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**«УТВЕРЖДАЮ» «СОГЛАСОВАНО»**

**Зав. кафедра естественных наук Председатель УМК**

**и математика, к.х.н., доцент международного медицинского**

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**Протокол №\_\_\_\_\_\_ «\_\_\_\_\_» \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_2018 г.**

**Экзаменационных тестовых вопросов**

для контроля знаний студентов по дисциплине «**Клиническая биохимия**»

на 2017-2018 учебный год

Курс -\_II\_\_ Семестр -\_IV\_\_

Объем учебной нагрузки по дисциплине «**Клиническая биохимия**» составляет всего **90** часов, из них **45** часов аудиторных, **45** часов самостоятельных работ.

Лекционные занятия **18** ч.

Практические занятия **27** ч.

Самостоятельные работы **45** ч.

Экзамен \_**4**\_\_\_ семестр

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Фонд тестовых заданий зарегистрирован в УИД под учетным номером \_\_\_\_\_\_\_\_\_\_ на правах учебно-методического электронного издания.

**Ош, 2018**

**Examination test for lipids**

1. Energetic function in the organism play the following lipids, except:
   1. tryacylglycerol c) diacylglycerol
   2. saturated fatty acids d) cholesterol
2. The highest phospholipids content is found in
   1. Chylomicrons c) LDL
   2. VLDL d) HDL
3. \_\_\_\_\_ are the simplest lipids but they may be a part of or a source of many complex lipids.
   1. Triglycerols c) Terpenes
   2. Carbohydrates d) Fatty acids
4. A digestive secretion that does not contain any digestive enzyme is
   1. Saliva c) Pancreatic juice
   2. Gastric juice d) Bile
5. A reserve fats in the fat depot mainly are:
   1. tryacylglycerols c) cholesterol
   2. phospholipids fatty acids
6. All the following can be oxidized by B-oxidation except
   1. Palmitic acid c) Linoleic acid
   2. Phytanic acid d) Fatty acids having an odd number of carbon atoms
7. Bile acids are metabolic products of :
   1. cholesterol c) tryglycerins
   2. phospholipids d) glycogen
8. Bile is produced by
   1. Liver c) Pancreas
   2. Gall-bladder d) Intestine
9. Carnitine is required for the transport of
   1. Triglycerides out of liver
   2. Triglycerides into mitochondria
   3. Short chain fatty acids into mitochondria
   4. Long chain fatty acids into mitochondria
10. Cephalin consists of
    1. Glycerol, fatty acids, phosphoric acid and choline
    2. Glycerol, fatty acids, phosphoric acid and ethanolamine
    3. Glycerol, fatty acids, phosphoric acid and inositol
    4. Glycerol, fatty acids, phosphoric acid and Serine
11. Ceramide is a precursor to which of the following compounds?
    1. Phosphatidyl serine c) Phosphatidyl glycerol
    2. Sphingomyelin d) Phosphatidyl choline
12. Cerebrosides are composed of
    1. Sphingosine, fatty acids, glycerol and phosphoric acid
    2. Sphingosine, fatty acids, galactose
    3. Glycerol, fatty acids, galactose
    4. Glycerol, fatty acids, galactose, sphingol
13. Current concepts concerning the intestinal absorption of triacylglycerols are that
    1. They must be completely hydrolysed before the constituent fatty acids can be absorbed
    2. They are hydrolysed partially and the material absorbed consists of free fatty acids, mono and diacyl glycerols and unchanged triacyl glycerols
    3. Fatty acids with less than 10 carbon atoms are absorbed about equally via lymph and via portal blood
    4. In the absence of bile the hydrolysis of triacyl glycerols is absorbed
14. Depot fats of mammalian cells comprise mostly of
    1. Cholesterol c) Triacyl glycerol
    2. Cholesterol esters d) Phospholipids
15. Dipalmitoyl lecithin acts as
    1. Platelet activating factor c) Lung surfactant
    2. Second messenger for hormones d) Anti-ketogenic compound
16. During each cycle of B-oxidation
    1. One carbon atom is removed from the carboxyl end of the fatty acid
    2. One carbon atom is removed from the methyl end of the fatty acid
    3. Two carbon atoms are removed from the carboxyl end of the fatty acid
    4. Two carbon atoms are removed from the methyl end of the fatty acid
17. During each cycle of B-oxidation of fatty acid, all the following compounds are generated except
    1. NADH c) FAD
    2. H2O d) Acyl CoA
18. Fatty acids are activated to acyl CoA by the enzyme thiokinase:
    1. NAD+  c) CoA
    2. NADP+ d) FAD+
19. Fatty acids are oxidized in the \_\_\_\_\_\_\_\_\_\_\_.
    1. mitochondrial matrix c) endoplasmic reticulum
    2. cytosol d) mitochondrial inner membrane space
20. Fatty acids having chain length of 10 carbon atoms enter the
    1. Portal ciruclation c) Systemic circulation
    2. Lacteals d) Colon
21. Fluidity of membranes is increased by the following constituent except
    1. Polyunsaturated fatty acids c) Integral proteins
    2. Saturated fatty acids d) Cholesterol
22. For the activation of long chain fatty acids the enzyme thiokinase requires the cofactor:
    1. Mg++ c) Mn++
    2. Ca++ d) K+
23. Glycosphingolipids are a combination of
    1. Ceramide with one or more sugar residues c) Sphingosine with galactose
    2. Glycerol with galactose d) Sphingosine with phosphoric acid
24. Hepatic lipogenesis is stimulated by:
    1. cAMP c) Epinephrine
    2. Glucagon d) Insulin
25. Hepatoenteral circulation of bile acids has such aim as:
    1. fats resynthesis
    2. formation of chylomicrons
    3. economical usage of bile acids
    4. cholesterol absorption
26. How many cycles of β -oxidation are required to completely process a saturated C18 fatty acid?
    1. 6 c) 9
    2. 8 d) 18
27. Hydrolysis of fats by alkali is called
    1. Saponification number c) nonsaponification
    2. Saponification d) Lipolysis
28. Chylomicrons are synthesized in
    * 1. Blood c) liver
      2. intestine d) pancreas

