GENERAL MEDICINE – Sample Entrance Exam Test

BIOLOGY

1. Virus is:
   a) non-cellular organism.
   b) autotrophic organism.
   c) procaryotic organism.
   d) simplest cell.

2. Viruses cause this disease in humans:
   a) Tuberculosis.
   b) Mumps.
   c) Intestinal salmonellosis.
   d) Tetanus.

3. Anaerobic glycolysis:
   a) Is energetically more profitable for the cell than the oxidative phosphorylation.
   b) Occurs only in mitochondria.
   c) Is the progressive oxidation of organic substances into the water .
   d) It is the only way of releasing energy from anaerobic cells.

4. Meiotic chromosome segregation:
   a) Is the random distribution of paternal and maternal chromosomes into gametes.
   b) Occurs during the second meiotic division.
   c) Is a mutual exchange of homological chromosomes.
   d) Is an independent combination of chromosomes in gametes into new diploid sets in zygotes.

5. Bacterial plasmids can:
   a) Be integrated into the bacterial chromosome only reversibly.
   b) Exist independenlty in the cytoplasm, but can also be incorporated into the bacterial chromosome.
   c) Be integrated into the bacterial chromosome only irreversibly.
   d) Contain RNA only.

6. What type of mutation is formed by insertion or deletion of nucleotide pair:
   a) Chromosomal.
   b) Aneuploidy.
   c) Frameshift.
   d) Gene.

7. Exon:
   a) Does not carry genetic information.
   b) forms a part of prokaryotic gene.
   c) Is spliced out after mRNA transcription.
   d) Is a coding sequence.

8. Linked genes are genes that:
   a) monitor the same genetic characteristics.
   b) express themselves independently.
   c) are not a part of one chromosome.
   d) can not recombine with each other freely.

9. Ribose and deoxyribose are:
   a) 3-carbon sugars.
   b) 4-carbon sugars.
   c) 5-carbon sugars.
   d) 6-carbon sugars.

10. If A_1A_2 phenotype is identical with a phenotype A_1A_1, then the allele A_1 is:
    a) Dominant.
    b) Recessive.
    c) Codominant.
    d) Semidominant.

11. The largest joint in the human body is:
    a) Shoulder.
    b) Hip.
    c) Knee.
    d) Elbow.

12. Most human-like characteristics could be found in:
    a) Chimpanzee.
    b) Gorilla.
    c) Macaque.
    d) Orangutan.

13. Hemolysis cannot come into the effect because of:
    a) Cobra venom.
    b) Physiological solution.
    c) Distilled water.
    d) Fat solvents.

14. Vital lung capacity is:
    a) Respiratory minute volume.
    b) Number of breaths per minute.
    c) The maximum volume of air that is exhaled after the deepest inhalation.
    d) Smaller in men than in women.

15. Which of the following does not belong to the evolutionary novelties in primates:
    a) The position of the thumb in opposition to the other fingers.
    b) Reduction of the teeth.
    c) Extention of the facial part of the skull.
    d) Extention of the period in parental care.

16. Retina of the eye:
    a) Projects reduced inverted images.
    b) Projects reduced direct images.
    c) Contains cone cells for vision at dusk.
    d) Contains rod cells for color vision.

17. Placenta:
    a) Is formed from the endometrium cells.
    b) Is used for the storage of waste products.
    c) Does not transmit alcohol and carbon monoxide.
    d) Performs the functions of the digestive system, lungs and kidneys for the fetus.

18. The respiratory center is located:
    a) In the diencephalon.
    b) In the medulla oblongata.
    c) In the thoracic spinal cord.
    d) In the telencephalon.

19. Toxoplasma belongs to the group
    a) Ciliata.
    b) Apicomplexa.
    c) Cnidaria.
    d) Bacteria.

20. Nervous system of Annelids (Annelida) is:
    a) Diffuse.
    b) Tubular.
    c) Ladder-like.
    d) Radial.

21. The heart of fish consists of:
    a) two atria and one chamber.
    b) the thick walled atrium.
    c) one atrium and two chambers.
    d) one atrium and one chamber.

22. The following mammals have compound eye:
    a) Marsupials and Monotremes (eg. Platypus).
    b) all mammals.
    c) no mammals.
    d) all primates.

23. Plant cell differs from the animal cell as follows:
    a) it is always bigger.
    b) it contains vacuole(s).
    c) it contains endoplasmic reticulum.
    d) it contains mitochondria.
24. Connections amongst the cells in the plant tissues form:
    a) so-called dots.
    b) trichomes.
    c) plasmodesma.
    d) cellulose fibers.

25. The most common storage material of green plants is:
    a) Starch.
    b) Vegetable oil.
    c) Glycogen.
    d) Laminarin.

