PART-A

Q. 1. An eye defect which usually results from an unequal curvature of the cornea is
(a) nearsightedness (b) astigmatism
(c) colour blindness (d) night blindness

Q. 2. The velocity of sound in air under normal conditions is
(a) 30 m/sec (b) 320 m/sec
(c) 332 m/sec (d) 3,320 m/sec

Q. 3. A photo-electric cell converts
(a) sound energy into electrical energy
(b) light energy into electrical energy
(c) an electrical signal into sound waves
(d) electrical energy into light energy

Q. 4. Which of the following sounds cannot be heard by human ear?
(a) 300 vibrations/sec
(b) 1,000 vibrations/sec
(c) 10,000 vibrations/sec
(d) 30,000 vibrations/sec

Q. 5. If force is expressed in newton and the distance in metre, then the work done is expressed in
(a) Joule (b) Kg wt
(c) Kg wt m (d) Watt

Q. 6. The Law of Natural Selection is associated with
(a) Dalton (b) Darwin
(c) Kepler (d) Mendel

Q. 7. When cream is separated from milk
(a) the density of milk increases
(b) the density of milk decreases
(c) the density of milk remains unchanged
(d) it becomes more viscous

Q. 8. The element of an electric stove is made of
(a) copper (b) [illegible]
(c) magnalium (d) nichrome

Q. 9. Which of the following is based on the process of fusion?
(a) Atom bomb (b) Hydrogen bomb
(c) Ordinary bomb (d) Napalm bomb

Q. 10. Hybridisation is
(a) downward movement of water through soil
(b) a process of tilling the land
(c) decayed vegetable matter
(d) cross-fertilisation between two varieties

Q. 11. Of the following foods, which one is the best source of protein ?
(a) Butter (b) Fish
(c) Lettuce (d) Milk

Q. 12. The red blood cells are formed in the
(a) heart (b) liver
(c) lymph nodes (d) marrow of bones

Q. 13. A wet-bulb and a dry-bulb thermometer are used to determine
(a) the minimum temperature at a place in any 24-hour period
(b) relative humidity
(c) air pressure
(d) the maximum temperature at a place in any 24-hour period

Q. 14. One of the isotopes of iodine has a 'half life' of 25 minutes. This information tells us that if we start with a given quantity of the isotopes, 50 minutes later there will remain
(a) one-fourth of the original amount
(b) none
(c) one-half of the original amount
(d) approximately the same amount

Q. 15. Small amounts of iodine are necessary in our diet to
(a) prevent pellagra
(b) compensate for underactivity of the thyroid gland
(c) stimulate clotting of blood
(d) stimulate pituitary gland

Q. 16. On sudden cardiac arrest, which of the following is advised as a first step to revive the functioning of human heart ?
(a) Mouth to mouth resuscitation
(b) Giving external cardiac massage
(c) Sprinkling water on the face
(d) Giving cool water to drink

Q. 17. A triode differs from a diode in the way that
(a) it can amplify a signal
(b) it has vacuum inside
(c) it has a heated cathode
(d) its current is caused by the photo electric effect

Q. 18. If the angles of a triangle are in the ratio 5 : 4 : 3, how many degrees are there in the largest angle
(1) 750 (2) 900 (3) 400 (4) 450

Q. 19. Two numbers are in the ratio 5 : 4, and their difference is 10. What is the larger number?
(a) 30 (b) 40 (c) 50 (d) 60

Q. 20. The ratio of the prices of two houses A and B was 4 : 5 last year. This year, the price of A is increased by 25% and that of B by Rs. 50,000. If their prices are now in the ratio 9 : 10, the price of A last year was
(1) Rs. 3,60,000 (2) Rs. 4,50,000
(3) Rs. 4,80,000 (4) Rs. 5,00,000

Q. 21. Three-fourths of 68 is less than two thirds of 114 by
(1) 12 (2) 25 (3) 35 (4) 48

Q. 22. Two cards are drawn together from a pack of 52 cards (a set of traditional playing cards), at random. The probability that one is a spade and other is a heart is
(a) 13/102 (b)3/20 (c) 47/100(d)29/34

Q. 23. A bag has 4 red and 5 black balls. A second bag has 3 red and 7 black balls. One ball is drawn from the first bag and two from the second. The probability, that there are two blacks balls and a red ball, is
(a) 14/45 (b) 11/45 (c) 7/15 (d) 9/54