29. Fatty acid synthesis takes place in

a) mitochondria c) cell membrane

b) cytosol d) endoplasmic reticulum

# 30. In eukaryotes fatty acid breakdown occurs in

a)mitochondrial matrix c) cytosol

b) cell membrane d) endoplasmic reticulum

31. Which of the following is not a source of acetyl- CoA:

a) ketone bodies b) pyruvat

c) cholesterol d) β – oxidation

32. Lipotropic factors include:

a) choline b) metionine

c) essential fatty acids d) cholesterol

33. In the intestine, the dietary fats are hydrolysed by

1. triacylglycerol lipase c) pancreatic lipase
2. adenylate cyclase d) protein kinase

34. In eukaryotes fatty acid breakdown occurs in

1. mitochondrial matrix c) cell membrane
2. cytosol d) endoplasmic reticulum

35. How many ATPs are formed during complete oxidation of palmitate?

a) 35 c) 129

b) 96 d) 131

**Metabolism of amino acids**

1. Histidine is degraded to α-ketoglutarate and is described as a:

a) gluco amino acid c) ketogenic amino acid

b)glucogenic amino acid d)keto-gluco amino acid

2. Which of the following amino acids is considered as both ketogenic and glucogenic?

a) Valine c) alanin

b)Tryptophan d)Lysine

3. A person with phenylketonuria cannot convert

a) phenylalanine to tyrosine c) phenylalanine to isoleucine

b) phenol into ketones d)phenylalanine to lysine

4. Oxidative deamination is the conversion of an amino

a) group from an amino acid to a keto acid c) acid to a carboxylic acid plus ammonia

b) acid to a keto acid plus ammonia d)group from an amino acid to a carboxylic acid

5. An example of a transamination process is

a) glutamate = hexanoic acid + NH3

b) aspartate + hexanoic acid = glutamate + oxaloacetate

c) aspartate + α ketoglutarate = glutamate + oxaloacetate

d)glutamate = α-ketoglutarate + NH3

6. Transamination is the process where

a) carboxyl group is transferred from amino acid

b) α-amino group is removed from the amino acid

c) polymerisation of amino acid takes place

d)glutamate = α-ketoglutarate + NH3

7. A person with phenylketonuria is advised not to consume which of the following products?

a) Glycine containing foods c) Fat containing food

b) Glucose d)Aspartame

8. Tyrosine is degraded to acetoacetyl CoA and fumarate and is described as a

a) glucogenic amino acid c) ketogenic amino acid

b)ketogenic and glucogenic amino acid d)keto-gluco amino acid

9. Transaminase enzymes are present in

a) liver c) pancreas

b) intestine d) kidney

10. An example of the oxidative deamination is

a) glutamate = hexanoic acid + NH3

b) aspartate + α-ketoglutarate = glutamate + oxaloacetate

c)glutamate = α-ketoglutarate + NH3

d)aspartate + hexanoic acid = glutamate + Oxaloacetate

11. In the normal breakdown of phenylalanine, it is initially degraded to

a) fumarate c) tyrosine

b) lysine d)phenylpuruvate

12. A ketogenic amino acid is one which degrades to

a) keto-sugars

b) either acetyl CoA or acetoacetyl CoA

c)pyruvate or citric acid cycle intermediates

d)multiple intermediates including pyruvate or citric acid cycle intermediates and acetyl CoA or acetoacetyl CoA

13. A person suffering from phenylketonuria on consumption food containing high phenylalanine may lead to the accumulation of

a) phenylalanine c) phenylpyruvate

b) tyrosine d)isoleucine

14. The nitrogen atoms of urea produced in the urea cycle are derived from

a) nitrate c) ammonia and aspartic acid

b) nitrite d) ammonia

15. Which of the following is used as carbon atom source while producing urea in the urea cycle?

a) Arginine c) Aspartic acid

b) Carbon dioxide d) Glucose

16. Urea cycle converts

a) ammonia into a less toxic form c) ketoacids into amino acids

b) amino acids into ketoacids d) ketoamino acids into ketoacids

17. The inputs to one cycle of the urea cycle are

1. 1 molecule of aspartic acid, 1 molecule of ammonia, 1 molecule of carbon dioxide, 3 molecules of ATP
2. 1 molecule of urea, 1 molecule of ammonia, 3 molecules of ATP and 1 molecule of fumaric acid
3. 1 molecule of fumaric acid, 1 molecule of urea, 3 molecules of AMP
4. 2 molecule of ammonia acid, 3 molecule of urea, 1 molecules of AMP

1**8**. The reactions of the urea cycle occur

a) In the cytosol c) In the mitochondrial matrix and the cytosol b) In the mitochondrial matrix d) Only in lysosomes

