RAMAKRISHNA MISSION VIVEKANANDA CENTENARY COLLEGE, RAHARA, KOLKATA

Undergraduate Admission Test 2022: Microbiology Honours

Full Marks : 150 **Time : 2hours**

1. A somatic cell that has just completed the S phase of its cell cycle, as compared to gamete of the same species has –
   a) Twice the number of chromosomes and four times the amount of DNA
   b) Four times the number of chromosomes and twice the amount of DNA
   c) Twice the number of chromosomes and twice the amount DNA
   d) Same number of chromosomes but twice the amount DNA.

2. The fluidity of a phospholipid membrane increases when the fatty acid –
   a) chain length increases and degree of unsaturation decreases
   b) chain length decreases and degree of unsaturation increases
   c) chain length decreases and degree of unsaturation decreases
   d) chain length increases and degree of unsaturation increases

3. Which of the following statements is not true?
   A. Glycerol is a 3-carbon alcohol with 3-OH groups which act as binding sites.
   B. Waxes are esters formed between a long chain alcohol and saturated fatty acids.
   C. The term protein was coined by Johannes Mulder.
   D. Agar is an indispensable polysaccharide and is a complex polymer of glucose and sulphur-containing carbohydrates.
   a) A, C and D
   b) A and C only
   c) A and D only
   d) C and D only

4. The molecules, hexanoic acid, lysine, histidine and glucose, each contain 6 carbon atoms, but have completely different properties due to the presence of different functional groups. Which one of these molecules has a high calorific value?
   a) Lysine
   b) Hexanoic acid
   c) Glucose
   d) Histidine

5. Most human cells are diploid with total DNA content of 2C. The DNA content increases to 4C before the onset of mitosis. At anaphase, the DNA content of each cluster will be –
   a) 4C
   b) 2C
   c) 1C
   d) 3C

6. A man bitten by Cobra is immediately taken to the hospital where doctor injected him antivenome. What type of immunity he got?
   a) Acquired immunity
   b) Innate immunity
   c) Passive immunity
   d) Active immunity

7. Find out the wrong statement for the sexual strategies of angiosperms
   a) Apomixis in angiosperm is defined as the asexual formation of a seed from the maternal tissues of the ovule, avoiding the processes of meiosis and fertilization, leading to embryo development.
   b) Pollen tube after pollen germination is treated as male gametophyte of the angiosperms.
   c) Double fertilization is a chief trait of angiosperms, in this phenomenon; one female gamete unites with two male gametes. One of the male gametes fertilizes the egg resulting in the formation of a zygote and the other after fertilization forms a diploid endosperm.
   d) In angiosperms, the megaspore mother cell produces a functional megaspore that develops into an embryo sac with one egg cell, two polar cells, three antipodal cells and two synergids.

8. Which pair of organisms is not true for biological nitrogen fixation?
   a) *Azolla pinnata* & *Anabaena azollae*
   b) *Pisum sativum* & *Clostridium botulinum*
   c) *Arachis hypogaea* & *Rhizobium leguminosarum*
   d) *Cycas revolute* & *Nostoc cicadae*

9. Arrange the process in chronological order during photosynthesis takes place in higher plants.
   A. Pigment System 2 split the water to fill electron whole.
   B. The reaction centre has been activated after taking action spectrum.
   C. Pigment System 1 release electron and transfer to the FRS complex.
   D. Rubisco helps in carbon assimilation to form 3PGA.
   E. Plastocyanin is a copper-containing motile protein that mediates electron-transfer.
   a) A, B, C, D, E
   b) C, B, A, E, D
   c) B, C, A, E, D
   d) C, A, B, D, E

10. Matches the correct pairs

A	Algae	(i)	Archegonium is the female reproductive organ
B	Bryophyta	(ii)	Vessel elements are absent, male gamete non-motile
C	Pteridophyta	(iii)	Oogonium can found as the female reproductive organ
D	Gymnosperms	(iv)	Vascular tissue absent, male gamete motile

   a) A – (i), B – (ii), C – (iv), D – (iii)
   b) A – (iv), B – (iii), C – (ii), D – (i)
   c) A – (iii), B – (iv), C – (i), D – (ii)
   d) A – (ii), B – (i), C – (iii), D – (iv)

11. I am the largest among leukocytes and I don't have any granules in my cytoplasm. I can move to infected tissue and phagocytose foreign pathogen. Who am I?
    a) Eosinophil
    b) T ltmphocyte
    c) Neutrophil
    d) Monocyte

12. Inactive protoxin produced in Bt cotton eventually cause death of insects because
    a) It is solubilized in the alkaline pH of the gut and creates pore in foregut endothelial cells.
    b) It is solubilized in the acidic pH of the gut and creates pore in midgut epithelial cells.
    c) It is solubilized in the alkaline pH of the gut and creates pore in midgut epithelial cells.
    d) It is solubilized in the alkaline pH of the gut and creates pore in midgut endothelial cells.

