KATHMANDU UNIVERSITY
End Semester Examination [C]
April, 2022

Marks Scored:

Level: B.Tech.
Year : II

Course : BIOT 205
Semester : I

Exam Roll No. :

Time: 30 mins.

F. M. : 20

Registration No.:

Date :

SECTION "A"
[20Q. × 1 = 20 marks]

Choose and tick [✓] the most appropriate option.

1. In 1861, who concluded that all living cells with protoplasm contained nucleus and cell organelles?
   [ ] Anton van Leeuwenhoek [ ] Robert Brown
   [ ] Francis Janssen [ ] Max Schultze

2. The sugar component of prokaryotic cell wall consists of alternating residues of
   [ ] β-(1,4) linked N-acetylglucosamine and N-acetylmuramic acid
   [ ] α-(1,4) linked N-acetylglucosamine and N-acetylmuramic acid
   [ ] β-(1,4) linked N-acetylgalactosamine and N-acetylmuramic acid
   [ ] α-(1,4) linked N-acetylgalactosamine and N-acetylmuramic acid

3. Which of the following is not considered as a benefit of having organelles in eukaryotes?
   [ ] Incompatible chemical reactions can be separated
   [ ] Chemical reactions become more efficient
   [ ] Enzymes can be clustered together
   [ ] Increased complexity benefits multicellular eukaryotes

4. If the genome of virus has complementary sequence to that of the viral mRNA produced; it is termed as:
   [ ] Positive strand virus [ ] Negative strand virus
   [ ] Positive strand Retrovirus [ ] Negative strand Retrovirus

5. The phosphate group of phospholipids are attached to Glycerol at:
   [ ] 1st position [ ] 2nd position
   [ ] 3rd position [ ] 4th position

6. Which of the following has the highest permeability across lipid bilayer:
   [ ] Steroid hormone [ ] Urea
   [ ] Glycerol [ ] Sucrose

7. The lumen of endoplasmic reticulum is topologically equivalent to
   [ ] Matrix of Mitochondria [ ] Extracellular space
   [ ] Lumen of Vacuole [ ] Nucleoplasm

8. Which movement of compounds can be categorized as endocytic pathway?
   [ ] Endoplasmic Reticulum to Golgi body
   [ ] Late Endosome to Golgi body
   [ ] Early Endosome to Recycling Endosome
   [ ] Early Endosome to Late Endosome

9. Movement of protein across mitochondrial membrane is mediated by:
[ ] TOM/TIM complex
[ ] VDAC channel
[ ] ANT transporter
[ ] PT pore

10. Which type of organism has the highest variability in terms of DNA contained within the haploid nucleus?
[ ] Flatworms
[ ] Fungi
[ ] Algae
[ ] Protozoa

11. The Z disc found at the end of sarcomere is an attachment point for:
[ ] plus ends of action filaments
[ ] minus ends of actin filaments
[ ] both ends of actin filaments
[ ] myosin II filaments

12. Which of the protein attached to microtubule is associated with its de-polymerization?
[ ] Kinesin -13
[ ] XMAP215
[ ] Troponin T
[ ] Tropomyosin

13. Proteins targeted for movement into nucleus has the nuclear import signal as:
[ ] Lys-Thr-Lys-Arg-Lys
[ ] Lys-Lys-Lys-Arg-Lys
[ ] Lys-Phe-Lys-Arg-Lys
[ ] Lys-Ala-Lys-Arg-Lys

14. The arrangement of microtubules in cilia follows
[ ] 9+2 pattern
[ ] 11+2 pattern
[ ] 9+3 pattern
[ ] 11+3 pattern

15. During cell division, chromosomes are aligned at the equatorial plate in:
[ ] Prophase
[ ] Metaphase
[ ] Anaphase
[ ] Telophase

16. Recombination takes place in prophase I in Meiosis; during which the actual exchange of DNA takes place in
[ ] Leptotene
[ ] Zygotene
[ ] Pachytene
[ ] Diplotene

17. Signals are released into the extracellular space and act locally on neighboring cells in
[ ] Contact dependent signaling
[ ] Paracrine signaling
[ ] Synaptic signaling
[ ] Endocrine signaling

18. Which receptor Tyrosine kinase stimulates angiogenesis?
[ ] Insulin-like Growth Factor
[ ] Nerve Growth Factor
[ ] Platelet-derived Growth Factor
[ ] Vascular Endothelial Growth Factor

19. Which of the following protein is anti-apoptotic in nature?
[ ] Bcl2
[ ] Bax
[ ] Bak
[ ] Bid

20. Fibrosarcoma is a tumor which occurs in
[ ] Ectoderm
[ ] Mesoderm
[ ] Endoderm
[ ] Connective tissue

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Level	: B. Tech.	Course	: BIOT 205
Year	: II	Semester	: I
Time	: 2 hrs. 30 mins.	F. M.	: 55

SECTION "B"

[5Q. × 7 = 35 marks]

Attempt ANY FIVE questions.

1. a. Explain the types of prokaryotes based on how it obtains energy and its relationship to oxygen utilization. [4]
   b. Explain how oligosaccharides are processed in different Golgi Apparatus. [3]

2. a. Compare H+ concentrations and arrangement of ATP synthase in mitochondria and chloroplast with appropriate figures. [4]
   b. Explain Glyoxylate cycle with labelled diagram. [3]

3. a. Show how the cadherin dependent cell-cell adhesion guides the organization of developing neural tube. [4]
   b. Explain how DNA is packaged during cell division. [3]

4. a. Explain how Kinesin moves along the Microtubule with a figure. [4]
   b. Explain the experimental setup that led to the discovery of Maturation Promoting Factor. [3]

5. a. State the functions of different phases of cell cycle and associated checkpoints. [4]
   b. Intracellular signaling proteins using ATP and GTP acts as molecular switches. Explain any one of them with a figure. [3]

6. a. Explain the response of a rod photoreceptor cell in response to light. [4]
   b. Explain the ways by which extracellular survival factors can inhibit apoptosis. [3]

7. a. Describe the oncogenic hypothesis of caner development. [4]
   b. Explain how the DNA methylation patterns could change in aging twins. [3]

SECTION "C"

8. Differentiate between (**ANY FIVE**): [5 × 2 = 10 marks]
   a. Cell wall of Gram Positive and Gram Negative Bacteria
   b. Simple diffusion and Facilitated diffusion across plasma membrane
   c. Polyploidy and Aneuploidy
   d. G1 phase and G2 phase
   e. Paracrine and Endocrine Signaling
   f. Oncogene and Tumor Suppressor Gene

9. Explain How /Why for (**ANY FIVE**): [5 × 2 = 10 marks]
   a. How lipid bilayer is formed?
   b. How phosphoinositides mark organelles and membrane domains?
   c. How APC complex facilitates chromatin separation during Anaphase?
   d. How root adjusts themselves towards the direction of gravity?
   e. How telomere shortening leads to replicative senescence?
   f. How the smooth muscle cell contracts?