Examination: **Ph.D Biotechnology**

## SECTION 1 - SECTION 1

**Question No.1**

Which of the following is not used for degrading RNA from RNA:DNA hybrid in replication?

- Polymerase I
- RNase A
- RNase H
- Exonuclease

**Question No.2**

The Nucleotide Sequence in the reading frame of mRNA that helps in recognition of Start Codon (AUG) in eukaryotes called?

- Intervening Sequence
- Shine-Dalgarno Sequence
- Alu Sequence
- Kozak sequence

**Question No.3**

With respect to their surrounding membrane system, which is the odd one out?

- endoplasmic reticulum .
- mitochondria
- nuclei
- chloroplasts

**Question No.4**

Increasing biodegradation possibility through employing microbes is known as

- Biomagnification
- Biostimulation
- Eutrophication
- Bioaugmentation

**Question No.5**

Genomic library is a collection of recombinant molecules

- With inserts that contain all of an organism’s genome
- With inserts that contain all of the genes of an organism

- That have been sequenced
- That express all of the genes of an organism

**Question No.6**

What is the best method to identify the cellular location of a protein?

- Place reporter gene next to the promoter and identify the cellular location of the reporter protein
- Tag the protein with fluorescent amino acids and identify the cellular location by fluorescence microscopy
- Separate the cellular compartments by centrifugation and screen the different compartments with an antibody
- Use labelled antibody to identify the cellular location of the protein

**Question No.7**

Cytochalasin D inhibits the formation of microfilaments. Which of the following biological activities will not be hindered?

- Muscle contraction
- Formation of the cleavage furrow following telophase of mitosis
- Cytosolic transport of vesicles
- Amoeboid movements of phagocytic cells

**Question No.8**

Bubonic Plague is caused by

- *Yersinia pestis*
- *Acinetobacterbaumannii*
- *Neisseria gonorrhoeae*
- *Trypanosomacruzi*

**Question No.9**

The $G_1$-S checkpoint called the _____ _____ appears to be the most important cell cycle check point in animal cells; those cells that receive a signal to pass through this point usually complete the S, $G_2$, and M phases and divide.

- restriction point
- check
- Check point
- point of stop

**Question No.10**

What is the correct statement regarding Okazaki fragments?

- These fragments result in continuous DNA replication mechanism.
- These fragments formed in the leading strand of DNA replication
- These fragments formed in both leading and lagging strand of DNA replication
- These fragments are of 100 to 200 base pair in length.

**Question No.11**

You have cloned a new gene into a vector. What would be next step to characterize the gene?

- Would consider your experiment as a failure and redo it
- First check the sequence by BLAST analysis in NCBI or UCSC
- Search for homologous sequences across different organisms
- your cloned segment is a nonspecific PCR amplified product and hence PCR is to be repeated

**Question No.12**

Which of the following statements about cis and trans elements are true?

- C is element is a protein that interacts with trans protein
- Trans element is a protein that binds cis DNA sequence
- Trans element is a DNA sequence that interacts with cis DNA sequence
- C is element is a protein that binds trans DNA sequence

**Question No.13**

Which one of the following is a saturated fatty acid

- Eicosapentaenoic Acid
- Palmitic Acid
- Alpha-linolenic Acid
- Docosahexaenoic acid

**Question No.14**

Maximum photosynthesis takes place in

- Blue light
- Red light
- White light
- Monochromatic light

**Question No.15**

Vitamins are sterilized by way of

- Filtration
- Ultraviolet Radiation
- Pasterurization
- Steam sterilization

**Question No.16**

A messenger RNA is 336 nucleotides long, including the initiator and termination codons. The number of amino acids in the protein translated from this mRNA is

- 111
- 630
- 999
- 330

**Question No.17**

Which of the following is NOT a key property of hereditary material?

- It must be capable of being copied accurately.
- It must occasionally mutate.
- It must be able to adapt itself to each of the body's tissues.
- It must encode the information necessary to form proteins and complex structures.

