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प्रश्नपुस्तिका क्रमांक
Question Booklet No.

O.M.R. Serial No. | | | | | | | | |

प्रश्नपुस्तिका सीरीज
Question Booklet Series
D

M.Sc (Biotechnology) Third Semester, Examination, February/March-2022
MBT-3001
Cellular and Molecular Immunology

Time : 1:30 Hours **Maximum Marks-100**

जब तक कहा न जाय, इस प्रश्नपुस्तिका को न खोलें

निर्देश : –

1. परीक्षार्थी अपने अनुक्रमांक, विषय एवं प्रश्नपुस्तिका की सीरीज का विवरण यथास्थान सही– सही भरें, अन्यथा मूल्यांकन में किसी भी प्रकार की विसंगति की दशा में उसकी जिम्मेदारी स्वयं परीक्षार्थी की होगी।
2. **इस प्रश्नपुस्तिका में 100 प्रश्न हैं, जिनमे से केवल 75 प्रश्नों के उत्तर परीक्षार्थियों द्वारा दिये जाने है। प्रत्येक प्रश्न के चार वैकल्पिक उत्तर प्रश्न के नीचे दिये गये हैं। इन चारों में से केवल एक ही उत्तर सही है। जिस उत्तर को आप सही या सबसे उचित समझते हैं, अपने उत्तर पत्रक (O.M.R. ANSWER SHEET)में उसके अक्षर वाले वृत्त को काले या नीले बाल प्वांइट पेन से पूरा भर दें। यदि किसी परीक्षार्थी द्वारा निर्धारित प्रश्नों से अधिक प्रश्नों के उत्तर दिये जाते हैं तो उसके द्वारा हल किये गये प्रथमतः यथा निर्दिष्ट प्रश्नोत्तरों का ही मूल्यांकन किया जायेगा।**
3. प्रत्येक प्रश्न के अंक समान हैं। आप के जितने उत्तर सही होंगे, उन्हीं के अनुसार अंक प्रदान किये जायेंगे।
4. सभी उत्तर केवल ओ०एम०आर० उत्तर पत्रक **(O.M.R. ANSWER SHEET)** पर ही दिये जाने हैं। उत्तर पत्रक में निर्धारित स्थान के अलावा अन्यत्र कहीं पर दिया गया उत्तर मान्य नहीं होगा।
5. ओ०एम०आर० उत्तर पत्रक **(O.M.R. ANSWER SHEET)** पर कुछ भी लिखने से पूर्व उसमें दिये गये सभी अनुदेशों को सावधानीपूर्वक पढ़ लिया जाय।
6. परीक्षा समाप्ति के उपरान्त परीक्षार्थी कक्ष निरीक्षक को अपनी प्रश्नपुस्तिका बुकलेट एवं ओ०एम०आर० शीट पृथक–पृथक उपलब्ध कराने के बाद ही परीक्षा कक्ष से प्रस्थान करें।
7. निगेटिव मार्किंग नहीं है।

महत्वपूर्ण : – **प्रश्नपुस्तिका खोलने पर प्रथमतः जॉच कर देख लें कि प्रश्नपुस्तिका के सभी पृष्ठ भलीभॉति छपे हुए हैं। यदि प्रश्नपुस्तिका में कोई कमी हो, तो कक्ष निरीक्षक को दिखाकर उसी सीरीज की दूसरी प्रश्नपुस्तिका प्राप्त कर लें।**