**19.** The thyroid hormone thyroxine (T4) is derived from

1. Threonine c) Thiamine
2. Tyrosine d) Tryptophan

**20.** Which of the metabolites below is a precursor of tyrosine?

a) L-dihydroxyphenylalanin c) Phenylalanine

1. Dopoamine d) Epinephrine

**21.**  Which of the following amino acids is a precursor to cysteine?

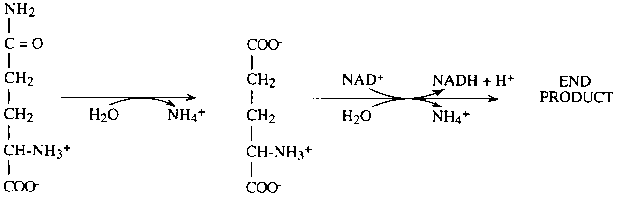
a) Threonine

1. Methionine

c) Phenylalanine

d) Lysine

**22.**  The second and final enzymatic step in the reaction pathway shown is most correctly described as



a) Amination c) Aminotransferase

b) Transamination d) Oxidative

**23.** The important reactive group of glutathione in its role as an antioxi­dant is

1. Serine c) Tyrosine
2. Sulfhydryl d) Acetyl coenzyme A (CoA)

**24**. Which one of the following hormones is derived most completely from tyrosine?

1. Glucagon c) Insulin
2. Thyroxine d) Prostaglandins

**25**. A newborn develops jaundice (yellow skin and yellow scleras) that requires laboratory evaluation. Which of the following porphyrin deriva­tives is conjugated, reacts directly, and is a major component of bile?

1. Bilirubin diglucuronide c) Biliverdin
2. Stercobilin d) Urobilinogen

**26**. Which of the following porphyrins gives stools their characteristic brown color?

1. Biliverdin c) Heme
2. Urobilinogen d) Stercobilin

**27**. Ceramide is a precursor to which of the following compounds?

1. Phosphatidyl serine c) Phosphatidyl glycerol
2. Sphingomyelin d) Phosphatidyl choline

**28**. Which of the following steps in the biosynthesis of cholesterol is thought to be rate-controlling and the locus of metabolic regulation?

1. Geranyl pyrophosphate ^ farnesyl pyrophosphate
2. Squalene ^ lanosterol
3. Lanosterol ^ cholesterol
4. 3-hydroxy-3-methylglutaryl CoA and mevalonic acid

**29**. Which of the following is most characteristic of a sphingolipidosis?

1. Multifactorial inheritance
2. Variable activities of abnormal enzyme in different patient tissues
3. Deficiency of a hydrolytic enzyme
4. Accumulation of ceramide-containing lipids

**30**. The end product of cytosol fatty acid synthetase in humans is

1. Oleic acid
2. Arachidonic acid
3. Linoleic acid
4. Palmitic acid

**31.** It has been noted that infants placed on extremely low-fat diets for a variety of reasons often develop skin problems and other symptoms. This is most often due to

1. Lactose intolerance
2. Glycogen storage diseases
3. Antibody abnormalities
4. Deficiency of fatty acid desaturase greater than A9

**32.** Is coWhich of the following lipoproteins would contribute to a measure­ment of plasma cholesterol in a normal person following a 12-h fast?

1. Very-low-density lipoproteins
2. High-density lipoproteins
3. Chylomicrons
4. Chylomicron remnants

**33**. Which of the following statements correctly describes the enzyme thiokinase?

1. It yields acetyl CoA as a product
2. It yields ADP as a product
3. It yields CoA as a product
4. It forms CoA thioesters as a product

**34**. Most of the reducing equivalents utilized for synthesis of fatty acids can be generated from

1. The pentose phosphate pathway
2. Glycolysis
3. The citric acid cycle
4. Mitochondrial malate dehydrogenase

**35.** During fatty acid metabolism in humans, coenzyme A (CoA) is dif­ferent from acyl carrier protein (ACP) in which one of the following ways?

1. Binding of malonic acid with a phosphopantetheine
2. Binding of fatty acids
3. Function in fatty acid oxidation
4. Function in the cytosol

**36**. Which one of the following compounds is a key intermediate in the synthesis of both triacylglycerols and phospholipids?

1. CDP-choline
2. Phosphatidate
3. Triacylglyceride
4. Phosphatidylserine

**37**. Which of the following is not used in the synthesis of fatty acids?

1. Cobalamin (vitamin B12) c) AMP
2. NADPH d) FADH2

**38**. The major source of extracellular cholesterol for human tissues is

1. Very-low-density lipoproteins (VLDLs) c) High-density lipoproteins (HDLs)
2. Low-density lipoproteins (LDLs) d) Albumin

**39**. Which of the following would rule out hyperuricemia in a patient?

1. Lesch-Nyhan syndrome c) Xanthine oxidase hyperactivity
2. Gout d) Carbamoyl phosphate synthase deficiency

**40**. Which one of the following contributes nitrogen atoms to both purine and pyrimidine rings?

a) Aspertate b) Carbamoyl

c) carbon dioxide d) glytamine

**41**. Which statement best describes xanthine?

1. It is a direct precursor of guanine
2. It covalently binds to allopurinol
3. It is a substrate rather than a product of the enzyme xanthine oxidase
4. It is oxidized to form uric acid

**42**. Which of the following compounds is a required substrate for purine biosynthesis?

1. 5-methyl thymidine

b. 5-methyl adenine

1. Ribose phosphate
2. 5-phosphoribosylpyrophosphate (PRPP)

**43**. Which of the following compounds is an analogue of hypoxanthine?

1. 5-methyl thymidine с) Ribose phosphate
2. Allopurinol d) 5-phosphoribosylpyrophosphate (PRPP)

**44**. A pentose with a 5'-phosphate group, a 2/-hydroxyl group, and a 1'-pyrimidine group describes which of the following structures?