**Question No.18**

Tm value of the primers is determined by

- MgCl2 concentration
- dNTPs used in the PCR master mix
- Number of nucleotides in the primer
- Percentage of GC-AT in the primer

**Question No.19**

In a typical gene cloning experiment, by mistake a researcher introduced the DNA of interest within ampicilin resistant gene instead of lac z gene. The competent cells were allowed to take up the plasmid and then plated in the media containing ampicilin, X-gal and IPTG and subjected to blue-white screening. Considering all plasmids were recombinant which one of the following statements correctly describes the outcome of the experiment?

- The bacteria which took up the plasmids would grow and give blue

colonies.

- All of the bacteria would grow and give white colonies.
- The bacteria which took up the plasmids would form white colonies.
- The bacteria which took up the plasmids would not grow.

**Question No.20**

*E.Coli* DNA ligase differs from T4 DNA Ligase, since it requires

- ATP as co-factor
- NAD as co-factor
- FAD as co-factor
- NADPH as co-factor

**Question No.21**

What will be the transcription product of 3'….AUCCGAGCUAAC….5' by reverse transcriptase?

- 5'….GTTAGCTCGGAT….3'
- 5'….UAGGCUCGAUUG….3'
- 3'….AUCCGAGGAUUG….5'
- 3'….GTTAGCTCGGAT….5'

**Question No.22**

Post translational modification refers to

- Modification that occur after protein synthesis
- Remodeling of Chromatin
- Modifications undergone by the mRNA
- Acetylation and Methylation of Histones

**Question No.23**

Which of the following is wrong with respect to chain termination sequencing?

- PAGE is used for analyzing the results
- Dideoxynucleotides are used.
- The sequence reads are less than 100bp.
- Flourescent dyes are used.

**Question No.24**

Radiation that are major source of background radiation are:

- Alpha

- gamma
- beta
- X-rays

**Question No.25**

Which one of the following organisms has shortest generation time?

- *Saccharomyces cerevisiae*
- *Leishmaniadonovani*
- *Scenedesmusquadricauda*
- *Bacillus subtilis*

**Question No.26**

Which one of the following organisms can grow at lower water activity (aw) when compared to others?

- *Dunaliellasalina*
- *Rihzopusstolonifer*
- *Pseudomonas aeruginosa*
- *Pleurotuscitrinopileatus*

**Question No.27**

The primary RNA transcript of Gene X is 7700 nt long but the mature mRNA is 1872. This is because of

- splicing
- removal of polyA tails
- capping
- cleavage of polycistronic mRNA

**Question No.28**

Which of the following is not true about the translational event in E.coli

- Translocation of amino-acyl tRNA from A site to P site of ribosome requires GTP
- Termination of translation is GTP independent
- Initiation of translation requires GTP for the binding of f-met-tRNA
- Elongation of polypeptide requires GTP for the binding of amino-acyl tRNA to the A site of ribosome

**Question No.29**

$CO_2$ is carried in the blood in the form of

- Potassium carbonate
- Sodium bicarbonate
- Sodium carbonate
- Magnesium carbonate

**Question No.30**

One of the triplets does not code for any amino acid

- UTA
- UUA
- UAA
- UCA

**Question No.31**

Which of the following antibiotic is NOT a protein synthesis inhibitor of prokaryotes

- Erythromycin
- Tetracycline
- Penicillin
- Chloramphenicol

**Question No.32**

Paracrine signalling is involved in which of the following

- Are affected by abiotic and biotic conditions
- Paracrine signalling travel only a limited distance from the cell where they are synthesized.
- Paracrine signalling long distances from the cell where they are synthesized.
- They are produced in response to stimuli like heat, light.

**Question No.33**

With respect to the composition of ribosome which of the following is correct.

- Eukaryotic ribosome small subunit contains only one 16S rRNA
- Ribosome is composed of 60S and 30S subunit
- 60S and 40S makes up the 80S ribosome
- 60S subunit consists of 5S rRNA and 23S rRNA

**Question No.34**

The milky water found in green coconuts is

- liquid female gametophyte
- liquid chalaza
- Liquid nucellus
- liquid nuclear endosperm

**Question No.35**

Which of the following statements are NOT true about dideoxy sequencing?

