to pesticide $A_2$ is 90.
(B) ○ The number of individuals exposed to pesticide $A_2$ but not to pesticide $A_1$ is 90.
(C) ○ **The number of individuals exposed to pesticide $A_1$ but not to pesticide $A_2$ is 180. (Correct Answer)**
(D) ○ The number of individuals exposed to pesticide $A_2$ but not to pesticide $A_1$ is 180.

**Question No.51 (Question Id - 40)**

Which is the correct order of the following organisms in terms of increasing genome size ?

A. *Sacchromyces cerevisiae*

B. *Arabdopsis thaliana*

C. *Haemophilus influenza*

D. *Mycoplasma genitalium*

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

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

**Question No.52 (Question Id - 49)**

Rohit extracted DNA from epithelial cells and found the presence of 27% cytosine. He calculated the percentage composition of rest of the bases. Choose the correct answer.

(A) ○ A = 73; C = 27; T = 27; G = 73
(B) ○ A = 73; C = 27; T = 73; G = 27
(C) ○ A = 27; C = 27; T = 73; G = 73
(D) ○ **A = 23; C = 27; T = 23 ; G = 27 (Correct Answer)**

**Question No.53 (Question Id - 81)**
Mean free path of gas molecule is defined as, (where N/V = molecules/volume, d = molecular diameter,
λ = mean free path).

(A) ○ **$\lambda=1/\sqrt{2}\,\pi d^2\,N/V$ (Correct Answer)**
(B) ○ $\lambda=1/2\,\pi d^2\,N/V$
(C) ○ $\lambda=1/\sqrt{2}\,\pi d\,N/V$
(D) ○ $\lambda=1/\sqrt{2}\,\pi d^2\,NV$

**Question No.54 (Question Id - 20)**
During gluconeogenesis, one of the following conversions is catalysed by an enzyme that is different from the enzyme that does reverse conversion during glycolysis. Identify it.

(A) ○ Conversion of Dihydroxyacetone phosphate to Glyceraldehyde-3-phosphate
(B) ○ Conversion of 3-phosphoglycerate to 2-phosphoglycerate
(C) ○ Conversion of 2-phosphoglycerate to phosphoenolpyruvate
(D) ○ **Conversion of Fructose-1, 6-bisphate to Fructose-6-phosphate (Correct Answer)**

**Question No.55 (Question Id - 46)**
In a new species methylated Guanosine is recognized as a distinct nucleotide by the translation system apart from the 4 normal nucleosides. How many unique triplet codons are possible ?

(A) ○ 64
(B) ○ **125 (Correct Answer)**
(C) ○ 128
(D) ○ 256

**Question No.56 (Question Id - 27)**
Which of the following statements about Chargaff's rule is **FALSE** ?

A. Largely, the ratio of Purine to pyrimidine is 1 : 1

B. Adenine + Guanine = Thymine + Cytosine

C. Adenine + Thymine = Guanine + Cytosine

D. Adenine + Guanine + Thymine + Cytosine = 1

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

(A) ○ A and D Only
(B) ○ B and C Only
(C) ○ **C and D Only (Correct Answer)**
(D) ○ B and D Only

**Question No.57 (Question Id - 19)**
Matching the plant disease **(List - I)** with the respective causative agents **(List - II)**.

| List - I | List - II |
|---|---|
| A. Red rot of sugarcane | I. Bacteria |
| B. Brown rot of potato | II. Fungi |
| C. Spotted wilt of tomato | III. Phytoplasma |
| D. Little leaf of brinjal | IV. Virus |

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

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

**Question No.58 (Question Id - 68)**

Which one of the following combination of statements regarding the extra embryonic membrane is **correct** ?

A. Amnion is the water sac that protects the embryo.

B. Chorion stores urinary waste and help mediate gas exchange.

C. Chorion is the water sac that protects the embryo.

D. Yolk sac is derived from splanchopleure that grows over the yolk to enclose it and helps mediate nutrition.

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

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

**Question No.59 (Question Id - 100)**

What is the pH and pOH of 0.001 M solution of HCl ?

