CAREER ENDEAVOUR
Best Institute for IIT-JAM, NET & GATE

CSIR-UGC-NET/JRF LIFE SCIENCES
TEST : IMMUNOLOGY

Time : 60 Minutes **Date : 01-11-2019**
M.M. : 60

INSTRUCTION:

1. **There are two parts. Part-B contains 20 objective type questions, each question carry 2 marks and Part-C contains 5 objective type questions, each question carry 4 marks.**
2. **There is negative marking, @ 25% will be deducted for each wrong answer.**
3. **Attempt all the questions, use of calculator is not allowed.**

PART-B

1. During T-cell activation signaling events are important. One such pathway in initiated when Diacylglycerol (DAG) activates protein kinase C (PKC). The isoform of PKC activated is?
   (a) PKC α (b) PKC θ (c) PKC γ (d) PKC δ
2. Many signaling pathways are involved in activation of cells of adaptive immunity. Which among the following pathways is incorrectly matched to its final target?

Pathway	Target
(a) DAG-PKC	NF-KB activation
(b) MAP kinase	AP-1 formation
(c) Ca^{+} - Calmodulin - Calcineurin	NFAT activation
(d) JAK-STAT pathway	V-(D)-J recombination

3. Long-lived plasma cells are found in bone marrow and require a different set of cytokines to enable their longevity. One such cytokine is
   (a) IL-2 (b) CXCR4 (c) APRIL (d) IRF-4
4. Cytokines are needed for class-switching to occur. Which among the following pairs will favour class-switch to IgA?
   (a) IL-4, TGF-α (b) IL-5, TGF-β
   (c) IL-2, IFN-γ (d) IL-4, IFN-γ
5. Mutational hot spot that is frequently targeted during somatic hypermutation is?
   (a) WGCW/WCGW (b) DGYW/WRCH
   (c) XGYC/XCYG (d) TATAA/TTATA
6. Which among the following is NOT found during Type-IV hypersensitive response?
   (a) Macrophages, T_H and T_C cells involved (b) Haptens as possible causes
   (c) Excessive production of cytokines (d) Production of anti-allergen antibodies

7. Animal model used to study systemic lupus erythematosus (SLE) in laboratories is?
   (a) Nude mice (b) Obese strain mice
   (c) (NZBX NZW)F_1 mice (d) Obese strain chicken
8. Rituximab is a drug used for treatment of rheumatoid arthritis and it acts by blocking CD20. The drug molecule is a
   (a) Humanized monoclonal antibody (b) Chimeric monoclonal antibody
   (c) Human monoclonal antibody (d) Synthetic monoclonal antibody
9. Variable surface glycoprotein (VSG) is found on the surface of a protozoan parasite and helps it evade immune system successfully. The protozoan is
   (a) *Trypanosoma brucei* (b) *Leishmania major*
   (c) *Plasmodium falciparum* (d) *Toxoplasma gondii*
10. Which among the following is an example of live-attenuated vaccine?
   (a) Salk vaccine (b) Hepatitis B vaccine
   (c) DPT vaccine (d) Sabin vaccine
11. NK cells initiate killing of target cells via delivery of molecules that could induce target cell damage directly. Which of the following is the most likely molecule?
   (a) Lysozyme (b) Granzyme
   (c) Peroxynitrite (d) Interleukin-2
12. Infection with Mycobacterium tuberculosis primarily evokes which of the following cytokine profiles?
   (a) IL-12, IL-2, and IFN-gamma (b) IL-4 and IL-10
   (c) IL-5 and IL-6 (d) IL-1, IL-4, and IFN-gamma
13. All of the following are true about acute phase proteins EXCEPT
   (a) They include complement proteins (b) They include C-reactive protein
   (c) They are mainly produced in the liver (d) They are not induced by cytokines
14. Hapten is an
   (a) Auto-antibody (b) Allergen
   (c) Antigen (d) Immunogen
15. The ligand for CD28 is
   (a) CD1 (b) CTLA-4
   (c) CD86 (d) MHC-II
16. Which of the following cell types (or their products)is the LEAST effective against extracellular bacterial pathogens?
   (a) Helper T CELLS (b) MACROPHAGES
   (c) Cytotoxic T CELLS (d) B cells
17. The endogenous pathway of antigen presentation involves
   (a) Mostly peptides derived from extracellular pathogens
   (b) Presentation of antigen to Th1 cells
   (c) Presentation of antigen on MHC class II molecules.
   (d) Presentation of antigen to cytolytic T cells

18. IFN gamma
    (a) Induces Th2 responses.
    (b) Is produced by all nucleated cells of the body.
    (c) Was discovered because of its effect on tumors.
    (d) Can activate macrophages

19. The ability of the immune system to recognize self antigens versus non self-antigen is an example of:
    (a) Specific immunity (b) Tolerance
    (c) Humoral immunity (d) Cell mediated immunity