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1. Antigen processing for presentation by MHC class II molecules involves :
   (A) DM
   (B) LMP2
   (C) TAP1 and TAP2
   (D) Calnexin
2. Antigen processing for presentation by MHC class II molecules involves :
   (A) Proteasomal-mediated cleavage
   (B) LMP2
   (C) TAP1 and TAP2
   (D) Calnexin
3. The processing of cytosolic protein involves :
   (A) Transport into late endosomes
   (B) Proteasome-mediated cleavage
   (C) Displacement of invariant chain
   (D) Displacement of beta2-microglobulin
4. The antigen moiety on an antigen-presenting cell recognized by the alpha beta T-cell receptor is :
   (A) Native protein antigen plus Major Histocompatibility Complex (MHC) molecule
   (B) Processed (Peptide) antigen plus MHC
   (C) Processed peptide antigen
   (D) Native antigen
5. Which of the following statements is incorrect? Affinity is :
   (A) A measure of the strength of the binding of antigen to antibody
   (B) The association constant of the Ag/Ab equilibrium
   (C) Avidity
   (D) Related to the free energy change of the Ag/Ab interaction

6. The intermolecular forces which contribute to the interaction between antibody and antigen :

(A) Are all electrostatic

(B) Are all van der Waals

(C) Are all hydrophobic

(D) Rely on a combination of the above

7. A hapten is :

(A) An epitope

(B) A paratope

(C) A small chemical grouping which reacts with preformed antibodies

(D) A carrier

8. MHC class II molecules are found on :

(A) Virtually all cells in the body

(B) B cells, dendritic cells and macrophages

(C) Only gamma-interferon activated cells

(D) Virtually all nucleated cells in the body

9. The T-cell receptor antigen recognition signal is transduced by :

(A) The TCR alpha chain

(B) The TCR beta chain

(C) CD3

(D) CD2

10. Using only random VDJ recombination, from 40 V, 30 D and 6 J gene segments, the number of possible variable regions of an antigen receptor molecule would be :

