REV-00
MSZ/29/36

2017/06

M.Sc. Zoology
Fourth Semester
CELL & MOLECULAR BIOLOGY
MSZ-402 A

Duration: 3 Hrs. **Marks: 70**

Part : A (Objective) = 20
Part : B (Descriptive) = 50

[PART-B : Descriptive]

Duration: 2 Hrs. 40 Mins. **Marks: 50**

[Answer question no. One (1) & any four (4) from the rest]

1. Write short notes on *any two*: (5+5=10)
   a. Human Genome Project.
   b. Differentiate between benign and malignant tumour.
   c. Receptor Tyrosine Kinase.

2. Distinguish between cloning vector and expression vector. State the mechanism of cloning in a given vector (plasmid). (3+7=10)

3. What is meant by Splicing? How does Splicing mechanism involve in the process of mRNA editing within the nucleus? Explain. (2+8=10)

4. What is Restriction endonuclease (R.E.)? State the phenomenon of Restriction Modifications. Explain the mechanism of R.E. catalytic action. (2+2+6=10)

5. What do you mean by apoptosis? Explain the intrinsic pathway of apoptosis with proper illustration. (2+8=10)

6. What is maximum life span and maximum life expectancy? Discuss briefly about different theories of aging. (4+6=10)

7. Write a note on classification of Intermediate Filaments (I.F.). Explain the polymerization and depolymerization of I.F. with diagram. (4+4+2=10)

8. Describe the structure and working mechanism of G-protein coupled receptors. Illustrate with proper diagram. (4+4+2=10)

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[Part-A : Objective]

Choose the correct answer from the following: **1×20=20**

1. Enzyme used in formation of cDNA from mRNA is
   a. Helicase
   b. Polymerase
   c. Reverse transcriptase
   d. Gyrase

2. The location of a given gene in the ORF sequence could be recognized by the presence of _____ in the 5'-3' direction.
   a. ATG
   b. TAA
   c. CAG
   d. UCA

3. Which of the following is not true for restriction endonuclease?
   a. Restriction enzymes work in presence of Mg^{2+}.
   b. Type II restriction endonucleases do not require ATP for restriction activities.
   c. It is present in both eukaryotes and prokaryotes.
   d. Each restriction enzyme only recognises the same palindromic sequences regardless of DNA source.

4. PCR is considered as a revolutionary technology because of all the following, except
   a. It enbles an unlimited production of a DNA fragment *in vitro*.
   b. It is a highly sensitive technology.
   c. Its experimental protocol is simple.
   d. It enables the direct production of a synthetic gene that did not exist before.

5. Restriction endonucleases hydrolyses polunucleotide from
   a. Only the 5' end.
   b. Either terminal.
   c. At an internal phosphodiester bond.
   d. A phosphodiester bond within a specific sequence.

6. The first step in PCR is
   a. Denaturation
   b. Primer extension
   c. Annealing
   d. Cooling

7. Any DNA molecule that has the ability to replicate in an appropriate host cell, to which the desire genes are integrated for cloning is called as
   a. Plasmid
   b. Linker
   c. Adapter
   d. Vector

8. Expression vectors differs from a cloning vector in having
   a. An origin of replication
   b. Unique restriction site
   c. Suitable marker genes
   d. Control element

9. Which of the following vectors have been widely used in Human Genome Project?
   a. Plasmid and cosmid
   b. Lambda phage and M13 vectors
   c. Phagemid and shuttle vectors
   d. BAC and YAc

10. Small cDNA sequence that represents a unique sequence of an active gene is
    a. SNPs
    b. SnRNAs
    c. ESTs
    d. Contigs

11. Mutation in which cell organelle leads to defect in energy production and formation of ROS?
    a. Nucleus
    b. Mitochondria
    c. Golgi body
    d. Rough ER

12. Study of ageing is called-
    a. Anthropology
    b. Histology
    c. Gerontology
    d. Senology

13. Which cellular organelles are involved in the initiation of the intrinsic pathway of apoptosis?
    a. Endoplasmic Reticulum
    b. Lysosomes
    c. Mitochondria
    d. Peroxisomes

14. What roles in regulating the intrinsic pathway of apoptosis are played by the Bcl-2 protein family members Bax and Bcl-2?
    a. Bax inhibits apoptosis while Bcl
    b. Bax stimulates apoptosis while Bcl
    c. Both Bax and Bcl
    d. Both Bax and Bcl

15. Cancer is often the result of activation of _____ to _____ and the inactivation of _____ genes.
    a. Oncogenes, tumor-suppressor genes, proto-oncogenes
    b. Proto-oncogenes, oncogenes, tumor-suppressor genes
    c. Oncogenes, proto-oncogenes, tumor-suppressor genes
    d. Proto-suppressor genes, suppressors, oncogenes

16. Hydrolysis of GTP to GDP on microtubules _____
    a. Provides the energy for movement of the axoneme
    b. Drives the movement of motor proteins
    c. Leads to depolymerization of the microtubule
    d. Is necessary for polymerization of the tubulin subunits

17. The types of cellular cargo transported by MAPs are
    a. Ribonucleo protein particles, Chromosomes
    b. Vesicles, Lysosomes, Mitochondria
    c. Both (a) and (b)
    d. Neither (a) and (b)

18. Kinesin is a motor protein that moves
    a. Flagella back and forth
    b. Vesicles toward the minus end of microtubules
    c. Vesicles toward the plus end of actin
    d. Organelles toward the plus end of microtubules

19. Which of the following statements is not true about a ligand-gated ion channel receptor?
    a. Ligand-gated ion channel receptors are present in the cell membrane.
    b. Neurotransmitters can act as the chemical messengers for ligand-gated ion channels.
    c. Ligand-gated ion channels consist of five glycoproteins.
    d. Differences in membrane potential affect whether ligand-gated ion channel receptors open or close.

20. Which of the following statements is true about a G-protein coupled receptor?
    a. It contains five transmembrane hydrophobic sections.
    b. There are more extracellular loops than intracellular loops.
    c. The binding region for the G-protein involves two extracellular loops.
    d. The N-terminal chain is extracellular and the C-terminal chain is intracellular.

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UNIVERSITY OF SCIENCE & TECHNOLOGY, MEGHALAYA

Question Paper CUM Answer Sheet

[PART (A) : OBJECTIVE]

Serial no. of the main Answer sheet

Course : .....

Semester : ..... **Roll No :** .....

Enrollment No : ..... **Course code :** .....

Course Title : .....

Session : 2016-17 **Date :** .....

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Instructions / Guidelines

- The paper contains twenty (20) / ten (10) questions.
- The student shall write the answer in the box where it is provided.
- The student shall not overwrite / erase any answer and no mark shall be given for such act.
- Hand over the question paper cum answer sheet (Objective) within the allotted time (20 minutes / 10 minutes) to the invigilator.

Full Marks	Marks Obtained	Remarks
20		

Scrutinizer's Signature *Examiner's Signature* *Invigilator's Signature*