Admission test -Degree Course in Pharmacy, University of Rome "Tor Vergata"
Academic Year 2023/2024
Please mark with an "X" the letter corresponding to the right answer

1. Where does the fertilization takes place?
A. Uterus
B. Ovaries
C. Fallopian Tubes
D. Cervix
E. None of The above

2. All of the following hormones are involved in the menstrual cycle EXCEPT:
A. Estrogen
B. Lh
C. Prolactin
D. Progesterone
E. Fsh

3. Which organelle produces steroid hormones?
A. Rough Endoplasmic Reticulum
B. Smooth Endoplasmic Reticulum
C. Mitochondria
D. Golgi Apparatus
E. Peroxysomes

4. In eukaryotic cells, DNA occurs only in:
A. Cell Nuclei, Mitochondria, Golgi Apparatus
B. Mitochondria, Golgi Apparatus, Chloroplasts
C. Cell nuclei, Lysosomes, Chloroplasts
D. Cell nuclei, Mitochondria, Chloroplasts
E. Mitochondria, Chloroplasts, Lysosomes

5. Cardiac muscles consume more energy than any other cell type. Which organelle would you expect to be most abundant in cardiac muscle cells?
A. Golgi apparatus
B. Mitochondria
C. Vacuole
D. Lysosome
E. Ribosome

6. Which blood group is called the "universal donor"?
A. A
B. B
C. O
D. Ab
E. Bo

7. In normal sexual reproduction, two mature germ cells fuse to form a:
A. Gonad
B. B. Ovary
C. Embryo
D. Zygote
E. None of the above

8. Which of the following are not organelles found in animal cells?
A. Nucleus and golgi apparatus
B. Cellular membrane and cytoplasm
C. Mitochondria and ribosomes
D. Chloroplast and central vacuole
E. Endoplasmic reticulum

9. Light initiates different types of cellular reactions. Which of the following responses to light converts the energy from light into a gain of potential energy?
A. Phototaxis
B. Photoperiodism
C. Photosynthesis
D. All the above
E. None of the above

10. The functional unit of heredity is the?
A. Gene
B. Chromosome
C. Protein
D. Nucleus
E. Mitochondria

11. DNA exists in the form of strands of DNA coiled about each other.
A. Double
B. Triple
C. Quadruple
D. Quintuple
E. None of the above

12. Cholesterol that is known as (LDL) stands for:
A. Low-density lipoproteins
B. Low-density lysosomes
C. Level-density lipoproteins
D. Level-density lysosomes
E. None of the above

13. The functional unit of the kidney is known as?
A. Medulla
B. Glomerulus
C. Pyramid
D. Nephron
E. Tubules

14.The male sex hormone is:
A. Estrogen
B. Testosterone
C. Insulin
D. Progesterone
E. T3,T4

15.Which branch of Zoology deals with the scientific study of animal behaviour?
A. Ecology
B. Physiology
C. Ethology
D. Anatomy
E. Pharmacology

16.The first cells on Earth were likely to be?
A. Amino acids
B. Probionts
C. Ribozymes
D. Anaerobic prokaryotes
E. None of the above

17.Which of the following is *not* a step in the formation of the first living cells?
A. The biotic synthesis of small organic molecules
B. The packaging of molecules into droplets with membranes that maintained an internal chemistry different fr
om their surroundings.
C. The joining of small molecules into macromolecules.
D. The origin of self-replicating molecules that eventually made inheritance possible
E. All the above are involved in the formation of the first living cells

18.Which of the following environmental conditions does not affect the activity of enzymes?
A. Temperature
B. The amount of free energy in the cell
C. pH
D. Chemicals in the enzyme's environment
E. None of the above affects the activity of enzymes

19.Which of the following reactions represents photosynthesis?
A. Pyruvate + nadh + h^+ → lactate + nad^2
B. $C_4h_6o_5$ + nad^+ → $c_4h_4o_5$ + nadh + h^+
C. $C_6h_{12}o_6$ + $6o_2$ → $6co_2$ + $6h_2o$ + energy
D. $6co_2$ + $6h_2o$ + energy → $c_6h_{12}o_6$ + $6o_2$
E. None of the above

