Admission test -Degree Course in Pharmacy, University of Rome 'Tor Vergata', Academic Year 2017/2018

1 **When the anion MnO^{4-} is transformed into cation Mn^{2+}, manganese:**
A Goes from oxidation number +7 to +2 and is reduced
B Goes from oxidation number +7 to +2 and is oxidized
C Goes from oxidation number -1 to +2 and is reduced
D Goes from oxidation number -2 to +2 and is reduced
E None of the above

2 **Indicate which is the sulfite ion:**
A SO_4^{2-}
B SO_3^{2-}
C S^{2+}
D $S_2O_3^{2-}$
E S^{2-}

3 **Given that the atomic mass of carbon is 12, how many atoms are present in 0,36g of carbon?**
A 50
B 0,03
C 6,022 x 1023
D 1,8066 x 1022
E 12

4 **If in a water solution the concentration of H_3O^+ ions is 0,001M, what is the pH?**
A 1
B 0,001
C 3
D 30
E 7

5 **How many grams of ethyl alcohol (C_2H_5OH, MW 46,1) are present in 500mL of a solution 0,2M?**
A 4,61g
B 6,022 x 1023g
C 1,0 x 1023g
D 0,461g
E None of the above

6 **Methanol is:**
A An organic compound containing a hydroxy group
B An aromatic organic compound
C A halogenated organic compound
D An organic compound containing an amino group
E None of the above

7 **An atom that contains 19 protons, 20 neutrons and 19 electrons has the following mass number:**
A 19
B 20
C 39
D 58
E 19,5

8 **Which of the following solutions has pH>7?**
A 50mL of a 0,1M solution of NaCl
B 50mL of a 0,1M solution of HCl
C 250mL of a 0,1M solution of HCl
D 50mL of a 0,1M solution of NaOH
E 50mL of a 0,1M solution of NH_4Cl

9 **A 0,5 M solution of KCl contains:**
A 1mol 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 1mole of solute per Kg of solution
E 0,5moles of solute per liter of solution

10 **Which of the following couples of atoms can form a covalent bonding?**
A H; Na
B H; Br
C Na; Br
D Ca; Cl
E Ca; O

11 **A gas sample at T=0°C and P= 1 atm has volume V= 44,8 L, contains:**

A About 1 mole
B About 1gram
C About 2 moles
D About 2grams
E About 2 molecules

12 **Ice and water constitute a system:**

A Chemically heterogeneous and physically heterogeneous
B Chemically homogeneous and physically heterogeneous
C Chemically homogeneous and physically homogeneous
D Chemically heterogeneous and physically homogeneous
E None of the above

13 **Which species can be formed upon combustion of methane (CH_4)?**

A Hydrogen and oxygen
B Carbon and hydrogen
C Propane
D Methane gas
E Carbon dioxide and water

14 **In order to neutralize 100mL of a 0,01M solution of KOH it is necessary to add:**

A 0,1mL of H_2O
B 0,1mL of a 1 M solution of NaOH
C 1mL of a 10^{-2} M solution of HNO_3
D 100mL of a 10^{-2} M solution of HNO_3
E 100mL of a 10^{-2} M solution of NaOH

15 **In order to neutralize 100ml of a10^{-3}M solution of HCl it is necessary to add:**

A 1000ml of H_2O
B 10ml of a 0.01 M solution of NaOH
C 10ml of a 0.01 M solution of KCl
D 1ml of a 10^{-2} M solution of HNO_3
E 1ml of a 10^{-2} M solution of NaOH

16 **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

17 **Two parents who do not exhibit phenylketonuria (PKU) have a son with PKU. Which of the following conclusions can be drawn from this situation?**

A The allele for PKU is located on the Y chromosome
B PKU is a dominant trait
C PKU is a recessive trait
D A mutation occurred in the sperm of the father
E None of the above

18 **Which of the following cellular processes normally produces ATP from glucose in the absence of oxygen?**