(A) ○ **3, 11 (Correct Answer)**
(B) ○ 3, 10
(C) ○ 2, 12
(D) ○ 11, 3

**Question No.60 (Question Id - 41)**

What anticodon sequence would pair with the codon 5'-AUG-3' assuming only Watson-Crick base pairing ?

(A) ○ **3'-UAC-5' (Correct Answer)**
(B) ○ 3'-CAU-5'
(C) ○ 5'-CAU-3'
(D) ○ 5'-UAC-3'

**Question No.61 (Question Id - 77)**

An electric field is applied to a semiconductor. There are N number of charge carriers with the average drift speed *v*. Which of the following option is true if the temperature is increased ?

(A) ○ Both N and *v* will decrease.
(B) ○ Both N and *v* will increase.
(C) ○ N will decrease but *v* will increase.
(D) ○ **N will increase but *v* will decrease. (Correct Answer)**

**Question No.62 (Question Id - 53)**

Various dyes and reagents **(List - II)** are used for visualization of cellular components / cell organelles **(List - I)** and are mentioned below.



| List - I | List - II |
|---|---|
| A. Nucleus | I. Osmium tetraoxide |
| B. Lipids | II. Rhodamine 123 |
| C. Mitochondria | III. DAPI |

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

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

**Question No.63 (Question Id - 99)**

Genomic DNA of bacteriophage $T_4$ is double stranded. If viral genome is heated and cooled, both linear and circular molecules are obtained. This is primarily due to the fact that :

(A) ○ all linear DNA on heating and cooling take circular shape.
(B) ○ the DNA molecule is circularly permuted.
(C) ○ **the DNA molecule has cohesive terminal ends. (Correct Answer)**
(D) ○ while passing through the hosts, the DNA molecule got integrated into the host genome to become circular.

**Question No.64 (Question Id - 55)**

Which of the following five major classes of antibodies can activate classical complement pathway ?

A. IgA

B. IgD

C. IgE

D. IgG

E. Igm

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

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

**Question No.65 (Question Id - 31)**

If the father has the genotype $I^Bi$ and the mother has the genotype $I^AI^B$, then what proportion of progeny will have O blood group ?

(A) ○ **0% (Correct Answer)**
(B) ○ 25%
(C) ○ 50%
(D) ○ 75%

**Question No.66 (Question Id - 70)**

Which one of the following compounds does not contain triple bond ?

(A) ○ Acetonitrile
(B) ○ Nitrogen
(C) ○ Carbon-monoxide
○

(D) **Ozone (Correct Answer)**

**Question No.67 (Question Id - 33)**

In tomato plants, red fruit (R) is dominant to yellow (r) and tallness (T) is dominant to short (t). What phenotypic and genotypic ratio would result if one of the parent plants is red homozygous and tall homozygous and other is red heterozygous and tall heterozygous ?

(A) ○ Phenotypically all are red and tall. Genotypically all are homozygous for both characters.

(B) ○ Half the plants obtained are red and tall and half are yellow and short.

(C) ○ **Phenotypically all are red and tall but genotypically four different types of plants exist. (Correct Answer)**

(D) ○ Half the plants are phenotypically red and tall and half are yellow and short and genotypically two types of plants exist.

**Question No.68 (Question Id - 18)**

Which one of the following organisms can be used as “natural genetic engineer” for transformation of japonica varieties of rice ?

(A) ○ *Agrobacterium japonicum*

(B) ○ ***Agrobacterium tumefaciens* (Correct Answer)**

(C) ○ *Bradyrhizobium japonicum*

(D) ○ *Pseudomonas japonicum*

**Question No.69 (Question Id - 23)**

During metabolic conversion, transfer of C1 units is mediated by all of the following, except :

(A) ○ $N^5$-Methyl-Tetrahydrofolate

(B) ○ $N^5$-formyl-Tetrahydrofolate

(C) ○ S-adenosyl methionine

(D) ○ **7, 8 Dihydrofolate (Correct Answer)**

**Question No.70 (Question Id - 50)**

A diploid eukaryotic cell, possessing $3.2 \times 10^6$ bp, will have how many nucleosomes ?