- its the method of DNA sequencing based on the process of replication
- any DNA fragment can be sequenced by without prior amplification
- after the incorporation of ddNTP the synthesis terminates due to lack of 3'OH
- a special nucleotide called dideoxyribonucleoside triphosphate used

**Question No.36**

One of the statements about biogas is wrong.

- Sludge can be used as a biofertilizer
- It kills pathogens
- It increases BOD
- It removes bad odours

**Question No.37**

In Oligonucleotide directed mutagenesis the single mismatch nucleotide is present in

- Centre or near to centre position in the primer
- 3' end of the primer sequence
- Centre of the template
- 3'end of the template

**Question No.38**

Three types of RNA involved in comprising the structural and functional core for protein synthesis, serving as a template for translation, and transporting amino acid, respectively, are

- rRNA, tRNA, mRNA
- rRNA, mRNA ,tRNA
- mRNA, tRNA, rRNA
- tRNA, rRNA, mRNA

**Question No.39**

One of the statement about the free radicals is incorrect

- Electrons or molecules with unpaired orbital electrons in outer shell
- The spin of the electron around its axis is only in clockwise direction
- The free radicals are very reactive.
- The unpaired electron of free radical revolves around the nucleus

**Question No.40**

Which is not a property of a good cloning vehicle

- Should be maintained as one copy per cell
- Low molecular weight
- Presence of Multiple Cloning site
- Presence of Selectable marker

**Question No.41**

An example of reporter vector is

- CAT based vector
- Ti plasmid
- pBR322
- M13 phage

**Question No.42**

If the GC content of a Double stranded DNA molecule is 44 percent, what are the percentages of the four bases (A, T, G & C) respectively?

- 28, 28, 22 & 22
- 22, 22, 28 & 28
- 22, 28, 22 & 28
- 28, 22, 22 & 28

**Question No.43**

Which one of the following terms represents the organic compounds having with both acidic and basic properties?

- Compound molecule
- Mutaroted molecule
- Autophagic molecule
- Amphoteric molecule

**Question No.44**

One of the following is not an entomopathogenic fungus

- *Verticilliumlecanii*
- *Baeuveriabassiana*
- *Metarrhiziumanisopliae*
- *Trichodermaviride*

**Question No.45**

The genome of an organism consists of approximately 1.8x106 base pairs. DNA synthesis occurs at a rate of 30bp/sec. In the early embryo, the entire genome is replicated in 5 min. How many bi-directional origins of synthesis are required to accomplish this feat?

- 2000
- 100
- 200
- 1000

**Question No.46**

Phosphate linkers are joined to convert the blunt ends into cohesive ends with the help of the following enzyme

- DNA ligase
- Polynucleotide Kinases
- Terminal transferase
- Phosphodiesterase

**Question No.47**

With reference to induced pluripotent stem cells (iPSCs), consider the following statements :
1. They are originally embryonic stem cells.
2. Tissues derived from iPSCs can avoid rejection by the immune system.
Which of the statements given above is/are correct?

- 1 only
- 2 only
- Both 1 and 2
- Neither 1 nor 2

**Question No.48**

Pinpoint the nearest localization in order for the following: $F_0F_1$-ATPase, $FADH_2$ Porins Matrix of mitochondria"

- Outer mitochondrial membrane, Pyruvate dehydrogenase activity, Inner mitochondrial membrane, Protein complex II
- Inner mitochondrial membrane Protein complex II, Outer mitochondrial membrane, Pyruvate dehydrogenase activity.
- Inner mitochondrial membrane, Protein complex II, Outer mitochondrial membrane Pyruvate dehydrogenase activity
- Protein complex II, Outer mitochondrial membrane, Pyruvate dehydrogenase activity, Inner mitochondrial membrane.

**Question No.49**

Name the stain used to distinguish between living/viable and dead/non-viable cells to assess the viability of a cell culture.

- Giemsa
- Acetocarmine
- Trypan blue
- EtBr

**Question No.50**

Which of the following statement is true about histone modification of chromatin remodeling

- Histone deacetylase (HDAC) removes acetate group in histone tails and the attraction between the basic histone proteins and the acidic DNA is tightened.
- Histone Acetyl Transferase (HAT) removes acetate group from histone tails and the attraction between the basic histone proteins and the acidic DNA is lessened.
- Histone Acetyl Transferase (HAT) adds acetate group in histone tails and the attraction between the basic histone proteins and the acidic DNA is tightened.
- Histone deacetylase (HDAC) adds acetate group in histone tails and the attraction between the basic histone proteins and the acidic DNA is lessened.