A Krebs cycle
B Glycolysis
C Chemiosmosis
D Calvin cycle
E None of the above

19 **Which of the following best describes the pathway of a protein from its manufacture to its secretion from the cell?**

A Endoplasmic reticulum → Golgi complex → secretory vesicle
B Secretory vesicle → endoplasmic reticulum → Golgi complex
C Secretory vesicle → Golgi complex → endoplasmic reticulum
D Golgi complex → endoplasmic reticulum → secretory vesicle
E None of the above

20 **A person touches a hot object and immediately moves her finger away from it. Which of the following structures is the first to receive an impulse triggered by the stimulus?**

A Synapse
B Ventral root ganglion
C Motor neuron
D Sensory neuron
E None of the above

21 **The sympathetic nervous system**

A Increases heart rate
B Is voluntary
C Is activated mainly in sleep
D Activates digestion
E None of the above

22 **A health disorder that results from a deficiency of thyroid hormone production in adults and is characterized by a low metabolic rate, increase in body weight and tiredness is:**

A Hyperthyroidism
B Goiter
C Cretinism
D Hypothyroidism
E None of the above

23 **In eukaryotic cells, protein synthesis takes place at the:**

A Nucleus
B Mitochondria
C Chloroplasts
D Ribosomes
E Lysosome

24 **The four bases which form the code words for DNA are:**

A UTAC
B ACTU
C AGCU
D ATCG
E None of the above

25 **Prokaryotic cells are different from eukaryotic cells because prokaryotic cells:**

A Are much bigger
B Have no cell nuclei
C Have cell nuclei
D Have no cell wall
E Have mitochondria and chloroplasts

26 **The DNA double helix is stabilized by hydrogen bonds between:**

A Purine bases and complementary pyrimidine bases
B Pyrimidine bases only
C Purine bases only
D Molecules of deoxyribose and phosphate groups
E Nitrogenous bases and phosphate groups

27 **During which of the following stages of cell cycle DNA replication occurs?**

A Early prophase
B G1 phase
C G2 phase
D G0 phase
E S phase

28 **Which of the following statements best describes mitosis?**

A It occurs only in the reproductive structure of organism
B During this stage DNA is synthesized
C It is one of the interphase stages
D It is the division of mother cell into two daughter cells, genetically identical to each other and to their parent cell
E It is the division of mother cell into two daughter cells, genetically different from each other and from their parent cell

29 **Gene expression may be regulated:**

A Only during translation
B Only during transcription
C During transcription and translation
D Only during replication
E During replication and transcription

30 **One of a series of different versions of gene is called:**

A Genome
B Haploid
C Diploid
D Allele
E Allosome

31 **Which of the following processes can decrease the genetic variation in natural populations?**
A Recombination
B Immigration
C Mutagenesis
D Inbreeding
E Hybridization

32 **Eutrophication is the process of:**
A Vegetation succession in lakes
B Nutrient depletion of lakes
C Increase inflow of minerals in lakes
D Primary succession in lakes
E Biological renewal of aquatic ecosystems

33 **Which of the following types of plants tissue transport water and minerals?**
A Phloem
B Xylem
C Meristem
D Vascular cambium
E Epidermis

34 **Which of the following require a host cell because they are notable to make proteins on their own?**
A Paramecium caudatum
B Escherichia coli
C Influenza virus
D Saccharomyces cerevisiae
E Euglena viridis

35 **Which of the following is found in an unusual high proportion in cells of cardiac muscle?**
A Lysosomes
B Mitochondria
C MRNA
D Golgi apparatus
E Cell nucleus

36 **Which of the following organisms conduct ethanol fermentation?**
A Yeasts
B Bears
C Spiders
D Barley
E Mushrooms

37 **Which of the following is the right order of the four stages of food processing?**
A Digestion, ingestion, absorption, elimination
B Ingestion, digestion, elimination, absorption
C Ingestion, digestion, absorption, elimination
D Digestion, ingestion, absorption, elimination
E Absorption, elimination, digestion, ingestion