20.How does physical or emotional stress affect blood pressure?
A. Smooth muscles relax
B. Blood pressure decreases
C. Arterioles narrow, increasing blood pressure upstream in the arteries
D. Arterioles increase in diameter
E. None of the above

21. An aqueous solution of HCl is 0.01M. What is the pH?

A. A1
B. 0.01
C. 2
D. 2.5
E. 7

22. When the $Cr_2O_7^{2-}$ is transformed into the cation Cr^{3+}, chromium:

A. Goes from oxidation number +6 to +3 and is reduced
B. Goes from oxidation number +7 to +3 and is oxidized
C. Goes from oxidation number -2 to +3 and is reduced
D. Goes from oxidation number -2 to +2 and is reduced
E. None of the above

23. The atomic mass of oxygen is 16. How many atoms are present in 0,32 g of 0_2?

A. 0.01
B. 1.2044×10^{22}
C. 6.022×10^{23}
D. 0.02
E. 3.011×10^{21}

24. Indicate the nitrite ion:

A. N^-
B. NO_3^-
C. N_2
D. NO_2^-
E. N_3^-

25. Which of the following solutions has pH<7?

A. 50 mL of a 0.1 M solution of NaCl
B. 250 mL of a 0.1 M solution of NaF
C. 50 mL of a 0.1 M solution of NaOH
D. 250 mL of a 0.1 M solution of CH_3CO_2Na
E. 50 mL of a 0.1 M solution of HNO_3

26. If the pH of a solution varies from 3 to 5, the concentration of $[H_3O^+]$ ions:

A. is halved
B. Doubles
C. Increases by 100 Times
D. Decreases by 100 Times
E. Increases by 3 Units

27. How many grams of baking soda ($NaHCO_3$, MW 84.07) are present in 200mL of a solution 0.5 M?

A. 8.407 g
B. 6.022×10^{23} g
C. 8.407×10^{23} g
D. 4.204 g
E. 16.8 g

28. Which type of bond describes O_2?:

A. Ionic
B. Covalent heteronuclear
C. Covalent homonuclear
D. Hydrogen bond
E. None of the above

29. After extensive boiling, a white powder deposits on the bottom of a pot water. What it the reaction causing the deposition?

A. Hydrolysis
B. Combustion
C. Redox
D. Neutralization
E. Precipitation

30. In order to neutralize 100 mL of a 0.01M solution of HCl it is necessary to add:

A. 100 mL of H_2O
B. mL of a 1 M solution of NaOH
C. mL of a 10^{-2} M solution of HNO_3
D. 100 mL of a 10^{-2} M solution of KOH
E. 10 mL of a 10^{-2} M solution of NaOH

31. An atom that contains 19 protons, 20 neutrons and 19 electrons has the following atomic number:

A. 19
B. 20
C. 39
D. 58
E. 19.5

32. Propanol is:

A. An aromatic compound
B. An alkyne
C. An alcohol
D. An aldehyde
E. An organic compound containing an amino group

33. A 0.7 M solution of NaF contains:

A. 1.4 mol of solute per liter of solution
B. 0.5g of solute per liter of solution
C. 0.5g of solute per Kg of solution
D. 0.7 moles of solute per Kg of solution
E. 0.7 moles of solute per liter of solution

34. If 1 g of ammonium chloride is dissolved into 100 mL of water, and the solution is further diluted 10 times, the concentration of the solution is:

A. 1000 g/L
B. 100 g/L
C. 10 g/L
D. 1 g/L
E. g/L

35. A methane sample at T=0°C and P= 1 atm has volume V= 56.3 L, contains:

A. About 2.5 Moles
B. About 2.5 Grams
C. About 3 Molecules
D. About 1 Mole
E. About 1 Gram

36. A car weighing 1800 kg moves along a highway with a constant speed of 19 m/s. What is the resultant force on the car (expressed in kN)?

A. 4.9
B. 1.9
C. Zero
D. 19.6
E. 9.8

37. A ball falling through the air reaches a final speed of 27 m/s when it is 14 m above the ground. How many seconds will it take to touch the ground?