**Question No.51**

Which one of the following indicate steps involved in DNA foot-printing to monitor interaction of DNA with a protein?

- DNA + protein-> treat with restriction enzymes -> run agarose gel -> stain with ethidium bromide and view under UV light.
- Analyze fragments obtained from the experiments described in (b) by MALDI mass spectrometry.
- DNA + protein -> treat with DNAse followed by restriction enzymes. Run the sample on SDS page and visualize by commassie blue staining.
- Label one of the DNA strands with a radiolabel-> treat one portion of labelled DNA with the protein of interest followed by reaction with

DNAse-> treat second portion of DNA with only DNAse. Run both the treated DNA samples on a sequencing gel.

**Question No.52**

Maternal Immunoglobulin is _____

- IgE
- IgA
- IgG
- IgM

**Question No.53**

The nucleotide sequence of a DNA codon is GTA. A mRNA molecule with the complementary codon is transcribed, in the process of translation, a tRNA pairs with the mRNA codon. What is the nucleotide sequence of the tRNA anti-codon?

- GUA
- CAU
- CAT
- CUT

**Question No.54**

Wobble base pairing is between the

- 3rd base of the codon and 3rd base of the anti-codon.
- 1st base of the codon and 1st base of the anti-codon.
- 3rd base of the codon and the 1st base of the anti-codon.
- 1st base of the codon and the 3rd base of the anti-codon.

**Question No.55**

Long DNA fragments cannot be amplified by Taq polymerase. Because

- It lacks 5'-3' endonuclease activity
- It lacks 3'-5' exonuclease activity
- It lacks 5'-3' exonuclease activity
- It lacks 3'-5' endonuclease activity

**Question No.56**

Who proposed the Fluid Mosaic Model for plasma membrane?

- Robert Hook
- Singer and Nicolson

- Scleiden and Schwan
- Von Mohl

**Question No.57**

Senescence of leaves could be delayed by

- Auxin
- Cytokinins
- Ethylene
- Gibberellins

**Question No.58**

Which is not a property of a good cloning vehicle

- Presence of Multiple Cloning site
- Presence of Selectable marker
- Should be maintained as one copy per cell
- Low molecular weight

**Question No.59**

Which of the following ions/cations accelerate the hydrolysis of fats?

- $Na^{++}$
- $Mg^{++}$
- $Fe^{++}$
- $Ca^{++}$

**Question No.60**

The yeast two-hybrid system is designed to identify which of the following?

- Two proteins that are involved in the same metabolic pathway
- Two proteins that directly interact with one another
- Human proteins that are required for binding RNA polymerase
- All of the components of a multiprotein complex

**Question No.61**

At which stage of Meiosis I the pairing of homologous chromosomes takes place

- Leptotene
- Pachytene

- Zygotene
- Diplotene

**Question No.62**

Which type of Restriction enzyme recognize and cleave the same target sequence?

- Type I
- Type III
- Type II
- Type IIs

**Question No.63**

For the charging of tRNA molecules the acyl linkage occurs between the carboxyl group of the amino acid to the _____

- 2’ hydroxyl group of G
- 2’ hydroxyl group of A
- 3’ hydroxyl group of T
- 3’ hydroxyl group of C

**Question No.64**

Keratin has larger amount of

- Magnesium
- Sulphur
- Calcium
- Phosphorus

**Question No.65**

The mRNA sequence 5’- AUG GCC GAA AGU GGU – 3’ codes for the peptide sequence Met-Ala-Glu-Ser-Gly. Mutations A, B & C makes the following changes in the mRNA sequence and peptide sequence:
A. AUG GCA GAA AGU GGU – leads to formation of Met-Ala-Glu-Ser-Gly peptide.
B. AUG GCC GAC AGU GGU – leads to formation of Met-Ala-Asp-Ser-Gly peptide.
C. AUG GCC GAC AAG UGG U – leads to formation of Met-Ala-Asp-Lys-Trp peptide.
What are these mutations named?

