

Applied Biology

Con. 3207-12.

KK-2552

(3 Hours)

[Total Marks : 100

28/04/12

Section-I

(40 questions-objective types) (40 x 1 = 40 marks)

1. Which of the following protozoan parasite replicate inside the lysosomes?
 - a. Toxoplasma
 - b. Leishmania
 - c. Trypanosoma
 - d. Plasmodium
2. The absorption of water from the digestive tract occurs mainly in the
 - a. Colon
 - b. Kidneys
 - c. Stomach
 - d. Duodenum
3. Transfer of a segment of DNA from one location to the different location of the genome is known as
 - a. deletion
 - b. reversion
 - c. transposition
 - d. duplication
4. The main source of energy for the body's metabolic processes comes from the breakdown of
 - a. Lipids.
 - b. Proteins.
 - c. Nucleic acids.
 - d. Carbohydrates.
5. Absorption of most nutrients from the digestive tract occurs in the
 - a. Liver.
 - b. Stomach.
 - c. Pancreas.
 - d. Small intestine.
6. In agarose gel electrophoresis
 - a. DNA moves towards the negative electrode
 - b. DNA moves towards the positive electrode
 - c. larger molecules moves faster than smaller molecules
 - d. supercoiled plasmids moves slower than their nicked molecule

7. *E. coli* are beneficial to humans because they

- a. Convert pepsinogen to pepsin.
- b. Produce vitamins and amino acids.
- c. Absorb water from the large intestine.
- d. Synthesize urea from the breakdown of amino acids.

8. In humans, the bacteria *E. coli* are normally found within the

- a. Colon
- b. Mouth
- c. Pancreas
- d. Small intestine

9. Two glands that are responsible for secreting protein-digesting enzymes are

- a. Salivary and gastric.
- b. Gastric and pancreas.
- c. Thyroid and pancreas.
- d. Intestinal and thyroid.

10. Blood glucose levels are lowered by insulin because it stimulates

- a. Gluconeogenesis.
- b. The uptake of glucose by cells.
- c. The conversion of glucose to fatty acids.
- d. The conversion of glucose to amino acids.

11. Surface antigens on live cells is normally identified by

- a. ELISA
- b. FACS
- c. RIA
- d. Immunoprecipitation

12. Glucose levels in the blood are lowered by the hormone

- a. Insulin.
- b. Glucagon
- c. Oxytocin
- d. Cholecystokinin (cck)

13. Which of the following enzymes is correctly matched with its substrate?

- a. Amylase—fat
- b. B Lipase—starch
- c. Pepsin—protein
- d. Trypsin—glycogen

14. Which type of blood vessel has thick walls in order to withstand high pressure?

- a. Vein
- b. Artery
- c. Arteriole
- d. Capillary

15. Which of the following are produced after rearrangement of DNA sequences in specific mammalian cells?

- a. Antigens
- b. Antibodies
- c. Actins
- d. Myosins

16. Blood vessels that allow diffusion of gases through their thin walls are the

- a. Arteries
- b. Venules
- c. Arterioles
- d. Capillaries

17. The main function of capillaries is to

- a. Return blood to the heart.
- b. Prevent the backflow of blood.
- c. Take blood away from the heart
- d. Exchange nutrients and wastes with tissues.

18. Blood leaves the liver by way of the

- a. Iliac vein
- b. Renal vein
- c. Hepatic vein
- d. Hepatic portal vein

19. The major component of human blood is

- a. Plasma
- b. Platelets
- c. Red cells
- d. White cells

20. Plasma is composed mostly of

- a. Salt
- b. Water
- c. Protein
- d. Hormones

21. Red blood cells originate in the

- a. Liver.
- b. Lymph nodes.
- c. Bone marrow.
- d. Capillary beds.

22. An important function of white blood cells is to

- a. Buffer blood.
- b. Carry oxygen.
- c. Fight infection.
- d. Carry carbon dioxide.

23. Blood which lacks platelets would not be able to

- a. Clot
- b. Carry oxygen
- c. Fight infections
- d. Transport nutrients.

24. Which of the following organs has a portal system associated with it?

- a. Skin.
- b. Lung.
- c. Liver.
- d. Heart

25. The exchange of oxygen and carbon dioxide in external respiration occurs by

- a. Osmosis.
- b. Diffusion.
- c. Active transport.
- d. Facilitated diffusion.

26. Which one of the following techniques will be the suited for the determination of 3-D structure of a globular proteins ?

