Examination: **Ph.D Biotechnology**

SECTION 1 - SECTION 1

Question No.1

Keratin has larger amount of

- Sulphur
- Phosphorus
- Magnesium
- Calcium

Question No.2

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

- Exonuclease
- RNase A
- RNase H
- Polymerase I

Question No.3

Left handed helix of DNA type is found in

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

Question No.4

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

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

Question No.5

Bubonic Plague is caused by

- *Yersinia pestis*
- *Acinetobacterbaumannii*

- *Trypanosomacruzi*
- *Neisseria gonorrhoeae*

Question No.6

Which one of the following organisms has shortest generation time?

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

Question No.7

Positional cloning involves which of the following?

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

Question No.8

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

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

Question No.9

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

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

Question No.10

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?

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

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

Question No.11

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
- B-cells
- T-cells
- immunoglobins

Question No.12

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
- point of stop
- Check point

Question No.13

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

- Helicase
- DNA polymerase
- Primase
- DNA ligase

Question No.14

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.15

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

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

Question No.16

One of the statement about the free radicals is incorrect

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

Question No.17

Which one of the following is a saturated fatty acid

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

Question No.18

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

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

Question No.19

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 proteins produced under two different physiological conditions to understand their function
- Comparing RNA produced under two different physiological conditions to understand patterns of gene expression
- Comparing newly synthesized nuclear RNA with cytoplasmic RNA to locate introns

  Predicting the presence of specific metabolites in a cell

Question No.20

In Oligonucleotide directed mutagenesis the single mismatch nucleotide is present in

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

Question No.21

An example of reporter vector is

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

Question No.22

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

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

Question No.23

One of the following ratio is constant for DNA

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

Question No.24

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

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

Question No.25

One of the following enzymes has molybdenum

- Carboxylase
- Hexokinase
- Flavin oxidase
- Nitrate reductase

Question No.26

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

- NaCl
- KH_2PO_4
- KNO_3
- $MgSO_4$

Question No.27

Radiation that are major source of background radiation are:

- Alpha
- gamma
- beta
- X-rays

Question No.28

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

Question No.29

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

- EtBr
- Giemsa

- Acetocarmine
- Trypan blue

Question No.30

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

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

Question No.31

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

- Lipases
- Dioxygenases
- Ketolases
- Proteases

Question No.32

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

Question No.33

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

- Erythromycin
- Penicillin
- Chloramphenicol
- Tetracycline

Question No.34

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

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

Question No.35

Maximum photosynthesis takes place in

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

Question No.36

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

- Liposomes
- Glyoxysomes
- Golgi bodies
- Microsomes

Question No.37

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

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

Question No.38

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

Question No.39

Tm value of the primers is determined by

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

Question No.40

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

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

Question No.41

One of the triplets does not code for any amino acid

- UCA
- UAA
- UUA
- UTA

Question No.42

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

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

Question No.43

Which is not a property of a good cloning vehicle

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

Question No.44

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

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

Question No.45

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

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

Question No.46

CO_2 is carried in the blood in the form of

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

Question No.47

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

- Inversion
- Translocation
- Reciprocal translocation
- Non-disjunction

Question No.48

Post translational modification refers to

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

Question No.49

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

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

Question No.50

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

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

Question No.51

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

Question No.52

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
- 200

1000

- 100

Question No.53

Maternal Immunoglobulin is _____

- IgM
- IgE
- IgG
- IgA

Question No.54

Increasing biodegradation possibility through employing microbes is known as

- Biomagnification
- Eutrophication
- Bioaugmentation
- Biostimulation

Question No.55

Who proposed the Fluid Mosaic Model for plasma membrane?

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

Question No.56

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

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

Question No.57

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

- removal of polyA tails

- splicing
- cleavage of polycistronic mRNA
- capping

Question No.58

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

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

Question No.59

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

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

Question No.60

Who proposed the Fluid Mosaic Model for plasma membrane?

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

Question No.61

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

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

Question No.62

Long DNA fragments cannot be amplified by Taq polymerase. Because

- It lacks 5'-3' exonuclease activity

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

Question No.63

Cosmids can carry DNA inserts of size

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

Question No.64

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

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

Question No.65

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

- rRNA
- lipids
- mRNA
- DNA

Question No.66

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

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

Question No.67

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

- 60S subunit consists of 5S rRNA and 23S rRNA

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

Question No.68

Vitamins are sterilized by way of

- Steam sterilization
- Ultraviolet Radiation
- Filtration
- Pasterurization

Question No.69

Senescence of leaves could be delayed by

- Ethylene
- Cytokinins
- Gibberellins
- Auxin

Question No.70

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?

- 100
- 50
- 25
- 75

Question No.71

One of the statements about biogas is wrong.

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

Question No.72

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

- The protein complex I.

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

Question No.73

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

- Diplotene
- Zygotene
- Pachytene
- Leptotene

Question No.74

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

- 630
- 999
- 111
- 330

Question No.75

What is the correct statement regarding Okazaki fragments?

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

Question No.76

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, 35S 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.

Question No.77

Northern blotting is used for analyzing

- Protein
- cDNA
- DNA
- RNA

Question No.78

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

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

Question No.79

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

Question No.80

Integral membrane proteins are attached by which interaction

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

Question No.81

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

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

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

Question No.82

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

- Phosphodiesterase
- Polynucleotide Kinases
- Terminal transferase
- DNA ligase

Question No.83

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

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

Question No.84

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

- lariats
- ribozymes
- splicesosmes
- mature RNAs

Question No.85

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

- 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.
- 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.
- DNA + protein-> treat with restriction enzymes -> run agarose gel -> stain with ethidium bromide and view under UV light.

Question No.86

The following group of bacteria are strict anaerobes

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

Question No.87

One of the following is not an entomopathogenic fungus

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

Question No.88

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.89

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?

- CAU
- GUA
- CUT
- CAT

Question No.90

Paracrine signalling is involved in which of the following

- Are affected by abiotic and biotic conditions

  They are produced in response to stimuli like heat, light.

- 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.

Question No.91

Genomic library is a collection of recombinant molecules

- That have been sequenced
- With inserts that contain all of an organism's genome
- With inserts that contain all of the genes of an organism
- That express all of the genes of an organism

Question No.92

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?

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

Question No.93

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

- chloroplasts
- nuclei
- endoplasmic reticulum .
- mitochondria

Question No.94

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

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

Question No.95

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

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

Question No.96

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

Question No.97

Virus-free plants could be obtained from

- Shoot apex
- Seed
- Leaves
- Fruits

Question No.98

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 deacetylase (HDAC) adds acetate group in 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.

Question No.99

The milky water found in green coconuts is

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

Question No.100

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