- A – Silent mutation, B – Missense mutation & C – Frame-shift mutation.
- A- Point mutation, B- Nonsense mutation & C- Addition
- A- Silent mutation, B – Missense mutation & C – Addition

A – Point mutation, B – Silent Mutation & C – Frame-shift mutation.

**Question No.66**

If a fragment of a chromosomes breaks off and re-attaches to the original chromosome but in the reverse direction, the resulting chromosome abnormality is called

- Reciprocal translocation
- Non-disjunction
- Inversion
- Translocation

**Question No.67**

Integral membrane proteins are attached by which interaction

- intramembrane alpha strands.
- Ionic bonds
- covalent bonds to membrane lipids.
- intramembrane alpha helices

**Question No.68**

Which of the following molecules functions to transfer information from the nucleus to the cytoplasm?

- rRNA
- DNA
- mRNA
- lipids

**Question No.69**

In the Meselson-Stahl DNA replication experiment, what percent of the DNA was composed of one light strand and one heavy strand after one generation of growth in 14N containing growth media?

- 25
- 100
- 75
- 50

**Question No.70**

The enzymes that are associated in conversion of fats into carbohydrates are present in

- Glyoxysomes
- Liposomes
- Golgi bodies
- Microsomes

**Question No.71**

The predominant enzymes involved in the degradation of hydrocarbons are known as

- Dioxygenases
- Proteases
- Lipases
- Ketolases

**Question No.72**

The following group of bacteria are strict anaerobes

- Hydrolytic bacteria
- Acetogenic bacteria
- Methanogenic bacteria
- Methylotrophic bacteria

**Question No.73**

RNAs that catalyze biological reactions, such as self-splicing introns, are known as

- splicesosmes
- mature RNAs
- lariats
- ribozymes

**Question No.74**

Which of the following system can be utilized for protein glycosylation in rDNA technology?

- Bacterial bio rectors
- Mammalian Cell lines
- Small bacterial fermentors
- Large bacterial fermentors

**Question No.75**

Who proposed the Fluid Mosaic Model for plasma membrane?

- Robert Hook
- Singer and Nicolson
- Von Mohl
- Scleiden and Schwan

**Question No.76**

One of the following enzymes has molybdenum

- Hexokinase
- Flavin oxidase
- Carboxylase
- Nitrate reductase

**Question No.77**

Which one of the following compounds is the most difficult in biodegradation?

- Aliphatic chain compounds
- Meta aromatic compounds
- Para aromatic compounds
- Ortho aromatic compounds

**Question No.78**

The oxidation of fatty acids in the mitochondria takes place in the

- Cytochrome C
- The protein complex I.
- Matrix of mitochondria
- The protein complex IV.

**Question No.79**

For the DNA strand 5'-TACGATCATAT-3' the correct complementary DNA strand is

- 3'-GCATATACGCG-5'
- 3'-ATGCTAGTATA-5'
- 3'-TATACTAGCAT-5'
- 3'-AUGCUAGUAUA-5'

**Question No.80**

During DNA replication the Okazaki fragments on the lagging strand are joined

together by

- Helicase
- DNA polymerase
- Primase
- DNA ligase

**Question No.81**

Cosmids can carry DNA inserts of size

- 50Kb
- 50Mb
- 200bp
- 100kb

**Question No.82**

Northern blotting is used for analyzing

- RNA
- Protein
- cDNA
- DNA

**Question No.83**

Virus-free plants could be obtained from

- Seed
- Leaves
- Fruits
- Shoot apex

**Question No.84**

Positional cloning involves which of the following?

- Assembling clone contigs for an entire genome
- Identifying genes present in genomic sequences
- Fingerprinting a chromosome or DNA fragment to provide a map for sequencing
- Walking along a chromosome from a marker to a nearby gene

**Question No.85**

DNA uptake by an E. Coli and an Animal Cell is referred respectively as:

- Transformation & Transfection
- Transfection & Transformation
- Transformation & Cloning
- Transfection & Cloning

**Question No.86**

What is the substrate used in Blue-White selection during cloning experiments

- 5,5'-Dibromo-4,4'dicholoroindigo
- X-gal
- glucose
- IPTG

**Question No.87**

One of the following chemicals is not required for the cultivation of Rhizobium

- $KNO_3$
- $KH_2PO_4$
- NaCl
- $MgSO_4$

**Question No.88**

One of the following is wrongly associated. Which one is it?