1. Cytosine c) Thymidine
2. Guanosine d) Cytidylate

**45.**  Which of the activated groups or units is most closely associated with uridine diphosphate (UDP)?

1. Electrons c) Aldehyde
2. Phosphoryl d) Glucose

46. Non-essential amino acids can be synthesized by:

a) Decarboxylation of amino acids c) Non-oxidative deamination

b) Oxidative deamination of amino acids d) d) Transamination

47. Urea cycle:

a) Is an energy supplying mechanism c) Convert ammonia into urea

b) Converts urea into uric acid d) Provides arginine in infants

48. Coenzyme for transamination is:

a) Thiamine pyrophosphate c) Pyridoxal phosphate

b) FAD d) Cyanocobalamin

**DNA structure and replication**

1. The accepted hypothesis for DNA replication is

a) conservative theory b) dispersive theory

c) semi-conservative theory d) evolutionary theory

2. When DNA polymerase is in contact with guanine in the parental strand, what does it add to the growing daughter strand?

a) Phosphate b) Cytosine

c) Uracil d) Guanine

3. Telomeres are usually rich in which nucleotide?

a) Adenine b) Guanine

c) Thymine d) Cytosine

4. Which is the largest among the followings?

a) Nucleotide b) Nitrogenous base

c) Phosphate d) Carbon

5. The chromosomal DNA complexes with

a) three types of histone as H1, H2A and H4

b) five types of histone as H1, H2A, H2B, H3 and H4

c) four types of histone as H1, H2A, H3 and H

d) two types of histone as H1 and H4

6. Adenine is

a) 6-Amino purine c) 2-Oxy-4-aminopyrimidine

b) 2-Amino-6-oxypurine d) 2, 4-Dioxypyrimidine

7. In DNA double helix, the two DNA chains are held together by

a) covalent bonds between the pair of bases

b) hydrogen bonds between the pair of bases

c) ionic bonds between the pair of bases

d) peptide bonds between the pair of bases

8. The 5' and 3' numbers are related to the

a) length of the DNA strand

b) carbon number in sugar

c) the number of phosphates

d) the base pair rule

9. Messelsen and Stahl model of replication was called

a) conservative replication

b) semi-conservative replication

c) the number of phosphates

d) the base pair rule

10. The most common liquid volumes in molecular biology are measured in

a) ml b) μl

c) nl d) 1

11. DNA replication takes place in which direction?

a) 3' to 5' b) 5 'to 3'

c) Randomly d) Vary from organism to organism

12. DNA gyrase in *E. coli*

а) adds positive supercoils to chromosomal DNA

b) can be inhibited with antibiotics

c) is required only at the site

d) performs the same function as helicase in eukaryotes

13. In DNA, there are

а) five bases known as adenine, guanine, thymine, tryptophan and cytosine

b) four bases known as adenine, guanine, thymine and cytosine

c) three bases known as adenine, guanine and cytosine

d) only two bases known as adenine and cytosine

14. In DNA, guanine pairs with

a) Adenine b) Cytosine

c) Thymine d) Uracil

15. All following are naturally occurring nucleotides except

a) Cyclic AMP c) DNA

b) ATP d) Inosine monophosphate

16. An enzyme of pyrimidine nucleotides biosynthesis regulated at the genetic level by apparently coordinate repression and derepression is

a) Carbamoyl phosphate synthetase c) Thymidine kinase

b) Dihydroorotate dehydrogenase d) Deoxycytidine kinase

17. Aspartate contributes the following carbon atoms of the pyrimidine nucelus:

* 1. C2 and C4 c) C2, C4 and C6
  2. C5 and C6 d) C4, C5 and C6

18. What is the approximate size (in kb) of the *E. coli* genome?

a) 3000 kilobase b) 4500 kilobase

c) 5500 kilobase d) 6500 kilobase

19. In the study of one experiment it was found that the value of Tm for DNA is = 40° C. If the cell has 20% GC at the above Tm, then what will be value of 'Tm' if the GC% increases to 60%?

a) Remains same b) Increases

c) Decreases d) Can not be compared

20. What is the range of melting point temperatures (Tm) for most DNA molecules?

a) 50 to 60°C b) 60 to 80°C

c) 70 to 90°C d) 80 to l00°C

21. The overall conclusion of the Hershey-Chase experiment was that

a) DNA was responsible for heredity

b) proteins and DNA were responsible for heredity

c) the ratio of Adenine to thymine was always the same

d) phage DNA was similar to bacterial DNA

22. A cesium chloride will separate DNA molecules by

a) absorption b) restoration

c) density d) adhesion

23. If one cell has AT contents 40%, what will be the percentage of Guanine residue?

a) 60% b) 15%

c) 30% d) Guanine residue can not be calculated

24. Which of the following enzyme adds complementary bases during replication?

a) Helicase b) Synthesase

c) Replicase d) Polymerase

25. Which DNA polymerase removes RNA primers in DNA synthesis?

a) Polymerase I b) Polymerase II

c) Polymerase III d) none of these

26. Enzymes, responsible for unraveling short segments of DNA is

a) DNA polymerase b) helicase

c) DNA ligase d) primase

27. Enzyme, responsible for proofreading base pairing is

a) DNA polymerase b) Telomerase

c) Primase d) DNA ligase

28. Which of the following would not contain DNA?

a) Yeast b) Bacteria

c) Glass crystals d) Mold

29. The nucleosome consists of histone

a) octamer and 146 bp of DNA b) tetramer and 146 bp of DNA

c) hexamer and 146 bp of DNA d) ) monomer and 146 bp of

30. What bands will be observed in a cesium chloride gradient after two rounds of replication?

a) One light, one medium and one heavy band

b) One light and one medium band

c) One medium band

d) One medium and one heavy band

31. Proteins involved in opening a replication bubble are

a) DNA helicases b) single stranded binding proteins

c) ligase d) DNA topoisomerase

32. What is the main damaging effect of UV radiation on DNA?

a) Depurination b) Formation of thymine dimers

c) Single strand break d) Dehydration

33. Which of the following is not directly involved in protein synthesis:

a) DNA b) different types of RNA c) Histone d) ATP

34. *E.coli* DNA polymerases II and III lack

a) 5' → 3' exonuclease activity b) 5' → 3' endonuclease activity

c) partially 5' → 3' exonuclease activity d) partially 5' → 3' endonuclease activity