A. 1.9
B. 1.6
C. 0.52
D. 0.26
E. 0.75

38. A man of 80 kg walks down a ramp inclined at 40° respect to the horizon. By how much does his gravitational potential energy, expressed in kJ, change as he descends 15 m down the ramp?

A. 7.9
B. 8.3
C. 8.5
D. 7.6
E. 8.7

39. A stone attached to a 2.00 m long string is spin in a horizontal circle in space where gravity can be neglected. If the centripetal acceleration cannot exceed 72 m/s^2 without breaking the string, the maximum tangential speed of the stone is:

A. 1.6 m/s
B. 8.5 m/s
C. 12 m/s
D. 144 m/s
E. 6 m/s

40. What is the magnitude of the total force acting on the driver of a dragster accelerating from rest along a straight path to a speed of 60 m/s in 8.0 s? (The mass of the pilot is 80 kg)

A. 0.99 kN
B. 0.78 kN
C. 0.60 kN
D. 0.66 kN
E. 1.4 kN

41.Select the correct equivalent expression to $(a^2)^3$
A. a^5
B. a^6
C. a^8
D. a
E. None of the above

42.If a=v/(3t), then t is…
A. a/(3v)
B. 3(v/a)
C. v/(3a)
D. 3a/v
E. None of the above

43.What is the solution to $x^2 = -1$ with x real?
A. x=1
B. x=-1
C. x=+1 and x=-1
D. x=0
E. none of the above

44.Mark the expression equivalent to $\sqrt{(x-y)^2}$
A. |x-y|
B. x-y
C. $(x-y)^{2/2}$
D. $x^2 - 2xy + y^2$
E. None of the above

45.Mark the correct mean of the sequence 2+3+4+5
A. 14
B. 7
C. 3.5
D. 4
E. None of the above

46.Who wrote "La Divina Commedia" (The Divine Comedy)?
A. Machiavelli
B. Giacomo Leopardi
C. Dante Alighieri
D. Alessandro Manzoni
E. Ugo Foscolo

47.When did the First World War start?
A. 1924
B. 1945
C. 1941
D. 1918
E. 1914

48. Which is the capital of Brazil?
A. Rio De Janeiro
B. Brasilia
C. Caracas
D. Buenos Aires
E. San Paolo

49. Which river runs through Milan (IT)?
A. Tevere
B. Navigli
C. Thames
D. Aniene
E. Seine

50. Which band has played the album “The Wall”?
A. Duran Duran
B. U2
C. Pink Floyd
D. Dire Straits
E. Oasis

51. What film genre has a plot that takes place during a journey, which has resonances from tales of epic journeys such as the "Odyssey" and the "Aeneid"?
A. Tour movie
B. Road movie
C. Heroic movie
D. Tragedy movie
E. Comedy movie

52. What is the capital city of Canada?
A. Vancouver
B. Ontario
C. Ottawa
D. Toronto
E. Calgary

53. In what year did the Chernobyl nuclear disaster occur?
A. 1978
B. 1986
C. 1980
D. 1990
E. 1994

54. Who was the first man to step on the moon?
A. Yuri Gagarin
B. Neil Armstrong
C. Louis Armstrong
D. Buzz Aldrin
E. John Glenn

55. Name the traditional and popular wrestling sport of Japan:
A. Sumo
B. Kendo
C. Ikebana
D. Origami
E. Judo

56. What number is represented by the letters XIX in Roman numerals?
A. 19
B. 21
C. 16
D. 11
E. 15

57. Leonardo da Vinci, Michelangelo and Raphael all belong to which historical art period?
A. Impressionism
B. Cubism
C. Neoclassicism
D. Rococo
E. Renaissance

58. Name the third known planet from the sun in our solar system:
A. Saturn
B. Earth
C. Mars
D. Venus
E. Jupiter

59. In which museum can you find Leonardo da Vinci's Mona Lisa?
A. Vatican museum
B. Uffizi museum
C. Le louvre
D. British museum
E. Metropolitan museum of art

60. Name the marine creature of the genus hippocampus?
A. Starfish
B. Crocodile
C. Hippopotamus
D. Manatee
E. Sea horse