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University Examinations 2023/2024

FOURTH YEAR SECOND SEMESTER EXAMINATION FOR THE DEGREE OF
BACHELOR OF SCIENCE IN MEDICAL MICROBIOLOGY

HMM 3425: VACCINES AND VACCINOLOGY

DATE: APRIL 2024

TIME: 2 HOURS

INSTRUCTIONS: Answer all questions in section one and two and any two questions in section three

SECTION ONE (20 MARKS)

1. Vaccination was invented by
 - a) Jenner
 - b) Pasteur
 - c) Koch
 - d) Salk
2. Hybridoma technique involves the fusion of
 - a) Plasma cells and dendritic cells
 - b) Cancer cells and B cells
 - c) B cells and T cells
 - d) Cancer cells and T cells
3. Which of the following statement is Incorrect about the vaccine development process?
 - a) A vaccine consists of live attenuated or killed germ cells

- b) Aluminum can be used as an adjuvant in a vaccine
 - c) Animal trials are not necessary for vaccines before going to the human trial
 - d) An effective and safe vaccine production can take up to 10 to 15 years
4. Ebola virus disease is a contagious disease and outbreaks have increased in higher numbers throughout the African region since it was first diagnosed. When was the first vaccine against the Ebola virus authorized and approved by the Food and Drug administration, USA (FDA)?
- a) 2021
 - b) 2018
 - c) 2010
 - d) 2019
5. Jenner prepared the vaccine of smallpox by using
- a) The attenuated pathogen of smallpox
 - b) The killed pathogen of smallpox
 - c) The attenuated pathogen of Cowpox
 - d) Pathogens from Cowpox pustule
6. Which of the following substances will not stimulate an immune response unless they are bound to a larger molecule?
- a) Antigen
 - b) Virus
 - c) Hapten
 - d) Miligen
7. A living microbe with reduced virulence that is used for vaccination is considered:
- a) A toxoid
 - b) Dormant
 - c) Virulent
 - d) Attenuated
8. Monoclonal antibodies recognize a single:
- a) Antigen
 - b) Bacterium

- c) Epitope
 - d) B cell
9. The ability of the immune system to recognize self-antigens versus non-self-antigen is an example of:
- a) Specific immunity
 - b) Tolerance
 - c) Cell mediated immunity
 - d) Antigenic immunity
10. An epitope is
- a) B-cell.
 - b) a hapten.
 - c) an antibody.
 - d) the antigen determinant site.
11. Which of the following is useful to STIMULATE antibody production?
- a) An adjuvant
 - b) A hapten
 - c) Antiserum
 - d) Purified antigen
12. The term variolation refers to:
- a) The generation of antibody variable regions.
 - b) The attenuation of virulent organisms
 - c) Inoculation of scab material into small skin wounds
 - d) The removal of scab material from an individual with smallpox
13. Which one of the following diseases has been completely eradicated world-wide?:
- a) Measles
 - b) Smallpox
 - c) Tuberculosis
 - d) Cowpox
14. BCG is used to protect against:
- a) Tuberculosis
 - b) Rabies

- c) Hepatitis B
 - d) Influenza
15. Most viral vaccines are thought to work by which of the following technique?
- a) Inducing the production of antigens
 - b) Inducing the production of cell wall
 - c) Inducing the production of cytosolic proteins
 - d) Inducing the production of antibodies
16. Which of the following is not a property of an ideal vaccine?
- a) It should be genetically stable
 - b) It should have private support
 - c) It should be affordable
 - d) It should not have any side effects
17. Which of the following vaccine contains a mutant strain of a virus that has been derived from wild-type virulent strain?
- a) Inactivated virus vaccines
 - b) Live recombinant virus vaccines
 - c) Virion subunit vaccines
 - d) Live attenuated virus vaccines
18. Which was the first vaccine developed?
- a) Smallpox vaccine
 - b) MMR vaccine
 - c) Polio vaccine
 - d) Rabies vaccine
19. Tetanus is treated by which of the following type of vaccine?
- a) Toxoid vaccine
 - b) Live attenuated vaccine
 - c) inactivated vaccine
 - d) Conjugate vaccine
20. Which of the following is NOT a type/category of vaccine?
- a) Live attenuated vaccines

- b) Killer vaccines
- c) Inactivated vaccines
- d) Toxoid vaccines

SECTION TWO: 40 MARKS

- a) Describe microparticles as used in vaccine delivery systems (6 marks)
- b) Describe briefly the mechanism of action of cancer vaccines (5 marks)
- c) Explain the three types of cancer vaccines (6 marks)
- d) Differentiate between DNA and RNA nucleic acid vaccines (6 marks)
- e) Outline any major discovery by Louis Pasteur in the vaccine development journey (6 marks)
- f) Outline the any three major parameters discovery by that Louis are Pasteur monitored in the by vaccine regulatory development authorities journey while tracking safety of vaccines after approval (6 marks)
- g) Describe adjuvants and their benefits when added to vaccines (6 marks)

SECTION THREE: 40 MARKS

- 1. Discuss in detail the economics involved in vaccine production (20 marks)
- 2. Discuss the general stages involved in the vaccine production and approval process (20 marks)
- 3. (i) Describe the historical development vaccines in the 18th century noting the major breakthroughs and the individuals involved (10 marks).
- (ii) Outline the main steps involved in production of monoclonal antibodies (10 marks)