Q. 24. The transverse, longitudinal and surface waves in an earthquake originate from
(a) the epicentre within the body of the earth
(b) the focus on the surface of the earth
(c) the focus within the body of the earth
(d) the epicentre on the surface of the earth

Q. 25. Seasonal contrasts are maximum in
(a) Mid latitudes (b) Low latitudes
(c) High latitudes (d) Subtropics

Q. 26. Although only the southern part of India lies in the tropical region, but the whole of India has tropical climate. This is because
(A) India comes under the influence of monsoons
(B) Northern part of India has large tracts of plain region
(C) Tropic of Cancer passes through the middle of the country
(D) High Himalayan mountain ranges separate it from the rest of Asia

Q. 27. What is the main cause of movement in the earth's atmosphere?
(A) Difference in air pressure
(B) Solar energy
(C) Difference in temperature
(D) Wind

Q. 28. Among the following which is a general purpose programming language-
a. C b. COBOL
c. PASCAL d. FORTRAN

Q. 29. Consider the following program:

```
A=0
B=0
I=0
Do While I =/=0
A=A^2+1
B=B^2-3
Else
PRINT A
```

The output of the programme will be
a. 0 b. 16
c. 9 d. 15

Q. 30 Among the following which is not an input device:
a. Mouse b. Scanner
c. OMR d. Plotter

PART-B

1. One of the parents of a cross has a mutation in its mitochondria. In that cross, that parent is taken as a male. During segregation of F2 progenies that mutation is found in
(1) one-third of the progenies
(2) None of the progenies
(3) all the progenies
(4) fifty percent of the progenies

2. When a freshwater protozoan possessing a contractile vacuole is placed in a glass containing marine water the vacuole will
(1) Increase in number (2) disappear
(3) Increase in size (4) Decrease in size

3. One of the following is a very unique feature of the mammalian body:
(1) Homeothermy (2) Presence of Diaphragm
(3) Four chambered heart (4) Rib cage

4. Chemically hormones are
(1) Biogenic amines only
(2) Proteins, steroids and biogenic amines
(3) Proteins only (4) Steroids only

5. Which one of the following pairs is not correctly matched?
(1) Vitamin B12 – Pernicious anaemia
(2) Vitamin B6 – Loss of appetite
(3) Vitamin B1 – Beri-beri
(4) Vitamin B2 – Pellagra

6. Uricotelism is found in
(1) Mammals and birds
(2) Fishes and fresh-water protozoans
(3) Birds, reptiles and insects
(4) Frogs and toads

7. Duodenum has characteristic Brunner's glands which secrete two hormones called
(1) Kinase, estrogen (2) secretin, cholecystokinin
(3) Prolactin, parathormone (4) Estradiol, progesterone

8. Mast cells of connective tissue contain
(1) Vasopressin and relaxin (2) heparin and histamine
(3) Heparin and calcitonin (4) Serotonin and melanin

9. Cancer cells are more easily damaged by radiation than normal cells because they are
(1) lack of mutation (2) undergoing rapid division
(3) different in structure (4) non-dividing

10. Certain characteristic demographic features of developing countries are
(1) high fertility, rapidly falling mortality rate, rapid population growth & young age distribution
(2) high fertility, high density, rapidly rising mortality rate and a very young age distribution
(3) high infant mortality, low fertility, uneven population growth and a very young age distribution
(4) high mortality, high density, uneven population growth and a very old age distribution

11. ATPase enzyme needed for muscle contraction is located in
(1) Actinin (2) Troponin (3) Myosin (4) Actin

12. Which one of the following is not correctly matched?
(1) Glossina palpalis – Sleeping sickness
(2) Culex pipiens – Filariasis
(3) Aedes aegypti – Yellow fever
(4) Anopheles culifacies – Leishmaniasis

13. Which one of the following pairs is not correctly matched?
(1) Streptomyces – Antibiotic
(2) Serratia – Drug addiction
(3) Spirulina – Single cell protein
(4) Rhizobium – Biofertilizer

14. A free living nitrogen-fixing cyanobacterium which can also form symbiotic association with the water fern Azolla is
(1) Tolypothrix (2) Chlorella
(3) Nostoc (4) Anabaena