(A) ○ $1.2 \times 10^4$ nucleosomes

(B) ○ **$1.6 \times 10^4$ nucleosomes (Correct Answer)**

(C) ○ $0.8 \times 10^4$ nucleosomes

(D) ○ $0.6 \times 10^4$ nucleosomes

**Question No.71 (Question Id - 79)**

The diffusion current in a P-N junction is :

(A) ○ from the N-side to the P-side.

(B) ○ **from the P-side to the N-side. (Correct Answer)**

(C) ○ from the N-side to the P-side, if the junction is forward and opposite direction if it is reverse biased.

(D) ○ from the P-side to the N-side if the junction is forward and opposite direction if it is reverse biased.

**Question No.72 (Question Id - 66)**

Given below are two statements :

**Statement I:**

Sea-urchin eggs are isolecithal.

**Statement II:**

Insect eggs are telolecithal.

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

(A) ◯ Both **Statement I** and **Statement II** are correct
(B) ◯ Both **Statement I** and **Statement II** are incorrect
(C) ◯ **Statement I is correct but Statement II is incorrect (Correct Answer)**
(D) ◯ **Statement I** is incorrect but **Statement II** is correct

**Question No.73 (Question Id - 82)**

Bragg's law states the relationship between incident direction of the wave from diffraction plane and wavelength λ of the radiation. (where d = inter planar spacing; n = 1, 2, 3, 4…, θ = incidence angle). Which of the following equation is **correct** ?

(A) ◯ **2dsinθ = nλ (Correct Answer)**
(B) ◯ dsinθ = nλ
(C) ◯ 2dsinθ = (n + 1/2) λ
(D) ◯ 2dsinθ = (n + 1) λ

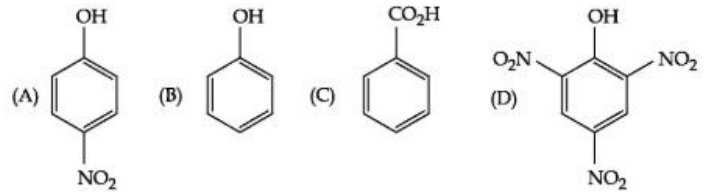
**Question No.74 (Question Id - 21)**

The sedimentation coefficient of E coli ribosome is 70S, where “S” stands for :

(A) ◯ Sutherland
(B) ◯ **Svedberg (Correct Answer)**
(C) ◯ Stahl
(D) ◯ Stein

**Question No.75 (Question Id - 69)**

Arrange the following compounds in the increasing order of acidity




(A) ◯ (A) < (B) < (C) < (D)
(B) ◯ (A) < (B) < (D) < (C)
(C) ◯ **(B) < (A) < (C) < (D) (Correct Answer)**
(D) ◯ (B) < (A) < (D) < (C)

**Question No.76 (Question Id - 56)**

Small molecule haptens can be made immunogenic by :

(A) ◯ giving multiple intravenous injections.
(B) ◯ using in a large amount.
(C) ◯ using Freund’s complete adjuvant.
(D) ◯ **conjugating the hapten with a large molecular weight protein. (Correct Answer)**

**Question No.77 (Question Id - 97)**

Which of the following herbivores, when crowded and starved, become cannibalistic ? This change in diet accompanied by the rapid conversion of the midgut from long winding canal into a much shorter passageway.

(A) ◯ Frog
(B) ◯ **Salamander larva (Correct Answer)**
(C) ◯ Cockroach
(D) ◯ Earthworm

**Question No.78 (Question Id - 94)**

Which of the following function is not performed by the microtubules in the cells ?

A. Cell movement

B. Chromosomal movement

C. Separate the dividing cell into two

D. Organelles transport

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

(A) ○ A and C Only
(B) ○ B and D Only
(C) ○ C and D Only
(D) ○ **C Only (Correct Answer)**

**Question No.79 (Question Id - 13)**

Which of the following statements, is NOT TRUE about the resolution of a light microscope ?