(A) 40

(B) 76

(C) 7,200

(D) 1.4×10^6

11. The percentage of human peripheral blood T-cells bearing a gamma delta T-cell receptor is :

(A) 30-80%

(B) 1-5%

(C) 100%

(D) 0%

12. The first immunoglobulin heavy chain class to be expressed on the surface of a newly produced B-cell is :

(A) IgM

(B) IgD

(C) IgE

(D) IgG

13. RAG-1 and RAG-2 enzymes effect the recombination of :

(A) VDJ to CH

(B) H to L

(C) CDR1 to CDR2

(D) V to D

14. Ig idiotypes are found :

(A) In the constant region of the heavy chain

(B) In the constant region of the light chain

(C) In the hinge region

(D) In the variable region of both heavy and light chains

15. With reference to the variable Ig domain, which of these answers is false :

(A) It mediates the secondary consequences of antigen recognition

(B) It has anti-parallel beta-pleated sheet structures

(C) It uses beta-turn loops to bind antigen

(D) It has an extra-long beta-turn relative to constant region domains

16. IgA in seromucus secretions :

(A) Has no J-chain

(B) Has no secretory piece

(C) Is dimeric

(D) Cannot bind to neutrophils

17. Which of the following statements does not apply to IgG?

(A) Appears early in the primary immune response

(B) Neutralizes bacterial toxins

(C) Can fix complement

(D) Crosses the human placenta

18. Recombination of V, D and J Ig gene segments :

(A) Only occurs in mature B-cells

(B) Is effected by recombinase enzymes

(C) Only occurs in light chains

(D) Involves heptamer-spacer-heptamer flanking sequences

19. Which of the following gene clusters do not contribute to antigen binding :

(A) VL

(B) CL

(C) VH

(D) D

20. The complementarity determining regions :

(A) Are restricted to light chains

(B) Are in the constant part of the Ig molecule

(C) Bind to Fc receptors

(D) Are concerned in antigen recognition

21. The basic Ig unit is composed of :

(A) 2 identical heavy and 2 identical light chains

(B) 2 identical heavy and 2 different light chains

(C) 2 different heavy and 2 identical light chains

(D) 2 different heavy and 2 different light chains

22. Protection against microorganisms inside cells is provided by :

(A) T-cells

(B) Antibody

(C) C3b

(D) C1q

23. The secondary, but not the primary, immune response is based on :

(A) Memory

(B) The bonus effect of multivalency

(C) Complement activation

(D) Clonal selection

24. Class switching of B-lymphocyte occurs when they encounter :

(A) Cytokines

(B) Antigen

(C) T-lymphocytes

(D) Complement

25. Which cell type produces antibodies?

(A) Macrophages

(B) T-lymphocytes

(C) NK

(D) Plasma cells

26. Secondary antibody responses are better because :

(A) They provide defense against unrelated antigens

(B) They are stronger and faster

(C) The antibody can be made by both T and B cells

(D) Complement-fixing antibodies are made

27. An immune response against grass pollen often involves :

(A) Pathogen-associated molecular patterns

(B) Breakdown of self-tolerance

(C) A hypersensitivity reaction

(D) Reaction against MHC

28. T cell surface receptors for antigen partly recognize :

(A) Cytokines

(B) MHC

(C) ADCC

(D) Antibody

29. Intracellular parasites within macrophages are killed more readily in the presence of:

(A) Gamma-interferon

(B) Antibody

(C) Kinins

(D) Properdin

30. Protective antibodies against infectious agents are often :

(A) Autoantibodies

(B) Neutralizing

(C) Toxoids

(D) Non-specific

31. Edward Jenner vaccinated against smallpox using :

(A) Killed smallpox virus

(B) Cowpox

(C) A recombinant protein derived from smallpox

(D) An unrelated virus

32. Immunological unresponsiveness to self-antigens is called :

(A) Tolerance

(B) Tolerogen

(C) Memory

(D) Acquired immunity

33. The main reason an experimental animal treated with X-rays can act as a living test tube for lymphocyte transfer experiments is because :

(A) It is microbiologically sterile

(B) Complement components will be inactivated

(C) The host lymphocytes are destroyed or unable to divide

(D) Only non-dividing cells are affected

34. Adoptive transfer of acquired immune responsiveness involves the transfer of :

(A) Serum

(B) Antibody

(C) Complement

(D) Lymphocytes

35. A plasma cell secretes :

(A) Antibody of a single specificity related to that on the surface of the parent B-cell

(B) Antibody of two antigen specificities

(C) The antigen it recognizes

(D) Many different types of antibody

36. Specific antibodies are readily detectable in serum following primary contact with antigen after :

(A) 10 min

(B) 1 h

(C) 5-7 days

(D) 3-5 weeks

37. Plasma cells :

(A) Have a thin layer of cytoplasm

(B) Have a highly developed rough endoplasmic reticulum are derived from T-cells

(C) Develop into B-cells

(D) Secrete large amounts of gamma interferon

38. Clonal selection occurs when antigen is encountered by :

(A) Neutrophils

(B) Mast cells

(C) T-cells

(D) Basophils

39. The transplantation of tissue from one part of the body to another is called an :

(A) Auto graft

(B) Isograft

(C) Allograft

(D) Xenograft

40. Which type of hypersensitivity is characterized by a rapid‘wheal and flare’ following introduction of the antigen under the skin?

(A) I

(B) II

(C) III

(D) IV

41. A structural similarity between microbial antigens and self-proteins may trigger an autoimmune response following a systemic infection. The T cell population selected by a pathogen may cross react with self-antigen. This is known as :

(A) Anergy

(B) Molecular Mimicry

(C) Central Tolerance

(D) Suppression

42. Severe combined immunodeficiency (SCID) can be treated with :

(A) Intravenous Immunoglobulin (IvIg)

(B) Haemopoetic Stem Cell Transplants (HSCT)

