

# Question Paper

Exam Date & Time: 28-Jun-2023 (02:00 PM - 05:00 PM)



## MANIPAL ACADEMY OF HIGHER EDUCATION

SECOND SEMESTER M.Sc. (MEDICAL BIOTECHNOLOGY/TISSUE ENGINEERING/GENOME ENGINEERING/MOLECULAR BIOLOGY AND HUMAN GENETICS) DEGREE EXAMINATION - JUNE/JULY 2023  
SUBJECT: MBT/MTE/MGE/MBH 502 - IMMUNOLOGY AND IMMUNOGENETICS  
(OBE - 2021 REGULATION)

Marks: 70

Duration: 180 mins.

**Answer all the questions.**

**Illustrate where necessary.**

**Answer the following questions in an essay format.**

- 1) Describe various strategies employed by innate immune system to eliminate pathogens. (14)
- 2) Explain historical and biochemical evidence for immunoglobulin structure. Discuss antibody diversity. (14)

**Answer the following questions in the form of a brief essay.**

- 3A) Describe role of neutrophils in combating pathogens. (7)
- 3B) Describe IL-6 mediated JAK/STAT Pathway during inflammation. (7)
- 4A) What is haplotype? Describe inheritance of HLA haplotypes. (7)
- 4B) Describe classification and functions of major subsets of T cells. (7)

**5. Answer the following with a brief note:**

- 5A) MALT. (3.5)
- 5B) Resident macrophages. (3.5)
- 5C) Clonal ignorance. (3.5)
- 5D) Haptens and their role in immune system. (3.5)

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# Question Paper

Exam Date & Time: 30-Jun-2023 (02:00 PM - 05:00 PM)



## MANIPAL ACADEMY OF HIGHER EDUCATION

SECOND SEMESTER M. Sc. (MEDICAL BIOTECHNOLOGY/MOLECULAR BIOLOGY AND HUMAN GENETICS) DEGREE  
EXAMINATION - JUNE/JULY 2023  
SUBJECT: MBT 504/MBH 504 - MOLECULAR MEDICINE  
(OBE - 2021 REGULATION)

Marks: 70

Duration: 180 mins.

**Answer all the questions.**

**Illustrate where necessary.**

**Answering the following essay type.**

- 1) What are induced pluripotent stem cells? Discuss Yamanaka factors and how they induce mouse fibroblasts to become induced pluripotent stem cells. (14)
- 2) What type of stem cells are found in bone marrow? Discuss mesenchymal stem cells and their differentiation. (14)

**Answer the following short essay type.**

- 3A) What is an mRNA vaccine? Explain how mRNA vaccines enter our cells to produce proteins using COVID-19 as an example. (7)
- 3B) Briefly describe the process of gene therapy. Give a specific and detailed example of how gene therapy may be used to solve associated with genetic disorders. (7)
- 4A) Make a note about how to find biomarkers using a multi-omics approach. (7)
- 4B) What are the endodermal lineages? Add a note on stem cells and Diabetes. (7)

**5. Answer the following short note.**

- 5A) How does Alzheimer's disease affect cognition? (3.5)
- 5B) What is translational research? (3.5)
- 5C) What roles do stem cells play in regenerative medicine? (3.5)
- 5D) Why the heart does not get cancer? Justify your comments. (3.5)

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