35. In sperm heads, DNA is particularly highly condensed and the histones are replaced with small basic protein called

a) protamines b) purines

c) pyrimidines d) pyrimidines, purines

36. DNA can be sequenced by the

a) chemical method

b) chain termination procedure

c) chemical method and chain termination procedure

d) physical method

37. The chemical nature of the primer regured for the synthesis of DNA

1. DNA b) Histone c) RNA d) hn-RNA

38. The enzyme responsible for the synthesis of RNA primer in eukaryotes

1. DNA polymers α b) DNA polymers γ
2. DNA polymers β d) topisomerases

39. The DNA damage caused by deamination is an example of

1. Single-base alteration c) chain breaks
2. two-base alteration d) cross linkage

40. The nitrogenous base that is never found in the genetic code

1. Adenine c) Thymine
2. Guanine d) Cytosine

41. The total DNA (genetic information) contained in a living cell (or organism) is regarded as:

1. Genome c) Proteome
2. Transiptome d) Gene
3. The enzyme responsible for the synthesis of m-RNAs in eukaryotic cells
4. RNA polymerase I c) RNA polymerase III
5. RNA polymerase II d) RNA polymerase α
6. Mitochondrial DNA is inherited from
7. Mother only c) Either father or mother
8. Father only d) Either mother or father
9. The first pharmaceutical product of recombinant DNA techonology approved for human use:
10. Insulin c) Growth hormone
11. Interferon d) Hypatits B vaccine

**RNA Structure**

1. A nicked RNA molecule can be ligated by

a) T4 RNA ligase b) DNA polymerase

c) T4 DNA ligase d) DNA I polymerase

2. Which of following RNA characteristically contains unusual purines and pyrimidmes?

a) rRNA b) nRNA

c) mRNA d) tRNA

3. The anticodon is a structure on

а) m-RNA. b) t-RNA

c) ribosome d) r-RNA

4. The genetic material of retroviruses such as HIV is

а) DNA b) RNA

c) protein d) r-RNA

5. Retroviruses replicate via \_\_\_\_\_\_\_\_\_\_ intermediate

а) RNA b) DNA

c) mRNA d) r-DNA

6. During RNA synthesis, the DNA template sequence 5'Tp Ap Gp Cp 3' Would be transcribed to produce which of the following RNA sequence?

а) 5'-Ap Tp Cp Gp-3' b) 5'-Gp Cp Up Ap-3'

c) 5'-Gp Cp Tp Ap-3' d) 5'-Ap Up Cp Gp-3'

7. RNA instability in alkaline solutions is due to

а) adenine b) ribose

c) uracil d) single strand natur

8. In RNA, uracil pairs with

а) adenine b) cytosine

c) thymine d) guanine

9. Two features of the tRNA molecule associated, in converting the triplet codon to an amino acid, are

а) in the T Loop and D stem and loop

b) in the anticodon loop and D stem loop

c) in the anticodon loop and the 3' CCA en

d) in the D Loop and T stem and loop

10. Which of the following is the smallest of the RNAs?

а) Messenger RNA b) Transfer RNAs

c) Ribosomal RNAs d) m- RNAs and r- RNAs

11. The mRNA from which of the following would contain a poly-A tail?

а) A restriction endonuclease from *E. coli* b) Bacterial alpha-amylase

c) Human insulin d) Bacteriophage DNA ligase

12. What is the average size (in bp) of a mature t-RNA?

а) 80 bp b) 100 bp

c) 120 bp d) 140 bp

13. What modified base is at the 5' extremity of a capped eukaryotic m-RNA?

а) 1-methyl-adenosine b) 2'-O-methyl-guanosine

c) 7-methyl-guanosine d) 1-methyl-guanosine

14. What is the function of messenger RNA?

а) It carries amino acids b) It is a component of the ribosomes

c) It is a direct copy of a gene d) It is the genetic material of some organisms

**Translation**

1. The process of copying a gene's DNA sequence into a sequence of RNA is called

a) replication. c) translation.

b) transcription d) PCR.

2. The transcribing enzyme is

a) ligase. c) RNA polymerase.

b) DNA polymerase d) amino-acyl transferase.

3. Which molecule contains the genetic code?

a) DNA c) tRNA

b) mRNA d) rRNA

4. Transcription occurs along a \_\_\_\_ template forming an mRNA in the \_\_\_\_ direction.

a) 5' to 3'; 5' to 3' c) 3' to 5'; 5' to 3'

b) 5' to 3'; 3' to 5' d) 3' to 5'; 3' to 5'

5. Which of the statements below is false?

a) The genetic code is overlapping.

b) The genetic code is universal.

c) Degenerate codons specify the same amino acids.

d) The genetic code is triplet.