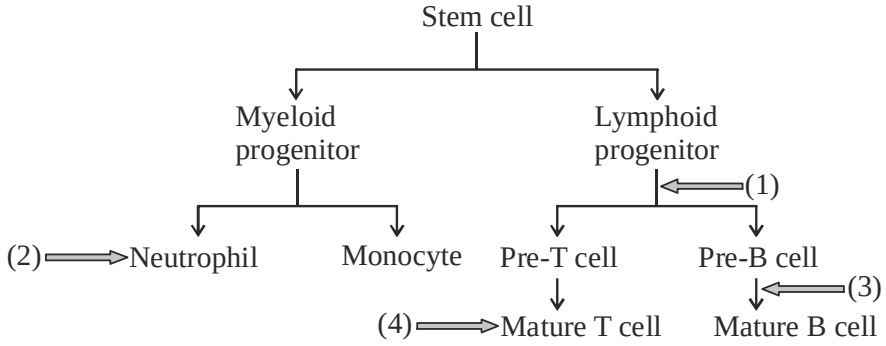
20. Abzymes are:
    (a) Also referred to as zymogens.
    (b) Enzymes that are highly specific like antibodies.
    (c) Enzymes that hydrolyze antibodies.
    (d) Antibodies that have catalytic activities

PART-C

21. In a diagnostic laboratory a technician prepared plastic assay plates for ELISA by coating a solution of the antigen, gp120 (a glycoprotein derived from the human immunodeficiency virus, the etiologic agent of AIDS), to the plastic surface. Several samples of serum from suspected infected individuals were tested for the presence of antibodies to gp120. When the assay was performed, all the test samples were positive, including control samples that were known not to contain anti-gp120 antibodies. What explanation best fits the facts?
    (a) Labeled anti-immunoglobulin was not added.
    (b) The technician put too much antigen on the plates.
    (c) The technician forgot to "block" the plates with a control protein.
    (d) The fluorescent labeling compound got dissociated from the labeled antibody.

22. Given below are some statements about different vaccine types
    P) Transplacental transfer of maternal IgG against measles confers short term immunity
    Q) Attenuated vaccines are more likely to initiate cell mediated immunity than killed vaccines
    R) DNA vaccines can not generate significant immunologic memory
    S) DNA vaccines can be prepared against protein as well as polysaccharide antigens
    Correct statements among these are
    (a) P, Q (b) P, R (c) Q, R (d) R, S

23. Given below are steps in development of immune system cells. Numbers against some steps indicate the cell type whose function is defective or developmental step that is absent in an immunodeficiency disease.



Correct match for (1), (2), (3) and (4) is

(a) 1 : Bare lymphocyte syndrome, 2 : SCID, 3 : Chronic granulomatous disease, 4 : X-linked agammaglobulinemia.

(b) 1 : X-linked agammaglobulinemia, 2 : Chronic granulomatous disease, 3 : SCID, 4 : Bare lymphocyte syndrome

(c) 1 : SCID, 2 : Chronic granulomatous disease, 3 : X-linked agammaglobulinemia 4 : Bare lymphocyte syndrome

(d) 1 : Bare lymphocyte syndrome, 2 : Chronic granulomatous disease, 3 : X-linked agammaglobulinemia, 4 : SCID

24. As amount of viral load for HIV increases in an infected person, his CD_4^+ T-cell count begins to decline. Various mechanisms have been proposed to account for this decrease in CD_4^+ T-cell count. Most likely reason is

(a) Viral load inhibits thymic maturation of T-cells

(b) Virus has cytopathic effects on CD_4^+ T-cells

(c) Virus causes anergy in CD_4^+ T-cells and causes them to undergo forced apoptosis

(d) Virus has hematopoietic inhibiton tendencies that cause immunosuppression

25. The effect of the MHC on the immune response to peptides of the influenza virus nucleoprotein was studied in H-2^b mice that had been previously immunized with live influenza virions. The CTL activity of primed lymphocytes was determined by in-vitro cytolytic assays such as CML. In such assays H-2^K fibroblasts were used as target cells. These target cells were additionally transfected with different H-2^b Class-I MHC genes. These target cells were then infected with live influenza virus or incubated with synthetic nucleoprotein peptides. The results of assays are given below.

	Target cell	Test antigen	CTL activity of influenza primed H-2b lymphocytes (% lysis)
(A)	Untransfected	Live influenza	0
(B)	Transfected with class I D^b	Live influenza	60
(C)	Transfected with class I D^b	Nucleoprotein peptide 365-380	50
(D)	Transfected with class I D^b	Nucleoprotein peptide 50-63	2
(E)	Transfected with class I K^b	Nucleoprotein peptide 365-380	0.5
(F)	Transfected with class I K^b	Nucleoprotein peptide 50-63	1

Based on this data what would be most apt suggestion for someone trying to develop synthetic peptide based vaccine against influenza?

(a) Synthetic peptide based vaccine cannot cover whole population for protection

(b) Multiple different peptides will be needed to generate immunity in different MHC alleleotypes

(c) Lysis response against same antigen can vary widely that can cause seasonal loss in immunity

(d) None of the above

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[ANSWER KEY]

PART-B

1. (b)	2. (d)	3. (c)	4. (b)	5. (b)	6. (d)	7. (c)
8. (b)	9. (a)	10. (d)	11. (b)	12. (a)	13. (d)	14. (c)
15. (c)	16. (c)	17. (d)	18. (d)	19. (b)	20. (d)	

PART-C

21. (c)	22. (a)	23. (c)	24. (b)	25. (b)