(C) Thymic transplantation

(D) Immunotherapy

43. The organs provide sites where lymphocytes mature and become antigenically committed.

(A) Primary lymphoid organs

(B) Secondary lymphoid organs

(C) Spleen

(D) None of the above

44. Chemicals released from mast cells during an allergic reaction include all of the following except :

(A) Histamine

(B) Interferons

(C) Prostaglandins

(D) Leukotrienes

45. Auto-immunity develops due to :

(A) Loss of T cells

(B) Loss of plasma cells

(C) Loss of complement

(D) Loss of immunological tolerance

46. Artificially acquired passive immunity refers to immunity from :

(A) Transfer of antibodies from mother to foetus across the placenta

(B) Recognition of an antigen by B cells

(C) Injection of the antigen in a vaccination

(D) Recognition of an antigen by T cells

47. Antigen-specific B-cells can be purified by :

(A) Sedimentation rate

(B) Panning on anti-Ig plates

(C) Binding of fluorescent antigen and separation in the FACS

(D) Forward light scatter in the fluorescence activated cell sorter (FACS)

48. Which one of the following is a primary lymphoid organ :

(A) Lymph nodes

(B) Spleen

(C) Peyer's patch

(D) Thymus

49. Which of the following immunoglobulins is responsible for most allergic and hypersensitivity reactions?

(A) IgA

(B) IgG

(C) IgE

(D) IgM

50. Which of the following is not involved in specific immunity?

(A) Neutrophil

(B) T cell

(C) Plasma cell

(D) B cell

51. The classical and alternative pathways meet at complement component :

(A) C4

(B) C4b

(C) Factor D

(D) C3

52. Which of the following is not involved in first line defence?

(A) Mucus membranes

(B) Saliva

(C) Tears

(D) Antibodies

53. Artificially acquired passive immunity refers to immunity from :

(A) Transfer of antibodies from mother to foetus across the placenta

(B) Recognition of an antigen by B cells

(C) Injection of the antigen in a vaccination

(D) Recognition of an antigen by T cells

54. Auto-immunity develops due to :

(A) Loss of T cells

(B) Loss of plasma cells

(C) Loss of complement

(D) Loss of immunological tolerance

55. Pattern Recognition Receptors (PRR) include :

(A) LPS

(B) PAMPs

(C) Lipoteichoic acid

(D) Lectin-like molecules

56. Ankylosing spondylitis is strongly associated with HLA :

(A) B27

(B) DR3

(C) DR4

(D) B2

57. Pernicious anemia can be treated with :

(A) Thyroxine

(B) Insulin

(C) Vitamin B12

(D) Thymectomy

58. Which of the following is a non-organ specific (systemic) autoimmune disease :

(A) Myasthenia gravis

(B) Systemic lupus erythematosus (SLE)

(C) Hashimoto's thyroiditis

(D) Pernicious anemia

59. A graft between members of the same species is termed an :

(A) Autograft

(B) Isograft

(C) Xenograft

(D) Allograft

60. Anaphylaxis can be triggered by cross-linking of IgE receptors on :

(A) Monocytes

(B) Mast cells

(C) B-cells

(D) Eosinophils

61. Which one of the following mast cell products is not preformed and therefore has to be newly synthesized?

(A) Histamine

(B) Prostaglandin D2

(C) Heparin

(D) Neutral protease

62. Di George syndrome results from defect in :

(A) Purine nucleoside phosphorylase

(B) WASP

(C) Thymic development

(D) DNA repair

63. Defects in neutrophil NADPH oxidase system produce :

(A) Chronic granulomatous disease

(B) Chediak-Higashi disease

(C) Leukocyte adhesion deficiency

(D) Hashimoto's disease

64. Secretory IgA protects external mucosal surfaces by :

(A) Triggering mast cells

(B) Recruiting phagocytic cells

(C) Preventing microbial adherence to the mucosa

(D) Binding to epithelial cells

65. Extracellular bacteria are optimally killed by :

(A) Macrophages plus antibody plus complement

(B) Complement

(C) Antibody

(D) Macrophages plus complement

66. The largest number of deaths from infectious diseases are caused by :

(A) AIDS

(B) Acute respiratory infections

(C) Diarrheal diseases

(D) Tuberculosis

67. Which immunoglobulin class crosses the placenta to provide a high level of passive immunity at birth?

(A) IgA

(B) IgD

(C) IgE

(D) IgG

68. The phenomenon whereby, following successful Ig gene rearrangement, further rearrangement on the sister chromatid is suppressed is called :