6. The first mRNA codon to specify an amino acid is always

a) TAC c) UAG

b) UAA d) AUG

7. The amino acid sequence of a polypeptide chain comprises the \_\_\_\_ structure of the protein.

a) primary c) tertiary

b) secondary d) quaternary

8. Transfer RNA's bind during translation by the

a) codon c) template.

b) anticodon d) triplet

9. Of the \_\_\_\_ different possible codons, \_\_\_\_ specify amino acids and \_\_\_\_ signal stop.

a) 20, 17, 3 c) 64, 61, 3

b) 180, 20, 60 d) 61, 60, 1

10. RNA contains which bases?

a) adenine, thymine, guanine, cytosine, uracil

b) adenine, thymine, guanine, cytosine

c) thymine, guanine, cytosine, uracil

d) adenine, guanine, cytosine, uracil

11. Which of the following statements is true regarding introns?

a) Introns are the parts of mRNA that are translated

b) Introns have no function

c) In general, human genes have fewer introns than genes of other organisms

d) Introns may be involved in exon shuffling

12. Which mode of information transfer usually does not occur?

a) DNA to DNA c) DNA to protein

b) DNA to RNA d) all occur in a working cell

13. The effort to decipher the genetic code was led by \_\_\_\_ who was awarded a Nobel Prize for his work.

a) Nirenberg c) Watson

b) Lederberg d) Crick

14. A DNA strand with the sequence AACGTAACG is transcribed. What is the sequence of the mRNA molecule synthesized?

a) AAC GTA ACG c) AAC GUA ACG

b) UUG CAU UGC d) TTG CAT TGC

15. Which sequence on the template strand of DNA corresponds to the first amino acid inserted into a protein?

a) TAC c) UAG

b) UAA d) AUG

16. Which of the following is an example of the degeneracy of the genetic code?

a) a given amino acid has more than one codon

b) each codon specifies more than one amino acid

c) the first two bases specify the amino acid

d) the genetic code is not degenerate

17. Proteomics are:

a) is another term for genomics in humans.

b) is the study of the collection of proteins produced in a particular cell.

c) is the study of proteins produced by a particular gene.

d) proves that a single gene codes for only one protein.

18. Which of the following statements is true regarding transposons?

a) They are sequences of mRNA that can move around in the genome.

b) They exist in corn, but are not found in the human genome.

c) They are the most abundant type of repeat in the genome.

d) All of the above are true regarding transposons.

19. Transcription and translation of a gene composed of 30 nucleotides would form a protein containing no more than \_\_\_ amino acids.

a) 10 c) 60

b) 15 d) 90

20. During translation, the \_\_\_\_ site within the ribosome hold the growing amino acid chain while the \_\_\_\_ site holds the next amino acid to be added to the chain.

a) A, P c) A,B

b) P, A d) B,A

21. The amino acid structure of a polypeptide chain determines its \_\_\_\_ structure.

a) primary c) tertiary

b) secondary d) quaternary

22. \_\_\_\_ regulate which genes or subsets of genes that are transcribed in a particular cell type.

a) transcription factors c) RNA polymerases

b) chaperone proteins d) transcription is not regulated

23. An antibiotic interferes with the ability of the ribosome to move. What affect would exposure to this chemical have on a bacterial cell?

a) protein synthesis will be affected

b) the protein synthesized will be shorter than normal

c) the protein synthesized will be longer than normal

d) no proteins will be produced

24. Phosphorus is taken up by the cell during the process of

а) carbohydrate synthesis. b) protein synthesis,

c) lipid synthesis d) ATP synthesis

25. Which of the following is not necessary for protein synthesis to occur, once transcription is completed?

а) tRNA b) Ribosomes

c) mRNA d) DNA

26. Ribosomes select the correct tRNAs

а) then bind to the appropriate mRNA

b) solely on the basis of their anticodons

c) depending on their abundance in the cytosol

d) with the least abundant anticodons

27. The pathway of a tRNA during polypeptide elongation on the ribosome is

а) A site → P site → E site b) P site → entry site → exit site

c) A site → P site → entry site d) P site → A site → E site

28. The site on a bacterial chromosome that marks the termination point for chromosome replication is called

а) *ter* b) a stop codon.