13. In the life cycle of *Plasmodium sp.*
    a) Gamets are formed in the salivary gland of mosquito and fertilized in the human liver.
    b) Parasites are asexually reproduced in the mosquito gut.
    c) Gamets are formed in human RBC and fertilized in the mosquito gut.
    d) Gametocytes are formed in human liver and fertilized in RBC

14. In early stage of infection when there are no symptoms, a pathogen can be detected by
    a) Real-Time PCR
    b) Agglutination
    c) ELISA
    d) Immunofluorescence

15. A man with HIV is highly prone to some common viral and bacterial infection because of the low level of
    a) T cytotoxic cell
    b) Macrophage cell
    c) Dendritic cell
    d) T helper cell

16. Tunica media is the –
    a) Middle layer of blood vessel composed of connective tissue with collagen fibres.
    b) Middle layer of blood vessel composed of smooth muscle and elastic fibres.
    c) External layer of blood vessel composed of fibrous connective tissue with collagen fibres.
    d) Middle layer of blood vessel composed of squamous endothelium.

17. In which organ from the below invading pathogen counteracts with our immune molecules?
    a) Tonsils
    b) Bone marrow
    c) Thymus
    d) Liver

18. The drug that interferes with the transport of the neurotransmitter is
    a) Amphetamines
    b) Cocain
    c) Charas
    d) Diacetylmorphine

19. T wave of ECG represents the
    a) Depolarisation of the ventricles
    b) Depolarisation of the atria
    c) Repolarisation of the ventricles
    d) Repolarisation of the atria

20. In which of the following application *Rhizobium* culture can be utilized for human welfare?
    a) Biofertilizer
    b) Biopesticide
    c) Sewage treatment
    d) All of them

21. Which of the following techniques is commonly used for sensitive and precise diagnosis of thalassemia?
    a) High-performance liquid chromatography (HPLC)
    b) X-ray crystallography
    c) CT Scan
    d) Enzyme-linked immunosorbent assay (ELISA)

22. Hemophilia is X chromosome linked recessive trait in human. What is the probability that the offspring, born to hemophilic father and hemophilia carrier mother, will be a hemophilic son?
    a) 0
    b) $\frac{1}{4}$
    c) $\frac{1}{2}$
    d) 1

23. Which of the following secrete pepsinogen?
    a) fundic gland cells
    b) parietal cells
    c) chief cells
    d) gastric mucosa

24. Which of the following is not correctly matched for the organism and its cell wall degrading enzyme?
    a) Plant Cell - Cellulase
    b) Bacteria - Lysozyme
    c) Fungi - Chitinase
    d) Algae - Methylase

25. Macromolecule chitin is –
    a) Sulphur containing polysaccharide
    b) Nitrogen containing polysaccharide
    c) Phosphorus containing polysaccharide
    d) Oligosaccharide

26. The following statements which depict the features of 'active transport' mechanism in plants, study them carefully and choose the right option.
    A. It requires ATP energy.
    B. Some special membrane proteins facilitate this mechanism.
    C. These proteins are sensitive to inhibitors that react with protein side chains.
    D. It can transport the substances in uphill direction.

a) Only A is true
b) A and B are true but C and D are false
c) A, B and C are false
d) All the above statements are true.

27. Study the following statements which describe the 'biosynthetic pathway' of plants and choose the correct option.
    A. This process does not directly depend on the presence of light.
    B. It is dependent on the products of the light reaction, i.e., ATP and NADPH.
    C. The first product of this pathway is 3-phosphoglyceric acid.
    D. The first product of this pathway is 3-phosphoglyceric acid and oxaloacetic acid depending on the types of plant.

a) Only A and D are true
b) Only A and B are true
c) Only C is false
d) A, B and C are false

28. Vernalization is the induction of a plant's flowering process by exposure to the prolonged cold of winter.

a) Oxytocin
b) Natural Auxins
c) Gibberellins
d) Artificial Auxins like 2,4,5 – T

29. Drosophila has 8 chromosomes (2n) in each cell. In a cell undergoing mitosis, what will be the number of chromosomes after G1 & S phase

a) 4 chromosomes
b) 8 chromosomes
c) 16 chromosomes
d) 32 chromosomes

30. Crossing over is an enzyme-mediated process, where the exchange of genetic material between non-sister chromatids of homologous chromosomes takes place. It occurs at the

a) Mitotic prophase-I
b) Pachytene of Prophase-I
c) Leptotene of Prophase-I
d) Diakinesis of Prophase-I

31. In Mendel's hybridization experiments, if one pure pea plant had green peas, how many varieties of pollen will that plant produce with regard to pea colour?

a) One
b) Atleast two
c) Maximum four
d) Sixteen

32. Which statement is true : RNA polymerase III transcribes –

a) mRNAs & tRNAs
b) tRNAs & hnRNAs
c) miRNAs & piRNA
d) 5S rRNAs & SINEs

33. Identify the epigenetic factor in human gene expression?

a) Recombination
b) LINEs & SINEs
c) DNA methylation
d) Alterative splicing

34. The following statements describe about the 'disorders of muscular and skeletal system' in human, study them carefully and identify the wrong statement.
    a) Myasthenia gravis: Auto immune disorder affecting neuromuscular junction leading to fatigue, weakening and paralysis of skeletal muscle.
    b) Muscular dystrophy: Progressive degeneration of skeletal muscle mostly due to genetic disorder.
    c) Tetany: Rapid spasms (wild contractions) in muscle due to low H^+ in body fluid.
    d) Gout: Inflammation of joints due to accumulation of uric acid crystals.