(A) Allelic exclusion

(B) Class switching

(C) Productive rearrangement

(D) Clonal selection

69. In the thymic medulla the majority of gamma delta T-cells are :

(A) CD4+CD8+

(B) CD4+CD8-

(C) CD4-CD8+

(D) CD4-CD8-

70. Hassall's corpuscles are found in :

(A) Peripheral blood

(B) Bone marrow

(C) Spleen

(D) Thymus

71. Which of the following is the earliest site of hematopoiesis in the embryo :

(A) Bone marrow

(B) Liver

(C) Spleen

(D) Yolk sac

72. Immune responses are :

(A) Depressed by stress

(B) Stimulated by glucocorticoids

(C) Depressed by estrogens

(D) Stimulated by androgens

73. Cells bearing MHC class I plus peptide are targets for specific :

(A) B-cells

(B) Cytotoxic T-cells

(C) Th1 cells

(D) Th2 cells

74. Injection of a mouse with a very high dose of sheep erythrocytes induces :

(A) A generalized antigen non-specific suppression

(B) Antigen-specific T-suppression

(C) Class switching to IgM antibody production

(D) IFN-gamma production by Th2 cells

75. A major factor regulating the adaptive immune response is :

(A) The neutrophil

(B) Complement membrane attack complex

(C) C-reactive protein

(D) Antigen concentration

76. Prior to class switching, B-cells express :

(A) IgA alone

(B) IgA and IgG

(C) IgM and IgD

(D) IgD alone

77. Which one of the following events occurs earliest in T-cell signaling :

(A) Activation of phospholipase C

(B) Activation of protein kinase C

(C) Production of inositol triphosphate

(D) Activation of protein tyrosine kinase

78. B-cells as distinct from T-cells :

(A) Are polyclonally activated by phytohemagglutinin

(B) Bear surface Ig receptors for antigen

(C) Bear surface CD3 molecules

(D) Are lymphocytes

79. Lipopolysaccharide (LPS) from Gram-negative bacteria is :

(A) Thymus-dependent antigen

(B) A type 2 thymus-independent antigen

(C) A polyclonal activator of murine B-cells

(D) Cross-links Ig receptors on B-cells

80. The early increase in phospholipase C gamma 1 activity following T-cell stimulation :

(A) Represents a sensitive regulatory negative feedback control mechanism

(B) Dephosphorylates protein tyrosine kinase inhibitors

(C) Accelerates hydrolysis of diacylglycerol

(D) Accelerates hydrolysis of phosphatidylinositol diphosphate

81. The T-cell ligand binding B7 on a professional antigen-presenting cell is :

(A) CD28

(B) CD2

(C) LFA-1

(D) ICAM-1

82. The following is characteristic of B- but not T-cells :

(A) Class I MHC

(B) Surface immunoglobulin

(C) Measles virus receptor

(D) Polyclonal activation by concanavalin

83. CD4 :

(A) Is essentially an intracellular glycoprotein

(B) Is heterodimeric

(C) Binds processed peptide in its outer groove

(D) Binds to MHC class II on antigen-presenting cells

84. CD8 is a marker of :

(A) B-cells

(B) Helper T-cells

(C) Cytotoxic T-cells

(D) An activated macrophage

85. Lymphocytes in the lamina propria secrete large amounts of :

(A) IgD

(B) IgA

(C) Gamma delta TCR

(D) Bence Jones protein

86. The germinal center is an important site of :

(A) Hematopoiesis

(B) B-cell maturation

(C) T-cell maturation

(D) Myeloid cell differentiation

87. Which one of the following is a primary lymphoid organ :

(A) Thymus

(B) Spleen

(C) Peyer's patch

(D) Tonsil

88. Antigen-specific B-cells can be purified by :

(A) Sedimentation rate

(B) Panning on anti-Ig plates

(C) Binding of fluorescent antigen and separation in the FACS

(D) Radioimmuno assay

89. PAMP stand for :

(A) Pattern Associated Molecular Pathogen

(B) Pathogen Assisted Molecules & Proteins