(A) ○ Blue light has more resolving power than red light.
(B) ○ Higher the numerical aperture of the objective lens, better is the resolution.
(C) ○ Numerical aperture of the condenser also affects the resolution.
(D) ○ **Lens working in the air can have numerical aperture greater than 1.0. (Correct Answer)**

**Question No.80 (Question Id - 4)**

Following are the two sets of experiments for studying the effect of light treatment on seed germination. Water-soaked seeds were treated with specific lights, sequentially as mentioned below.
Set 1 : Red light → Far-red light → Red light
Set 2 : Far-red light → Red light → Red light
Which of the following is likely to be observed ?

(A) ○ Set 1 will germinate faster than Set 2.
(B) ○ Set 2 will germinate faster than Set 1.
(C) ○ **Both sets will germinate equally. (Correct Answer)**
(D) ○ None of the sets will germinate.

**Question No.81 (Question Id - 44)**

Oxidation of fatty acids in mitochondria generates _____ as end-product.

(A) ○ Acyl-CoA
(B) ○ glycerol
(C) ○ **Acetyl-CoA (Correct Answer)**
(D) ○ triglyceride

**Question No.82 (Question Id - 74)**

For the conversion of reactant X to product Y, the change in enthalpy is 8 $kJ.mol^{-1}$ and the change in entropy is 20 $J.K^{-1}mol.^{-1}$ Above what temperature does the reaction become spontaneous ?

(A) ○ 45°C
(B) ○ 60°C
(C) ○ 77°C
(D) ○ **127°C (Correct Answer)**

**Question No.83 (Question Id - 57)**

During inflammation, when white blood cells from blood stream travel into surrounding tissues, leukocyte extravasation is the central feature of cell trafficking and it involves the following events :

A. Activation by chemokines

B. Transendothelial migration or diapedesis

C. Tethering and rolling mediated by selectins

D. Arrest and adhesion mediated by integrins

Arrange them in the **correct** sequential order :

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

**Question No.84 (Question Id - 24)**
Haemoglobin binds to oxygen molecule via its :
(A) ○ One of the nitrogen atom in the porphyrin ring
(B) ○ Tyrosine residue the $8^{th}$ helix
(C) ○ Proximal histidine residue in the $8^{th}$ helix
(D) ○ **$Fe^{++}$ ion in the porphyrin ring (Correct Answer)**

**Question No.85 (Question Id - 64)**

Match the hypersensitivities **(List - I)** with their characteristics/examples **(List - II)**.

| List - I | List - II |
|---|---|
| A. IgG or IgM mediated hypersensitivity | I. Mediated by T cells |
| B. Delayed type hypersensitivity | II. Serum sickness, systemic lupus erythmatosus |
| C. Immune complex mediated hypersensitivity | III. Mediated by IgE |
| D. Type I hypersensitivity | IV. Erythroblastosis fetalis |

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

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

**Question No.86 (Question Id - 98)**
Who among the following scientists have received the Nobel Prize in Physiology and Medicine in 2019 ?

(A) ○ J.P. Allison and T. Honjo
(B) ○ **W.G. Kaelin, P.J. Ratcliffe and G.L. Semenza (Correct Answer)**
(C) ○ M.W. Young, M. Rosbash and J.C. Hall
(D) ○ Y. Ohsumi

**Question No.87 (Question Id - 29)**
Given below are two statements :

**Statement I:**

RFLP is used in DNA fingerprinting.

**Statement II:**

RFLP is a co-dominant marker.

In the light of the above statements, choose the **most appropriate** 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.88 (Question Id - 73)**
0.1 M solution of an weak acid has pH equal to 5 at 298 K. What is the dissociation constant of that

acid ?