- a. Circular dichroism
- b. Mass spectrometry
- c. X-ray diffraction
- d. NMR

27. Antidiuretic hormone (ADH) is released by the

- 1. Kidneys.
- 2. Pancreas.
- 3. Anterior pituitary.
- 4. Posterior pituitary.

28. Aldosterone is secreted by the

- 1. Testes.
- 2. Nephron.
- 3. Adrenal cortex.
- 4. Posterior pituitary.

29. Which of the following symptoms might be an indication of kidney failure?

- a. Salt in the urine.
- b. Urea in the urine.
- c. Protein in the urine.
- d. Uric acid in the urine.

30. The distribution of sodium and potassium ions across the membrane of an axon is maintained by

- a. diffusion.
- b. exocytosis.
- c. phagocytosis.
- d. active transport.

31. Tandem repeats of simple DNA sequence on a given strand are called

- a. DNA satellites
- b. Alu sequences
- c. Transposable elements
- d. Exons and introns

32. The size difference between primary RNA transcript and the mature mRNA occurs primarily as a result of:

- a. capping
- b. cleavage of polycistronic mRNA
- c. removal of poly A tails
- d. splicing

33. Origin of species is the epoch making work by

- a. Gregor Mendel
- b. Herbert Stern
- c. Charles Darwin
- d. Jim Watson

34. One of the following viruses is associated with hepatic cancer

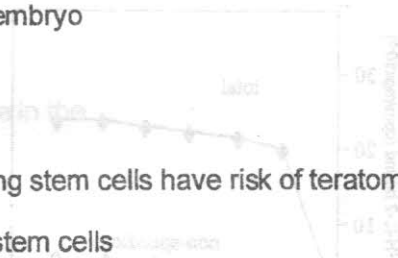
- a. HIV
- b. Hepatitis Virus B
- c. Measles virus
- d. H1N1

35. Embryonic stem cells are derived from

- a. Epiblast stage embryo
- b. Blastocyst
- b. Germ cells
- c. Skin cells

36. Which of the following stem cells have risk of teratoma formation

- a. Hematopoietic stem cells
- b. Embryonic stem cells
- c. Spermatogonial stem cells
- d. Mesenchymal stem cells

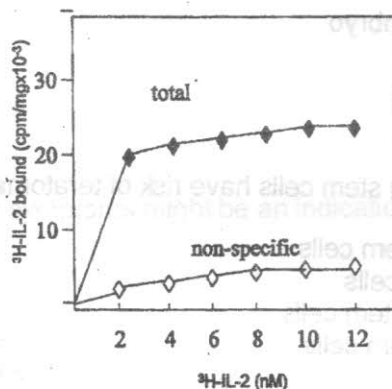


37. Jonas Salk is credited for developing vaccine for
- Hepatitis
 - AIDS
 - Measles
 - Polio
38. The first immunoglobulin class produced in a primary response to an antigen is
- IgA
 - IgG
 - IgM
 - IgE
39. All of the following are involved in immediate hypersensitivity except
- mast cells
 - IgE
 - histamine
 - platelets
40. Glycosylation of proteins occurs in
- mitochondria
 - Golgi complex
 - Peroxisomes
 - Endoplasmic reticulum

Section-II

Attempt any three questions (3 x 10 = 30 marks)

1. An experiment is designed to measure the number of Interleukin-2 (IL-2) receptor on membranes of human T cells. It involves mixing tritium labeled IL-2 with T cells and incubation for 10 min at 37°C, process cells the given way and then measure the radioactivity in the membrane fraction. The graph obtained is as follows.



Specific activity of the labeled IL-2 is 1×10^{13} cpm/mmol and there are 8×10^8 T cells/mg of membrane protein. Assuming one IL-2 molecule binds/receptor, calculate the number of IL-2 receptors on the membrane of a T cell?

2. Sketch the lateral view of the human brain and label its areas/parts.
 3. Describe how the semi-conservative nature of DNA replication was established.
 4. Write a short note on programmed cell death.
 5. Distinguish between monoclonal and polyclonal antibodies? How are purified polyclonal antibodies generated?
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Section-III

Attempt any two questions

(2 x 15 = 30 marks)

1. Describe step-wise, with suitable diagram/flow chart, how a PCR product that codes for a protein can be cloned, expressed in bacteria and characterized.
 2. Identify a research problem in your environment and write a research proposal indicating the experiments with reasoning you would like to carry out to solve it.
 3. Give a step wise account of malaria parasite life cycle.
 4. Explain the process of spermatogenesis and provide a labeled diagram of a mature human spermatozoon.
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