c) a stem-loop d) *pau*

29. Which site of the tRNA molecule binds to the mRNA molecule?

а) Anticodon b) Codon

c) Amino acid d) 5 prime end

30. The first step in translation is

a) binding of the two ribosomal subunits to each other

b) binding of mRNA to the two ribosomal subunits

c) binding of tRNA to the small ribosomal subunit

d) binding of mRNA to the small ribosomal subunit

31. The growing polypeptide chain is released from the ribosomes when

а) a chain terminating codon is reached

b) a chain terminating tRNA binds to the ribosome

c) the 7-methyl guanosine cap is reached

d) the poly A tail is reached

32. How many bases of nucleic acid determine a single amino acid?

а) Four b) One

c) Two d) Three

**Transcription and Regulation**

1. The complex of RNA polymerase, DNA template and new RNA transcript is called

a) transcription bubble b) translation bubble

b) replication bubble d) elongation bubble

2. RNA polymerase in prokaryotes has a removable

a) alpha subunitb c) α- and β-subunit

b) beta subunit d) sigma subunit

3. The binding of lac repressor to DNA could be considered to be analogous to

a) competitive inhibition of an enzyme

b) mixed-type inhibition of an enzyme

c) uncompetitive inhibition of an enzyme

d) allosteric effects in enzyme regulation

4. Rho-dependent termination of transcription in E. coli

a) requires ATP

b) requires about 50 nucleotides of uncomplexed mRNA

c) requires ATP and 50 nucleotides of uncomplexed mRNA

d) removes mRNA and holoenzyme from the DNA

5. The function of the sigma factor of RNA polymerase is to

a) assure that transcription begins at the proper point

b) assure that transcription ends at the proper point

c) assure that translation begins at the proper point

d) assure that translation ends at the proper point

6. In both eukaryotes and prokaryotes, a promoter region that is rich in AT bases is called as

a) CATT c) TATA box

b) Shine Dalgarno region d) SV40 region

7. The RNA polymerases that transcribe bacterial DNA are

a) multisubunit enzymes

b) only active inside the cell

c) interchangable with DNA polymerases

d) highly glycosylated in their active forms

**Biochemistry of blood**

1. The matrix of blood is known as
2. Plasma c) RBC and WBC
3. Serum d) WBC and platelets
4. The percentage of formed elements in the blood is
5. 45 c) 55
6. 50 d) 65
7. The life span of RBC
8. 100 days c) 120 days
9. 110 days d) 130 days
10. The ratio of WBC and RBC is
11. 1:60 c) 1:6000
12. 1:600 d) 1:60000
13. During blood coagulation, thromboplastin is released by
14. RBC c) Leucocytes
15. Blood plasma d) Clumped platelets and damaged tissues
16. The life span of WBC is approximately
17. Less than 10 days
18. Between 20-30 days
19. Between 2-3 months
20. More than three months
21. The normal level of Hb per 100ml of blood in women is
22. 14 g
23. 18g
24. 20g
25. 10 g
26. Which of the following cations is required for the conversion of Prothrombin into active thrombin by thromboplastin (Blood coagulation step)
27. Cu+2
28. Fe +2
29. Mg+2
30. Mn+2
31. High levels of lead can affect heme metabolism by combining of SH groups of which enzyme?
32. ALA synthase
33. ALA dehydratase
34. PBG deaminase
35. Coproporphrinogen oxidase
36. Which out of the following conditions is not associated with excessive bilirubin formation from hemolysis?
    * 1. Sickle cell anemia
      2. Thalassemia
      3. Malaria
      4. Rotor syndrome
37. Urine analysis of a patient reveals the presence of Bilirubin and urobilinogen, which serum enzyme is expected to be elevated much higher than normal?
    * 1. ALT (Alanine Amino Transferase)
      2. AST (Aspartate Amino Transferase)
      3. 5 prime Nucleotidase
      4. Alkaline Phosphate
38. Normal pH human blood is usually maintained b/w.
    * 1. 5.0 – 6.8 c) 7.8 – 8.0
      2. 7.36 – 7.45 d) 6.8 – 7.1

**Plasma proteins**

1. Hemophilia A is to the deficiency of clotting factor
2. X; c**) \***VIII;
3. V; d) II;
4. Plasma albumin performs the following functions:
5. Osmotic; c) Nutritive;
6. Transport; d) \*All of them;
7. The immunoglobulin present in most abundant guantity;
8. \*IgG; c) IgM;
9. IgA; d) IgE;
10. Name the immunoglobulin involved in body allergic reactions:
11. IgA; c) IgD;
12. \*IgE; d) IgM;
13. The following anticoagulant binds with Ca2+ and prevents blood clotting:
14. Heparin; b**) \***Oxalate; c) protein; d) all of them.

**Hemoglobin and porphyrins**

1. The characteristic red colour of hemoglobin is due to
2. \*Heme; c) β-globin;
3. α-globin; d) γ-globin;
4. The number of heme groups present in mioglobin:
5. \*1; c) 2;
6. 3; d) 4.
7. The patient of sickle-cell anemia are resistant to:
8. Filaria; c) Diabetes;
9. \*Malaria; d) Trypanosomiasis.
10. The compount that facilitates the release of O2 from oxyhemoglobin
11. 2,3-BPG (b); c) Cl-;
12. H+; d) \*all of them.
13. Name the amino acid that directly participates in the synthesis of heme:
14. Methionine; c) \*Glycine;
15. Aspartate; d) Tryptophan;