(C) Pathogen Associated Molecular Patterns

(D) All of these

90. In all ELISA you might use an antigen or antibody labeled with :

(A) 1251

(B) FITC

(C) Colloidal gold

(D) Horseradish peroxidase

91. Which of the following is not used as a direct conjugate to the antibody for visualizing tissue antigens :

(A) Fluorescein

(B) Anti-immunoglobulin

(C) Alkaline phosphatase

(D) Peroxidase

92. SDS-PAGE separates proteins on the basis of :

(A) Isoelectric point

(B) Sedimentation coefficient

(C) Molecular size

(D) Degree of glycosylation

93. Western blots are primarily used to detect :

(A) Protein

(B) Carbohydrate

(C) Lipid

(D) RNA

94. Characterization of antigens by electrophoresis and immunofixation relies on the reaction of antigen and antibody in (or on) :

(A) Agar

(B) Streptavidin

(C) Gold-plated sensor chip

(D) Latex particles

95. The RAST measures :

(A) Antigen concentration

(B) IgE antibodies

(C) IgM antibodies

(D) Agglutination

96. Latex particles are often used in :

(A) Agglutination tests

(B) Affinity chromatography

(C) Affinity measurements

(D) Adjuvants

97. The affinity of an antibody can be determined by measuring :

(A) Its concentration

(B) The valency of antigen binding

(C) The amount of antibody bound at various antigen concentrations

(D) Its ability to neutralize bacterial toxins

98. Antibody titer refers to the :

(A) Absolute amount of specific antibody

(B) Affinity of specific antibody

(C) Avidity of specific antibody

(D) Highest dilution of antibody still able to give a positive result in a test system

99. An epitope :

(A) Is the area on an antigen which contacts antibody

(B) Is the area on an antibody which contacts antigen

(C) Requires both antigen-binding arms of the antibody molecule for its recognition

(D) Is usually composed of a linear sequence of amino acids

100. Super antigens :

(A) Do not cause pathology

(B) Are not mitogenic for T-cells

(C) Bind to MHC class III

(D) Bind to all members of a given V beta T-cell receptor family

******

Rough Work / रफ कार्य

DO NOT OPEN THE QUESTION BOOKLET UNTIL ASKED TO DO SO

1. Examinee should enter his / her roll number, subject and Question Booklet Series correctly in the O.M.R. sheet, the examinee will be responsible for the error he / she has made.
2. **This Question Booklet contains 100 questions, out of which only 75 Question are to be Answered by the examinee. Every question has 4 options and only one of them is correct. The answer which seems correct to you, darken that option number in your Answer Booklet (O.M.R ANSWER SHEET) completely with black or blue ball point pen. If any examinee will mark more than one answer of a particular question, then the first most option will be considered valid.**
3. Every question has same marks. Every question you attempt correctly, marks will be given according to that.
4. Every answer should be marked only on Answer Booklet **(O.M.R ANSWER SHEET).**Answer marked anywhere else other than the determined place will not be considered valid.
5. Please read all the instructions carefully before attempting anything on Answer Booklet**(O.M.R ANSWER SHEET).**
6. After completion of examination please hand over the Answer Booklet **(O.M.R ANSWER SHEET)** to the Examiner before leaving the examination room.
7. There is no negative marking.

Note: On opening the question booklet, first check that all the pages of the question booklet are printed properly in case there is an issue please ask the examiner to change the booklet of same series and get another one.