15. In the ABO system of blood groups, if both antigens are present but no antibody, the blood group of the individual would be
(1) B (2) O (3) AB (4) A

16. Which one of the following pairs correctly matches a hormone with a disease resulting from its deficiency?
(1) Luteinizing hormone – Failure of ovulation
(2) Insulin – Diabetes insipidus
(3) Thyroxine – Tetany
(4) Parathyroid hormone – Diabetes mellitus

17. Angiosperms have dominated the land flora primarily because of their
(1) power of adaptability in diverse habitat
(2) property of producing large number of seeds
(3) nature of self pollination
(4) domestication by man

18. Which of the following hormones is not a secretion product of human placenta?
(1) Human chorionic gonadotropin (2) Prolactin
(3) Estrogen (4) Progesterone

19. You are required to draw blood from a patient and to keep it in a test tube for analysis of blood corpuscles and plasma. You are also provided with the following four types of test tubes. Which of them will you not use for the purpose?
(1) Test tube containing calcium bicarbonate
(2) Chilled test tube
(3) Test tube containing heparin
(4) Test tube containing sodium oxalate

20. In your opinion, which is the most effective way to conserve the plant diversity of a nation?
(1) By tissue culture method
(2) By creating biosphere reserves
(3) By creating botanical garden
(4) By developing seed bank

21. Which of the following is expected to have the highest value (in m^2 yr) in a grassland ecosystem?
(1) Secondary Production (2) Tertiary Production
(3) Gross Production (GP) (4) Net Production (NP)

22. If by radiation all nitrogenase enzymes are inactivated, then there will be no
(1) fixation of nitrogen in legumes
(2) fixation of atmospheric nitrogen
(3) conversion from nitrate to nitrite in legumes
(4) conversion from ammonium to nitrate in soil

23. What kind of evidence suggested that man is more closely related with chimpanzee than with other hominoid apes?
(1) Evidence from DNA from sex chromosomes only
(2) Comparison of chromosomes morphology only
(3) Evidence from fossil remains, and the fossil mitochondrial DNA alone
(4) Evidence from DNA extracted from sex chromosomes, autosomes and mitochondria

24. A gene which suppresses the action of another gene not situated on the same locus on the same chromosome is termed
(a) jumping gene (b) epistatic gene
(c) Supplementary gene (d) Hypostatic gene

25. Gene therapy is
(a) same as recombinant DNA technology
(b) aimed at growing plants in vitro
(c) aimed at growing animals in vitro
(d) employed to replace defective genes of animals or plants by correct genes

26. According to operon concept, an operator gene combines with
(a) inducer gene to 'switch on' transcription
(b) regulator gene to 'switch off transcription
(c) regulator protein to 'switch off transcription
(d) regulator protein to 'switch on' transcription

27. Which among the following is not an endocrine gland?
(a) Pineal (b) Pituitary
(c) Adrenals (d) Gonads

28. The excreta of lizards is rich in
(a) urea (b) uric acid
(c) guanidine (d) alantoin

29. Which among the following is not a stem modification?
(a) Rhizome of ginger (b) Sweet potato tuber
(c) Corm of Colocasia (d) Potato tuber

30. Down's syndrome is due to
(a) trisomy of chromosome 21
(b) trisomy of Y chromosome
(c) trisomy of X chromosome
(d) deletion of X chromosome

31. To get a constant specific growth rate in a fed batch reactor the feeding pattern should be
(a) constant rate
(b) linearly increasing rate
(c) Pulse feeding
(d) Exponential feeding

32. A plasmid was treated with topoisomerase followed by an intercalator which is known to unwind DNA by 18 degrees. Subsequently the ligand-DNA mixture was extracted with phenol chloroform and run on an agarose gel where it was found to have 2 positive supercoils. The number of ligand molecules bound to one plasmid is
(a) zero (b) 20
(c) 40 (d) 80

33. When a protein is denatured by heating, the absorbance as measured in a UV spectrometer will
(a) always increase
(b) always decrease
(c) increase or decrease depending on wavelength
(d) remain unaffected

34. Chymotrypsinogen in the native state and reduced unfolded states is loaded in well A and B respectively. They are electrophoreses and stain, one of the following results is likely to be observed.
(a) Protein in well A would have moved longer distance than that in well B
(b) Protein in well A would have moved shorter distance than that in well B
(c) Protein in well A and B would have moved the same distance
(d) Protein in well A and B would not move at all