38 **Which hormone is produced by the placenta?**
A Progesterone
B Insulin
C Thyroxin
D Melatonin
E None of the above

39 **Which of the following is not characteristic for mammals?**
A Mammary glands
B Hair
C Cold-blooded
D Three middle ears bones
E Sweat glands

40 **All of the members of a particular species that live in one area are called a(an):**
A Biotope
B Community
C Ecosystem
D Biosphere
E Population

41 **Consider the following inequalities:**

A (2/3)>(3/4)

B (2/3)<(2/5)

C $z^{-1} > z^{-2}$ when z is real and z>1

D $2 + \frac{1}{10} > 1 + \frac{11}{10}$

E None of the above

42 **What is the solution of the linear system x+y=5; 2x+3y=4?**

A x=1, y=1

B x=11, y=-6

C The linear system has infinite solutions

D x=-11, y=6

E The linear system has no solution

43 **What is/are the correct value(s) of $(a+b)^2 (a, b\ real\ numbers)$?**

A $a^2 + ab + b^2$

B $a^2 + b^2$

C $a^2 - b^2$

D $a^2 + 2ab + b^2$

E $a^2 + 2ab + b^2$

44 **Consider the equation $4 - \sqrt{7 + \sqrt{9 + \sqrt{4 + x}}} = 0$. Mark the correct value of x**

A 3660

B 46

C 567

D 68

E 5180

45 **What is/are the correct value(s) of x for the equation $log_x(16) = \frac{4}{3}$?**

A $x = \sqrt[3]{65536}$

B $x = 64$

C $x = 2$

D $x = 8$

E $x = 1$

46 **Calculates the mass of the motorcycle with speeds of 10 m / s and kinetic energy of 10000 J**

A 100 kg

B 300 kg

C 200 kg

D 400 kg

E 500 kg

47 **Which physical quantity can be measured in Newton meter (N m)?**

A Force

B Momentum

C Kinetic energy

D Power

E Work

48 **Which physical quantity can be measured in Newton second (N s)?**

A Force

B Momentum

C Kinetic energy

D Power

E Work

49 **When do you have a uniform circular motion?**

A When there is a variable centripetal force

B When there is a constant centripetal force

C When there is a constant centrifugal force

D When there is a variable centrifugal force

E When there is a constant velocity

50 **A net force FA acts on object A, and a net force FB acts on object B. The mass of object B is twice the mass of object A, and the acceleration of object B is twice that of object A. Which of the following relations between F_A and F_B is true?**

A FB =¼ FA

B FB =1/2FA

C FB = FA

D FB = 2FA

E FB = 4 FA

51 **In which year the Wright brothers achieved the first powered, sustained and controlled airplane flight?**
A 1908
B 1918
C 1880
D 1903
E None of the above

52 **The Machu Picchu is an archeological site located in?**
A Perù
B Iran
C Mexico
D Colombia
E None of the above

53 **Which is the Capital of Romania?**
A Budapest
B Bucarest
C Belgrad
D Novi Sad
E None of the above

54 **Which architect designed the Sagrada Familia in Barcellona?**
A Le Corbusier
B Carlos Gardel
C Antoni' Gaudi'
D Oscar Niemeyer
E None of the above

55 **Who first discovered the oral polio vaccine?**
A Fleming
B Sabin
C Dulbecco
D Pasteur
E None of the above

56 **In which year Christopher Columbus discovered America?**
A 1592
B 1472
C 1492
E 1542

57 **Who designed the cupola of Santa Maria del Fiore in Florence?**
A Michelangelo
B Raffaello
C Maderno
D Brunelleschi
E None of the above

58 **Which of the following movies was not directed by Stanley Kubrick?**
A 2001: A Space Odyssey
B Lawrence of Arabia
C Shining
D A clockwork Orange
E None of the above

59 **Which of the following Nations is not a Republic?**
A Portugal
B Austria
C Greece
D Sweden
E None of the above

60 **Roger Federer is:**
A Football player
B Basketball player
C Volleyball player
D Tennis player
E None of the above