- Maltose-pepsin
- Starch-amylase
- Fat-lipase
- Protein-trypsin

**Question No.89**

The Cre system, utilized by plant genetic engineers, is an example of which type of recombination?

- Transposition
- Site-specific recombination
- Retrotransposition
- Homologous recombination

**Question No.90**

Which of the Following statement/s is/are TRUE?
i. Nucleotides are Phospho-Nucleosides.

ii. Nucleosides are Phospho – Nucleotides.
iii. Adenine & Thymine are Purines, Guanine & Cytosine are Pyrimidines.
iv. Adenine & Cytosine are Purines, Guanine & Thymine are Pyrimidines.

- i & iv
- i &iii only
- iii only
- i Only

**Question No.91**

The A260 value of a dsDNA molecule at $37^{o}C$ and $70^{o}C$ were 0.21 and 0.40 respectively.The difference between the A260 is because of

- removal of glycosidic bonds in dsDNA
- removal of hydrogen bonds between the nitrogenous bases
- removal of phosphodiester bonds in dsDNA
- degradation of nucleotides at higher temperature

**Question No.92**

One of the following ratio is constant for DNA

- A+G/T+C
- A+U/C+G
- A+C/U+G
- A+T/G+C

**Question No.93**

Left handed helix of DNA type is found in

- Z type only
- B & Z type
- A + B type
- B type only

**Question No.94**

Which one of the following is the regulatory sub unit of the mitosis promoting factor (MPF)

- Cylcin
- Cdk (Cylcin dependent kinase)
- Proline
- Ubiquitin

**Question No.95**

What happens if both the 5’ and 3’ end of DNA has –OH group?

- Replication will take place only in 3’ to 5’ direction
- Replication takes place in both the directions
- Replication will take place only in 5’ to 3’ direction
- Replication will not take place

**Question No.96**

Some types of cancerous cells express _____ _____ _____ on their surfaces. These allow them to be recognized by natural killer cells, which can then attack and kill them.

- Killer attack receptors
- T-cells
- immunoglobins
- B-cells

**Question No.97**

Which of the following statement explains the 32P and 35S radio labeling in Hershey – Chase experiment to confirm the genetic material?

- The 32P labeled in DNA and 35S labeled in protein, 32P radio activity observed in the progeny Phages.
- The 32P labeled in protein and 35S labeled in DNA, 32P radio activity observed in the progeny Phages.
- The 32P labeled in DNA and 35S labeled in protein, 35S radio activity observed in the progeny Phages.
- The 32P labeled in protein and 35S labeled in DNA, 35S radio activity observed in the progeny Phages.

**Question No.98**

A microarray is a large collection of specific DNA oligonucleotides spotted in a defined pattern on a microscope slide. What is the most useful experiment that can be done with such a tool?

- Comparing newly synthesized nuclear RNA with cytoplasmic RNA to locate introns
- Comparing RNA produced under two different physiological conditions to understand patterns of gene expression
- Comparing proteins produced under two different physiological conditions to understand their function
- Predicting the presence of specific metabolites in a cell

**Question No.99**

Frederick Griffith accidentally discovered transformation when attempting to develop a vaccine for pneumonia. He injected mice with samples from S-strain (virulent) and/or R-strain (nonvirulent) pneumococci bacteria (Streptococcus pneumoniae). Which of the following results is NOT consistent with Griffith's experiments?

- injected mixture of heat-killed S-strain and live R-strain; mouse lives
- injected mixture of heat-killed R-strain and live S-strain; mouse dies
- injected heat-killed S-strain; mouse lives
- injected R-strain; mouse lives

**Question No.100**

The Ultra – Violet absorption maxima for DNA and RNA were:

- 260 & 280nm
- 260nm for Both
- 280 & 260nm
- 280nm for Both