35. Urea is known to denature proteins at high concentration due to
(a) its ability to disrupt water structure
(b) its ability to hydrogen bond with the peptide group in proteins
(c) Both (a) and (b)
(d) its ability to disrupt electrostatic interactions

36. Super antigens activate
a. T cells only in an antigen non-specific manner by cross linking T cell receptors with the MHC-II molecules
b. B cells only in an antigen non-specific manner by Cross linking a large number of surface immunoglobulin molecules
c. Both T and B cells without interacting through TCR or BCR
d. T cells only through an unknown mechanism

37. Macrophages which are also called monocytes, have the ability to
(a) process and present antigens to T cells
(b) produce antibodies
(c) express IgM molecules on their surface
(d) Differentiate into dendritic cells when necessary

38. Indicate which statement is not correct. T helper cells
(a) stimulate migration of macrophages
(b) help B cells to produce antibodies
(c) are cytotoxic to virus infected cells
(d) help in generation of cytotoxic T Cells

39. Which of the following substances will not produce antibodies when injected into an animal?
(a) Bacterial polysaccharides (b) DNA
(c) Dinitrophenol (d) Actin

40. Monoclonal antibodies are secreted by Hybridomas which are generated by
(a) fusion of immune spleen cells with any type of cells capable of growing in tissue culture
b) fusion of immune spleen cells with plasmacytoma cells
(c) growing immune spleen cells in the presence of HAT
(d) growing immune spleen cells in the presence of B cell growth factors

41. The dendritic cells can only present antigen to naive T cells-
(a) because they constitutively express MHC-II and costimulatory molecules on their surface
(b) because they can phagocytose antigens very rapidly and process them

(c) because they are the only antigen presenting cells present at the site of antigen entry
(d)because they are the only type of cells which have receptors for naive T cells

74. A live virus while multiplying inside a host cell also activates T-cytotoxic cells because-
(a) the viral antigens present inside the cell are processed and presented on MHC-class I molecules to activate such cells
(b) the viral antigens are secreted out to activate antigen presenting cells which produce IL-12 to activate such cells
(e) the viral antigens directly bind to T cytotoxic cells and activate them
(d) in the presence of viral antigens the humoral response is suppressed which Indirectly enhances the T cytotoxic response

42. In a mouse during the embryonic stage of development of the immune system (gestation period)
(a) both γδ and αβ thymocytes are generated in equal numbers
(b) the γδ thymocytes predominate over the αβ thymocytes till about 17 days of gestation
(c) the αβ thymocytes predominate over the γδ thymocytes till about 17 days of gestation
(d) there are no γδ or αβ thymocytes produced during the gestation period

43. Which class of proteins is not generally specified by an oncogene?
(a) Ion channels
(b) Growth factors
(c)Transcription factors
(d) Signal transduction protein

44. A characteristic of homologous chromosomes is that
(a) they carry alleles for the same genes in the same relative positions
(b) they regularly exchange parts by crossing over at meiosis
(c) they physically pair at meiosis
(d) All of the above

45. Which one of the following characteristics best applies to an allosteric effector?
(a) Competes with substrate for the catalytic site
(b) Binds to a site on the enzyme molecule distinct from the catalytic site
(c) Changes the nature of the product formed
(d) Changes the substrate specificity of the enzyme

46. Which one of the following toxins inhibits eukaryotic protein synthesis through the depurination of a single adenine residue in 28S ribosomal RNA (rRNA)?
a. Diptheria toxin b. Ricin
c. α- Sarcin d. Colicin E-3

47. Which one of the following enzyme-catalyzed reactions generates a high-energy phosphate bond?
(a) The phosphorylation of glucose
(b) 2_phosphoglycerate to phosphoenolpyruvate
(e) 3_phosphoglycerate to 2_phosphoglycerate
(d) Dihydroxyacetone phosphate to glyceraldehyde-3-phosphate

48. Which one of the following enzymes is tightly associated with the inner mitochondrial membrane?
(a) Citrate synthase
(b) Alpha-ketoglutarate dehydrogenase
(c) Succinate dehydrogenase
(d)Fumarase

49. Which one of the following supports glycogen synthesis?
(a) High cyclic adenosine monophosphate (cAMP) levels
(b) Inactive adenylyl cyclase
(c) Active phosphorylase a
(d) Epinephrine