35. The 'density of a population' in a given habitat during a given period, fluctuates due to changes in four basic processes. Identify the wrong option.
    a) Natality is responsible for the increase in the density of a population.
    b) Mortality causes the declining of population density.
    c) Immigration increases the density of a population.
    d) Emigration helps to increase the density of a population.

36. LacI is the repressor of the lac-operon in *E. coli*; a mutation that disables binding of LacI to the operator region will result in –
    a) Very high levels of expression upon induction
    b) Low expression when lactose is present
    c) Constitutive expression of lac-operon
    d) lac-operon remains permanently repressed

37. A foreign DNA and plasmid cut by the same restriction endonuclease can be joined to form a recombinant plasmid using –
    a) Taq Polymerase
    b) Eco RI
    c) Polymerase III
    d) Ligase

38. XXY karyotype accounts for
    a) Down syndrome
    b) Klinefelter syndrome
    c) Turner syndrome
    d) None of these

39. The following statements are related to 'productivity' of an ecosystem. Choose the correct option.
    A. Primary production is defined as the amount of biomass or organic matter produced per unit area over a time period by plants during photosynthesis.
    B. It can be divided into gross primary productivity (GPP) and net primary productivity (NPP).
    C. Net primary productivity is the available biomass for the consumption to heterotrophs (herbivores and decomposers).
    D. The relation between gross primary productivity (GPP) and net primary productivity (NPP) is NPP = GPP – R.
    a) Only A is true
    b) A and B are true but C and D is false
    c) A, B and C are false
    d) All the above statements are true

40. If a colour-blind man marries a woman who is homozygous for normal colour vision, the probability of their son being colour-blind is –
    a) 1
    b) 0
    c) 0.5
    d) 0.75

41. In the reaction – $CH_3COOH \xrightarrow{LiAlH_4} A \xrightarrow{PCl_5} B \xrightarrow{alk.\ KOH} C$
    The product C is
    a) Acetyl chloride
    b) Acetaldehyde
    c) Acetylene
    d) Ethylene

42. How many liters of water must be added to 1 liter of an aqueous solution of HCl with a pH of 1 to create an aqueous solution with pH of 2?
    a) 9.0L
    b) 0.9L
    c) 0.1L
    d) 2.0L

43. A compound $(C_6H_{12}O_6)$ on reaction with phenylhydrazine gives a yellow precipitation and with Na produces a mixture of sorbitol and mannitol. The compound is –
    a) fructose
    b) glucose
    c) mannose
    d) sucrose

44. Natural rubber has –
    a) Alternate cis- and trans- configuration
    b) All cis- configuration
    c) Random cis- and trans configuration
    d) All trans- configuration

45. Choose the correct decreasing order of basic strength of the followings –
    a) $NH_2^- > OH^- > NH_3 > H_2O$
    b) $OH^- > NH_2^- > H_2O > NH_3$
    c) $NH_3 > H_2O > NH_2^- > OH^-$
    d) $H_2O > NH_3 > OH^- > NH_2^-$

46. Select the strongest acid from the followings –
    a) H_2SO_4
    b) $HClO_3$
    c) $HClO_4$
    d) H_2SO_3

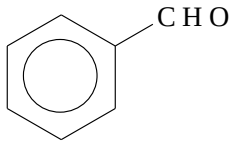
47. Nitrobenzene on reaction with conc. HNO_3/H_2SO_4 at 80 - 100° C forms which one of the following product
    a) 1, 2-Dinitrobenzene
    b) 1, 3-Dinitrobenzene
    c) 1, 4-Dinitrobenzene
    d) 1, 2, 4-Trinitrobenzene

48. Which one of the following molecules contains no π bond
    a) CO_2
    b) SO_2
    c) NO_2
    d) H_2O

49. 6.02×10^{20} molecules of urea are present in 100 ml of its solution. The concentration of the solution is –

a) 0.1 M
b) 0.001 M
c) 0.01 M
d) 0.02 M

50. Most reactive towards Nucleophilic addition reaction is-

a)


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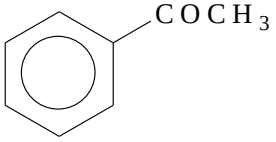

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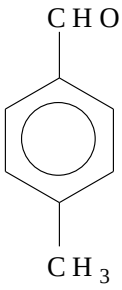

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