26. Which of the following plants do not contain alkaloids:
    a) Autumn crocus *(Colchicum autumnale).*
    b) Mint (*Mentha piperita*).
    c) Black nightshade *(Solanum nigrum).*
    d) Coffee plant (*Coffea arabica*).

27. Mutually beneficial relationship amongst the populations is:
    a) Parazitism.
    b) Mutualism.
    c) The relationship between plants and herbivores.
    d) Intraspecific competition.

28. Succession is a process that:
    a) Leads to cyclic seasonal changes in species composition of communities.
    b) Rapidly leads to a climax community with predominance of bushes.
    c) It starts up when a community gets into the climax stage.
    d) Includes long-term changes leading to the Final success stage, when the Community reaches a state of equilibrium (a balanced state) with its environment.

29. The following has a positive effect on edafon
    a) acid rains.
    b) overload of soil nutrients.
    c) increased humus content.
    d) high doses of pesticides.

30. The following substances do not belong to the toxic substances which concentration increases along with their rising position in the food chain
    a) Mercury.
    b) SO_2
    c) PCBs (polychlorinated biphenyls).
    d) DTT.

CHEMISTRY

1. The concentration of OH^- ions in pure water is
   a) 10^{-7} mol/l.
   b) 55,5 mol/l.
   c) 10^{7} mol/l.
   d) can not be specified.

2. The catalyst
   a) reduces the rate of chemical reaction.
   b) increases the activation energy.
   c) increases the rate of a chemical reaction and increases activation energy.
   d) increases the rate of a chemical reaction and reduces the activation energy.

3. Oxidation can be described as
   a) reduction of oxidation number of an element.
   b) hydrogenation.
   c) loss of electrons.
   d) acceptance of electrons.

4. Mark the pair that is not conjugated pair according to the Bronsted Theory
   a) HCl, Cl^-
   b) HCl, H^+
   c) NH_3, NH_4^+
   d) H_2O, H_3O^+

5. The following occurs during electrolysis:
   a) oxidation at the cathode.
   b) reduction at the anode.
   c) oxidation at the cathode and simultaneously reduction at the anode.
   d) reduction at the cathode and simultaneously oxidation at the anode.

6. During exothermic reaction
   a) the heat is released.
   b) the heat is consumed.
   c) the amount of heat does not change.
   d) the heat is released and then consumed.

7. Which of the following is the formula for orthosilic acid
   a) H_4SiO_2
   b) H_4SiO_3
   c) H_4SiO_4
   d) H_4SiO_5

8. Select the incorrect statement about carbon monoxide
   a) prevents transmission of O_2 in the organism.
   b) is part of the exhaust gases of combustion engines.
   c) pollutes the environment.
   d) is very little reactive gaseous substance.

9. Which of these compounds reacts in an aqueous solution as alkaline
   a) NH_4Cl
   b) Na_2SO_4
   c) $NaNO_3$
   d) Na_2CO_3

10. The term slaked lime can be described as
    a) CaO
    b) CaOH
    c) $Ca(OH)_2$
    d) $CaCO_3$

11. What molar mass of iron contains 1 mole of ferric oxide (Iron (III) oxide)
    a) 1 mol.
    b) 2 mol.
    c) 0.5 mol.
    d) can not be determined in this manner.

12. What kind of agents are S-elements
    a) strongly oxidative.
    b) strongly reducing.
    c) weakly oxidative.
    d) weakly reducing.

13. What molar mass of water corresponds to the weight of 180 g of water
    a) 10 mol.
    b) 5 mol.
    c) 50 mol.
    d) 15 mol.

14. What is the molar concentration of HCl in a HCl solution of pH = 1
    a) 1 mol/dm^3
    b) 10^{-1} mol/dm^3
    c) it is not possible to determine
    d) 0,1 mol
15. What is the volume of sulphuric acid weighing 1.137 g and the density of 1.07 g/cm^3
    a) 106 dm^3
    b) 106 cm^3
    c) 10.6 dm^3
    d) 1.06 cm^3

16. Determine the weight of oxygen in the carbon dioxide attributable to 6 g of carbon
    a) 53.3 g.
    b) 32.0 g.
    c) 16.0 g.
    d) 12.0 g.

17. What is the pH of the solution, where $c(OH^-) = 10^{-2}$ $mol.dm^{-3}$
    a) 10.
    b) 12.
    c) 14.
    d) 8.

18. What is the concentration of H_3O^+ in an aqueous solution of KOH with a volume of 1 dm^3 containing KOH of molar amount of 0.01 mol
    a) 10^{-14} mol/dm^3
    b) 10^{-2} mol/dm^3
    c) 10^{-12} mol/dm^3
    d) 10^{-11} mol/dm^3

19. What is formed by using side chain oxidation of toluene (methylbenzene)
    a) phenol (carbolic acid).
    b) benzoic acid.
    c) toluene acid.
    d) xylene.