50. A patient is suffering from a deficiency in the activity of acetyl coenzyme A (CoA) carboxylase. Which one of the following metabolites is most likely to accumulate in the patient's serum?
(a) Short-chain fatty acids
(b) Long-chain fatty acids
(c) Ketone bodies
(d) Malonyl CoA

51. Which one of the following statements describes the ubiquitin-mediated degradation of proteins in the cytosol?
(a) One molecule of ubiquitin binds to the protein to be degraded
(b) The process is catalyzed by a single enzyme
(c) The process depends on adenosine triphosphate (ATP)
(d) The N-terminal residue of ubiquitin becomes covalently attached to the protein to be degraded

52. A patient is suffering from untreated insulin-dependent diabetes. Which one of the following metabolic actions is occurring in this patient?
(a) Glucose is used by skeletal muscle for fuel
(b) Ketone bodies are released by the liver into the blood
(c) Glucose is used by the liver for fuel
(d) fatty acids are transported from the liver to the adipose tissue

53. The initiator codon in eukaryote is-
a. AUG b. GUG
c. CUG d. UUU

54. If the same aminoacid is coded by 2 or more codons, it is called-
a. Universal b. Overlapping type
c. degenerate d. Non-sense

55. Uncoiled DNA in differentiating cells is generally busy in synthesis of-
a. DNA b. mRNA
c. Proteins d. glucose

56. What do mutation and recombination have in common-
a. They increase variation b. They cause genetic drift
c. They cause natural selection d. All of the above

57. Actinomycin D is an inhibitor of
(a) respiration
(b) photosynthesis
(c) protein synthesis
(d) transcription

58. The B-form of the DNA molecule takes a complete turn after
(a) every base pair
(b) every five base pairs
(c) every ten base pairs
(d) every two base pairs

59. Stem cells are
(a) Callus cells from plant stems
(b) Embryonic cells of higher animals in culture
(c) Tumor cells from kidneys
(d) Tumor cells from bone marrow

60. All of the following are sources of energy for active transport except
(a) ATP (b) Proton gradients
(c) light (d) All of the above

61. While studying a cell with the electron microscope, a scientist notes the following numerous ribosomes, a well-developed endoplasmic reticulum, chloroplasts, and a cell wall. Which of the following could be the source of this cell?
(a) A fungus (b) An animal
(c) A bacterium (d) A plant

62. Which of the following statements is true about the Krebs (citric acid) cycle and the Calvin (light-independent) cycle?
(a) They both result in a net production of ATP and NADH
(b) They both result in a release of oxygen
(c) They both are carried out by enzymes located within an organelle matrix
(d) They both take place within the cytoplasmic matrix

63. Which therapeutic antibiotic blocks the peptidyl transferase reaction of protein synthesis?
(a) Chloramphenicol
(b) Erythromycin
(c) Tetracycline
(d) Puromycin

64. The mitochondrial electron transport chain carriers are located
(a) in the inner mitochondrial membrane
(b) in the mitochondrial matrix
(c) in the inter-membrane space
(d) on the inner surface of the outer mitochondrial membrane

65. The release of arachidonic acid from membrane glycerophospholipids is inhibited by which one of the following compounds?
(a) Aspirin
(b) Linoleic acid
(c) A specific protein induced by glucocorticoids
(d) 2-Acyl lysophosphatidylcholine

66. Cell lysis can be brought about by
(a) ligase
(b) pyrase
(c) Lysozyme
(d) cellulase

67. The two principals and products of photosynthesis are
(a) starch and sucrose
(b) glycerol and glycogen
(c) cellulose and glycogen
(d) glycerol and cellulose

68. Find out which is not the correct statement
The collagen triple helix domain
(a) is rich in glycine
(b) is rich in proline
(c) is rich in alanine
(d) is rich in hydroxyproline

69. Extranuclear inheritance is a consequence of presence of genes in
(a) Mitochondria and chloroplasts
(b) Endoplasmic reticulum and mitochondria
(c) Ribosomes and chloroplast
(d) Lysosomes and ribosomes

70. An ecosystem which can be easily damaged but can recover after some time if damaging effect stops will be having
(a) Low stability and high resilience
(b) High stability and low resilience
(c) Low stability and low resilience
(d) High stability and high resilience