(A) ○ **$10^{-9}$ (Correct Answer)**
(B) ○ $10^{-11}$
(C) ○ $10^{-7}$
(D) ○ $10^{-5}$

**Question No.89 (Question Id - 47)**
In a PCR experiment 1 ng of a 100 bp PCR template was amplified using specific primers. Assuming 100% efficiency of the PCR reaction the amount of 100 bp fragment after 10 cycle of PCR reaction is about :

(A) ○ 10 ng
(B) ○ 100 ng
(C) ○ **1000 ng (Correct Answer)**
(D) ○ 10000 ng

**Question No.90 (Question Id - 28)**

Match the names of the Scientists **(List - I)** with the model organism they have worked with **(List - II)**.

| List - I | List - II |
|---|---|
| A. Gregor Mendel | I. Bacteriophage |
| B. Thomas Hunt Morgan | II. Pea Plant |
| C. Hershey and Chase | III. Drosophila |

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

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

**Question No.91 (Question Id - 17)**
Those parasites capable of switching to saprophytic mode of nutrition are known as :
(A) ○ **Facultative saprophytes (Correct Answer)**
(B) ○ Facultative parasites
(C) ○ Obligate parasites
(D) ○ Obligate saprophytes

**Question No.92 (Question Id - 60)**
In monoclonal antibody production, the role of aminopterin in the HAT medium is to :
(A) ○ block the salvage pathway of DNA synthesis.
(B) ○ cause fusion of plasma cell and myeloma cell.
(C) ○ **block the *de novo* pathway of DNA synthesis. (Correct Answer)**
(D) ○ prevent myeloma-myeloma fusion.

**Question No.93 (Question Id - 71)**
Which one of the following molecules is an exception to the octet rule ?
(A) ○ Ammonia ($NH_3$)
(B) ○ **Boron trifluoride ($BF_3$) (Correct Answer)**
(C) ○ Carbon-di-oxide ($CO_2$)
(D) ○ Water ($H_2O$)

**Question No.94 (Question Id - 51)**
Which one of the following cytoskeletal filaments is less dynamic in nature ?
(A) ○ Actin

(B) ◯ Tubulin
(C) ◯ **Intermediate filaments (Correct Answer)**
(D) ◯ Microtubules

**Question No.95 (Question Id - 10)**

Root endodermis plays a crucial role in maintaining water balance in plants, for the following reason/s :

A. At the endodermis, casparian strip blocks apoplast pathway.

B. Casparian strip is composed of suberin.

C. Casparian strip maintains continuity of the apoplast pathway.

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

(A) ◯ A Only
(B) ◯ **A and B Only (Correct Answer)**
(C) ◯ C Only
(D) ◯ B and C Only

**Question No.96 (Question Id - 7)**

Given below are two statements :

**Statement I:**

Etiolated seedlings of corn show absence of greening, reduction in leaf width, failure of leaves to unroll and elongation of coleoptile and mesocotyl.

**Statement II:**

Etiolated seedlings of mustard show absence of greening, reduced leaf size, hypocotyl elongation and maintenance of apical hook.

In the light of the above statements, choose the **most appropriate** 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.97 (Question Id - 11)**

Which of the following statements describing the bacterial electron transport chain (ETC) are **TRUE** ?

A. It operates in the plasma membrane.

B. It generates a protein gradient.

C. It utilizes nitrate as the terminal electron acceptor in aerobic conditions.

D. It utilizes oxygen as the terminal electron acceptor in aerobic conditions.

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

(A) ◯ **A, B and D Only (Correct Answer)**
(B) ◯ A, C and D Only
(C) ◯ B, C and D Only
(D) ◯ B, A and C Only

**Question No.98 (Question Id - 34)**

Match the following plants **(List - I)** according to the evolution of ploidy level **(List - II)** of their genome.

| List - I | List - II |
|---|---|
| A. Indian mustard (*Brassica juncea*) | I. Triploid (Auto) |
| B. Wheat (*Triticum aestivum*) | II. Diploid |
| C. Seedless Watermelon (*Citrullus lanatus*) | III. Allohexaploid |
| D. Rice (*Oryza sativa*) | IV. Allotetraploid |

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

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

**Question No.99 (Question Id - 35)**

Match the following animals mentioned in **List - I** with their category mentioned in **List - II**.

| List - I | List - II |
|---|---|
| A. Bengal Tiger | I. Bioindicator |
| B. Insects | II. Critically Endangered species |
| C. Pygmy hog | III. Keystone species |
| D. Frogs | IV. Flagship species |

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

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

**Question No.100 (Question Id - 8)**

Below are the metabolites that are formed in the TCA cycle.