20. Ethers can be formed during the following
    a) reaction of acid and alcohol.
    b) reaction of alkyl bromide and alkoxide.
    c) hydrogenation of alcohol.
    d) decarboxylation of acids.

21. C_2H_5-O-C_2H_5 is a formula for
    a) acetone.
    b) diethyl ether.
    c) diphenyl ether.
    d) diethyl ketone.

22. Vinyl alcohol rapidly rearranges to
    a) ethanol.
    b) propanol.
    c) acetaldehyde.
    d) propanal (propionaldehyde).

23. Acetaldehyde is formed by
    a) hydrogenation of acetone.
    b) oxidation of acetone.
    c) hydrogenation of ethanol.
    d) dehydrogenation of ethanol.

24. What is formed during reaction between acetyl chloride and ethanol
    a) acetic acid, hydrogen chloride and diethyl ether.
    b) acetic acid and ethyl acetate.
    c) acetic acid and hydrogen chloride.
    d) ethyl ester of acetic acid and hydrogen chloride.

25. The primary structure of proteins is understood to be
    a) a sequence of amino acids in the polypeptide chain.
    b) the number of amino acids in the polypeptide chain.
    c) an optical activity of the protein.
    d) biological properties of a protein.

26. Rancidity of fats in chemical terms means
    a) polymerisation.
    b) reduction.
    c) oxidation.
    d) elimination.

27. Splitting triacyglycerols using lipase is
    a) moisturizing march.
    b) hydrolysis.
    c) hydrogenation.
    d) dehydration.

28. The following does not belong amongst polysaccharides
    a) amylose.
    b) amylopektin.
    c) saccharose.
    d) cellulose.

29. β-carotene (provitamin A) belongs to
    a) terpenes.
    b) sterols.
    c) saccharides.
    d) amino acids.

30. The final product of glycolysis in humans under anaerobic conditions is
    a) citric acid.
    b) acetic acid.
    c) tartaric acid.
    d) lactic acid.

PHYSICS

1. Which of these physical quantities is dimensionless?
   a) capacitance
   b) efficiency
   c) absolute humidity of the air
   d) volume

2. If we double the pressure through an isochoric process,
   a) the volume will be decreased to one half.
   b) the temperature will double.
   c) the temperature will be decreased to one half.
   d) the temperature will remain constant.

3. An ideal gas cannot do work in a process that is
   a) Isothermal.
   b) isochoric.
   c) isobaric.
   d) adiabatic.

4. The state of an ideal gas of constant particle number can always be described by the equation
   a) $pVT = \text{const.}$
   b) $pV/T = \text{const.}$
   c) $pV = \text{const.}$
   d) $pT = \text{const.}$

5. Which of these processes cannot be described as sublimation
   a) evaporation of solid carbon dioxide.
   b) drying of frozen clothes.
   c) formation of soot when burning candles under reduced oxygen.
   d) decrease of crystalline iodine in an open container.

6. In which of the listed substances is there more molecules than in 1 kg of water
   a) 1 kg of helium
   b) 1 kg of oxygen
   c) 1 kg of glucose
   d) 1 kg of air

7. A 2 kg body is thrown vertically upwards with an initial speed of 10 $m \cdot s^{-1}$. How high will the body get if we assume no air resistance and a value of 10 $m \cdot s^{-2}$ for the acceleration due to gravity?
   a) 10 m
   b) 7,5 m
   c) 5 m
   d) 2,5 m

8. The circumference of a wheel with diameter 50 cm is moving at a speed of 20 $m \cdot s^{-1}$. Calculate how many rotations per minute this bike will perform.
   a) 2400/p min^{-1}
   b) 1200/p min^{-1}
   c) 2400 min^{-1}
   d) 1200 min^{-1}

9. The force of upthrust in a liquid (buoyancy) does not depend on
   a) volume of submerged (immersed) body.
   b) acceleration due to gravity.
   c) liquid density.
   d) density of submerged (immersed) body.

10. Water is flowing through a pipe at a speed of 10 $m \cdot s^{-1}$. How will the speed of the flow change at a point where the radius of the pipe is reduced to half of the original value? Water is considered to have the ideal fluid density of 1000 kg m^{-3}.
    a) it will be decreased to 5 $m \cdot s^{-1}$
    b) it will be decreased to 2,5 $m \cdot s^{-1}$
    c) it will be increased to 20 $m \cdot s^{-1}$
    d) it will be increased to 40 $m \cdot s^{-1}$

11. Underdamped harmonic oscillator has a minimum value of kinetic energy, if
    a) the acceleration reaches a maximum.
    b) passes through its equilibrium position.
    c) the value of its displacement is precisely half the amplitude.
    d) the value of its displacement is equal to $\sqrt{2} \cdot y_{max}$.

