

KATHMANDU UNIVERSITY
End Semester Examination
June/July, 2023

Marks Scored:

Level : B.Tech.

Year : III

Exam Roll No. :

Time: 30 mins.

Registration No.:

Course : BIOT 315

Semester : II

F. M. : 20

Date

11 JUL 2023

SECTION "A"

Mark [X] appropriate answer from the given choices.

[20 Q. × 0.5 = 10 marks]

- DiGeorge's syndrome is an immunodeficiency disease due to microdeletion of chromosome:
 22q11.2 15q11-13 7q11.23 4p16.3
- Which among the following antibiotics act as folate antagonists?
 Penicillin Tetracycline Trimethoprim Cefotaxime
- The point mutation in sickle cell anemia leads to change in codon. Identify the correct change
 UGA to UAA GUG to GAG GAG to GUG UAA to UGA
- Which of the following is not a type of β -lactam antimicrobial?
 Penicillins Glycopeptides Cephalosporins Monobactams
- Endotoxin (LPS) is an important constituent of
 Gram positive bacteria Gram negative bacteria
 Some protozoa Fungi
- Wiskott-Aldrich syndrome is an immunodeficiency disease which occurs due to
 T cell defects B cell defects
 Both B and T cell defects Disorder of Complement
- Cell-wall biosynthesis is inhibited by antibiotics by inhibiting the biosynthesis of which of the following?
 Lipopolysaccharide Cellulose
 Peptidoglycan Proteins
- Benzylpenicillin is the chemical name for which of the following penicillin?
 Penicillin G Penicillin V Penicillin F Phenethicilin
- Which of the following CAG repeat lengths would indicate an individual will develop Huntington Disease?
 41 35 33 30
- Embryonic stem cells are derived from the _____ of the blastocyst.
 inner cell mass ectoderm blastocoel mesoderm

11. Which one of the following genes was NOT part of transcription factors used to generate induced pluripotent stem (iPS) cells from mouse skin fibroblasts?
 Oct4 Sox2 c-jun Klf4
12. In RNA interference, genes are silenced using
 ssDNA dsDNA dsRNA ssRNA
13. The first clinical gene therapy was done for the treatment of
 AIDS Cancer Cystic fibrosis ADA-SCID
14. BRAF gene mutation is a prognostic biomarker for diagnosis of
 Melanoma Sickle cell anemia
 Cystic fibrosis Thalassemia
15. Which selection system is used in a yeast plasmid recombinant?
 Antibiotic Lac
 Auxotrophic mutant cI gene
16. In O-linked glycosylation, monosaccharides bind to the hydroxyl group of which of the following amino acids?
 Histidine or glycine Alanine or tryptophan
 Aspartic acid or glutamic acid Serine or threonine
17. The envelope of a virus is derived from the host's
 nucleic acids membrane structures
 cytoplasm genome
18. A positive-strand RNA virus:
 must first be converted to a mRNA before it can be translated.
 can be used directly to translate viral proteins.
 will be degraded by host enzymes.
 is not recognized by host ribosomes.
19. *PARK7* gene that encodes DJ-1 protein is located in
 chromosome 1 chromosome 7 chromosome 6 chromosome 4
20. Method of gene transfer that involve use if electric impulses of high field strength to increase permeability of membrane by creating transient pores in it, is
 Microinjection Electroporation Biolistics Lipofections

Fill in the blanks.

[10 Q. × 1 =10 marks]

21. In Gram-negative bacteria, quorum sensing signals are
22. Envelope of Influenza A virus contains a spike protein known as that interacts with a sialic acid residue on a glycoprotein in the membranes of secretory cells of the respiratory tract.

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23. Autosomal recessive form of severe combined immunodeficiency disease that is caused by mutations in the adenylate kinase 2 gene is
24. Consider an autosomal dominant trait. If an unaffected parent and an affected heterozygous parent are expecting a child, what is the chance of them having an unaffected child?
25. are stem cells obtained by genetically reprogramming somatic cells back into a pluripotent state.
26. An in vitro fertilization procedure in which sperm is injected directly inside the egg nucleus is
27. are naturally occurring catalytic RNA molecules that have separate catalytic and substrate-binding domains.
28. In a Real Time PCR, the number of cycles required for the fluorescent signal to exceed background levels is called
29. Enzyme that catalyzes the formation of disulfide bonds between cysteine amino acids that are nearby in the folded protein is
30. Diagnostic method involving antigen-antibody reactions that measure the extent of disease based on the intensity of the color is

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SECTION "B"

[3Q. × 8 = 24 marks]

Attempt *ANY THREE* questions.

1. Explain the principal clinical manifestations of HIV infection. What is the pathogenesis of these manifestations? [4+4]
2. Explain the pathological changes and genetic risk factors for Alzheimer's disease.
3. Define antibiotics. Describe the mode of action of protein synthesis inhibitors [1+7]
4. Compare and contrast indirect and sandwich ELISAs. Describe an application of indirect and sandwich ELISAs in the diagnosis of a human disease. [2+6]

SECTION "D"

[31 marks]

Attempt *ANY SIX* questions. (**Q5 is compulsory**)

5. Write short notes on: [2 Q. × 3 = 6 marks]
 - a. SELEX
 - b. Zinc finger nuclease
6. What is Stem Cell? Classify stem cells based on their potency. Explain in brief. [2+3]
7. Mention the three major classes of exotoxins. Contrast the activities of different A–B toxins. [1+4]
8. Describe the mechanisms of bacterial resistance to antibiotics. [5]
9. What strategies can be used to increase proper folding and secretion of recombinant proteins in yeast cells? [5]
10. Explain how two different alleles can be distinguished by using a TaqMan assay? [5]
11. Explain the mechanisms by which viruses enter host cells? What are the functions of the proteins that are typically encoded by “early” and “late” viral genes? [3+2]