A. 2-oxogluterate

B. Succinyl CoA

C. Succinate

D. Fumerate

E. Malate

Choose the **correct** answer that indicates order of their formation in the TCA cycle.

(A) ◯ A → C → B → D → E
(B) ◯ B → C → A → D → E
(C) ◯ **A → B → C → D → E (Correct Answer)**
(D) ◯ C → B → A → E → D

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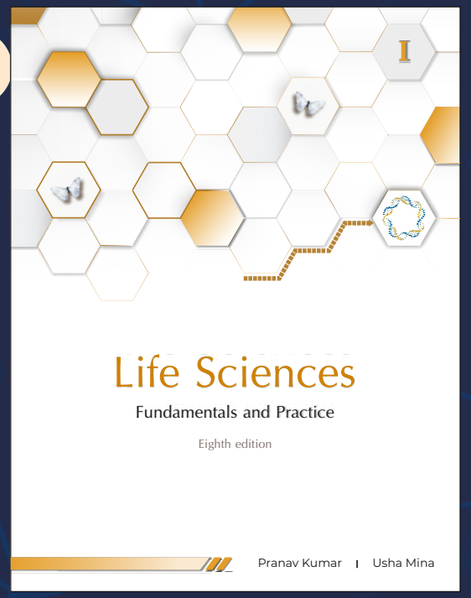


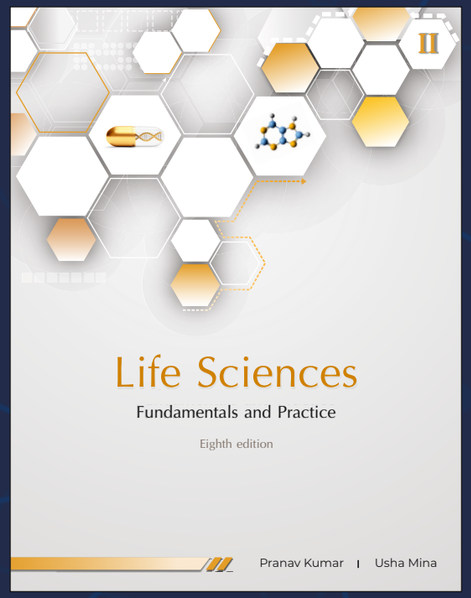


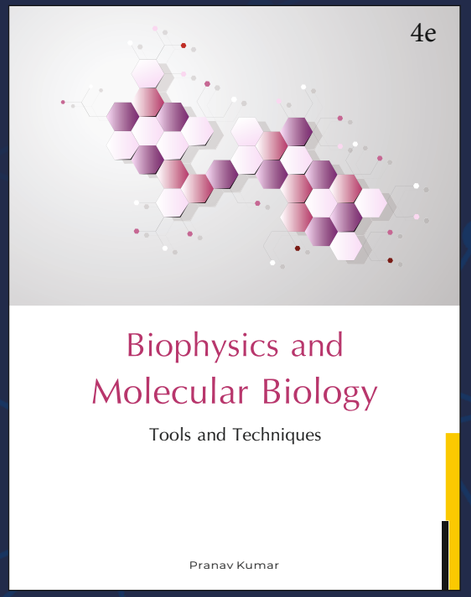


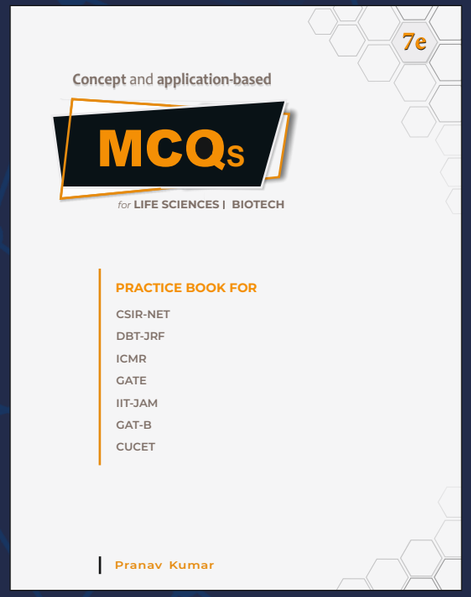


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