12. In which of the following substances does sound travel at the highest speed?
    a) air
    b) steel
    c) helium
    d) water

13. The electrostatic force acting between two point charges of unit magnitude
    a) is directly proportional to their distance.
    b) is proportional to permittivity (dielectric constant) of environment.
    c) has a size of electric potential.
    d) is given by an expression $1/(4p \cdot e \cdot r^2)$.

14. We have three identical capacitors, each with a capacitance of 1 nF.
    How do we have to connect them to be able to substitute them with a capacitor with a capacitance of 3 nF?
    a) in parallel
    b) in series
    c) to two parallel-connected ones we will connect one serially
    d) substituting for a capacitator with a capacitance of 3 nF is not possible

15. A wire is carrying a constant current of 100 mA. How long does it take to for a charge of 5 C to pass through?
    a) 20 s
    b) 500 s
    c) $5 \cdot 10^{-8}$ s
    d) more than 10 hours...

16. The force experienced by a current-carrying conductor in a magnetic field is zero, if
    a) the angle formed by the conductor and the vector of magnetic field is equal to 0°.
    b) the current is alternating.
    c) the angle formed by the conductor and the magnetic field vector is equal to 90°.
    d) magnetic field lines are parallel.

17. The magnetic induction around a conductor ("straight wire") carrying a direct electric current (DC) is
    a) dependent on the metal from which the wire is made.
    b) directly proportional to the amount of current.
    c) directly proportional to the length of the conductor.
    d) equal to zero (there is no magnetic field present).

18. The thermistor is
    a) a device for storing thermal energy.
    b) a device for maintaining a constant temperature.
    c) a device using an electric voltage at the contact between two different metals.
    d) a temperature-dependent semiconductor resistor.

19. Total internal reflection can only occur
    a) at the interface of a material with a vacuum.
    b) when a light beam transits from an environment of lower optical density into an environment of higher optical density.
    c) when a light beam transits from an environment of higher optical density into an environment of lower optical density.
    d) in the case when the angle of incidence is larger than the angle of refraction .

20. A converging lens has an optical power + 20D. What is the focal length?
    a) - 20 m
    b) + 20 m
    c) - 5 cm
    d) + 5 cm
21. An air-filled bubble with very thin glass walls in the shape of a converging lens will act as
    a) a converging lens.
    b) an absolutely reflecting mirror.
    c) a diverging lens.
    d) body without optical power.

22. A portion of energy of each photon of violet light passing through an environment has been imparted to an electron. Then
    a) resulting photons may correspond to blue light.
    b) resulting photons may correspond to ultraviolet light.
    c) there is no reason to change the color of light.
    d) energy of photon cannot transform into electron energy.

23. Which of the following phenomena is related to the polarization of light?
    a) the so-called shimmer over a candle
    b) mirage
    c) dispersion of polychromatic light in a prism
    d) birefringence

24. Luminous (light) flux is defined as
    a) light energy per unit area.
    b) the proportion of luminous intensity and solid angle into which the body radiates.
    c) product of luminous intensity and solid angle into which the body radiates.
    d) product of luminous intensity and area from which the body radiates.

25. Which triad includes only particles, whose trajectory can be easily changed by an electric charge?
    a) electron, proton, alpha-particles.
    b) proton, electron, photon.
    c) electron, photon, meson.
    d) neutron, proton, electron.

26. X-rays are
    a) a current of fast electrons.
    b) a current of fast ions.
    c) electromagnetic radiation of wavelengths longer than 10 nm.
    d) electromagnetic radiation of wavelengths shorter than 10 nm.

27. Radionuclide has a half-life of 4 days. Its activity decreases to zero after
    a) theoretically an infinitely long time.
    b) four days.
    c) two days.
    d) eight days.

28. Energy can be obtained through fission of uranium-235 because
    a) any other nuclide has a smaller mass deficit per nukleon.
    b) it is not radioactive.
    c) lighter nuclides have greater mass deficit per nukleon.
    d) this nuclide is not fissionable.

29. The Compton effect differs from the photoelectric effect because
    a) relaxing electrons emit X-rays.
    b) the wavelength of photons shortens after matter interaction.
    c) after matter interaction photons do not disappear but their wavelength is lengthened.
    d) emitted electrons can be assigned a so-called de Broglie wavelength.

30. Breaking X-rays have
    a) a continuous spectrum.
    b) a line spectrum.
    c) a mono-frequency character.
    d) a larger photon energy than characteristic radiation.