**Biochemistry of liver**

1. Normal level of albumin in blood is:
2. 1,5-2,5 md/dl c) 2,5-3,5 g/dl
3. 2,5-3,5 md/dl d) \*3,5-5 g/dl
4. Hypo albuminemia is seen in all the following conditions, except:
5. Cithosis of liver c) Malnutritin
6. Nephritic syndrome d) \*Acute intections
7. Wilson's hepatolenticular degeneration is characterized by:
8. Ceruloplasmin level in blood is increased
9. \*Copper is accumulated in liver to produce cirrhosis
10. Copper is deposited in skin to produce bronze color
11. Autosomal dominant interitance
12. Albumin level in blood is estimated by:
13. Jaffe's picric acid reaction c) diacetyl monoxide method
14. \*Bromo cresol green reaction d) chromatography
15. All are transport proteins of blood, except:
16. Albumin c) Transferrin
17. Transcortin d) \*Ceruloplasmin
18. One of the plasma proteins listed below is not a transport protein (carrier protein):
19. Transferrin c) Albumin
20. Haptoglobin d) \*alpha-1-antitrypsin
21. The anticoagulant found in the body is:
22. Potassium oxalate c) \*Heparin
23. Sodium citrate d) EDTA
24. Which protein is not present in plasma?
25. Albumin c) \*Hemoglobin
26. Fibrinogen d) Globulins
27. The protein present in highest concentration in plasma is:
28. Fibrinogen c) \*Albumin
29. Gamma globulins d) Alpha globulins
30. Which of the following is not transported by albumin?
31. Calcium c) \*Sodium
32. Copper d) Aspirin
33. HbA differs from HbF in that:
34. HbA has only alpha chains
35. \*HbF cannot bind to 2,3-BPG
36. HbF can bind only 2 molecules of oxygen
37. HbA is alkali resistant
38. Methemoglobinemia is found in all the following conditions, except:
39. Indestion of nitrites c) presence of HbM
40. \*Carbon monoxide poisoning d) poisoning by aniline dyes
41. One deciliter (100 ml) of blood with 15 grams of hemoglobin can carry how much oxygen?
42. 7,5 ml of oxygen c) \*15 ml of oxygen
43. 20 ml of oxygen d) 30 ml of oxygen
44. A person with HbS trait is likely to have:
45. About 90% of hemoglobin
46. A single band on electrophoresis
47. \*Slicking at high altitudes
48. Irreversibly sickled cells in peripheral smear
49. Which factor causes a shift in the ODC ( oxygen dissociation curve) to left?
50. High pO2 c) \*Low pH
51. Low pO2 d) High temperature
52. Anemia can result from deficiency of all the following:
53. Iron c) \*Cholesalciferol
54. Cobalamin d) Pteroylglutamic acid
55. Hemoglobin will not copolymerize with HbS?
56. HbC c) \*HbD
57. HbA d) HbE
58. Regarding the CO2 transport in blood:
59. \*oxyHb is more negatively charged (stronger acid) thah deoxy Hb
60. In normal blood,bicarbonate to carbonic acid ratio is 1:20
61. One milimole deoxy hemoglobin can take up 10 mEq of hydrogen ions
62. Carboxyl and group of Hb chain takes up carbon dioxide
63. The characteristic red colour of hemoglobin is due to
64. \*Heme c) β- globin
65. α-globin d) all of them
66. The number of heme groups present in myoglobin
67. \*1 c) 3
68. 2 d) 4
69. All enzymes are elevated in obstructive liver disease, except:
70. Gamma-glutamyltransferase (CCT)
71. 5'nucleotidase (NTP)
72. Alkaline phosphatase (ALP)
73. \*Lactate dehtdrogenase (LDH)
74. All are features of obstructive jaundice, except:
75. Increased level of conjugated bilirubin in blood
76. Clay colored stools
77. Presence of bile salts in urine
78. \*Increased excretion of urobilinogen in urine
79. A patient with intective hepatits is likely tp nave all the following findins, except:
80. Hyperbilirubinemia c) Absence of bile salts in urine
81. \*Bilirubinemia d) Elevated AST
82. An increase in serum unconjugated bilirubin occurs in:
83. \*Hemolytic jaundice c) Detect in intestinal absorption
84. Obstructive jaundice d) glomerulonephritis
85. Conjugated hyperbilirubinemia with phosphates levels are characteristic of:
86. \*Obstructive jaundice c) Viral hepatitis
87. Hemolytic jaundice d) physiolojical jaundice
88. Gastric acid secretion is stimulated by following, except:
89. \*Hyperglycemia c) Vagus
90. Gastrin d) Histamine
91. Hypoacidity is found in all the following, except:

a) pernicious anemia c) \*Insulinoma

b) carcinoma of stomach d) Atrophic gastritis

1. All the following biochemical parameters are indices of liver function, except:
2. Bilirubin c) Albumin
3. Cholesterol d) \*Creatinine
4. Which enzyme test is more specific for parenchymal (hepatocellular) liver disease?
5. Acid phosphatase (ACP) c) Lactate dehtdrogenase (LDH)
6. \*Alanine aminotransferase (ALT) d) Amylase
7. Which hormone has effect on gastric secretion?
8. Cholecystokinin c) Gastrin
9. Secretin d) \*Somatomedin
10. Which of the following tests is not indicated in a patient with generalized edema?
11. Liver function tests c) thyroid function tests
12. Renal function tests d)\*Pancreatic function tests
13. Which of the following biochemical findins does not agree with acute hepatic failure?

a) Respiratory alkalosis c) Lactic acidosis

b) Hyperammmonemia d) \*Uremia

1. The laboratory data that is a diagnosis of obstructive jaundice is:
2. High alkaline phosphates level
3. \*Increased excretion of urobilinogen in urine
4. Evelated serum cholecterol level
5. Direct positive van den Bergh reaction
6. **Lipids**

1 - d 6 - b 11 – b 16 – c 21- a 26 – b 31 – c

2 –d 7 – a 12 – b 17 – b 22- b 27 – b 32 - a

3 – d 8 – a 13 – b 18 – c 23 – a 28 – b 33 - b

4 – d 9 – d 14 – c 19 – a 24 – d 29 – b 34 - a

5 – a 10 –b 15 – c 20 – a 25 – c 30 – a 35 - c

**2. Amino acid metabolism**

1 - b 6 - b 11 – c 16 – a 21- b 26 – d 31 –d 36 – b 41- d 46 - c

2 –b 7 –d 12 – b 17 – a 22 - d 27 – a 32 - b 37 – d 42 - c 47 - d

3 – a 8 – b 13 – c 18 – c 23 – b 28 – d 33 - d 38 - b 43 - b 48 - d

4 – b 9 – a 14 – c 19 - c 24 - c 29 – d 34 - a 39- d 44 - d

5 – c 10 –c 15 – b 20 – c 25 – a 30 – d 35 – c 40 – d 45 - d

**3. DNA – structure and replication**

1 - c 6 - b 11 – b 16 – c 21 - a 26 – a 31 – d 36- c 41 - a

2 – b 7 – b 12 – b 17 – a 22 - c 27 – a 32 – b 37 -c 42 - b

3 – b 8 – b 13 – b 18 – b 23 – c 28 – c 33 – 38 - a 43 - a

4 – a 9 – b 14 – b 19 – b 24 – d 29 – a 34 – a 39 - a 44 - a

5 – b 10 –b 15 – d 20 – d 25 – a 30 – b 35 – с 40 - c

1. **RNA - structure and replication**

1 - c 6 - b 11 – c

2 –d 7 – b 12 – a

3 – b 8 – a 13 – c

4 – b 9 – c 14 – c

5 – b 10 –b

1. **Translation**

1 - b 6 - d 11 – d 16 – a 21 - a 26 – b 31 – a

2 –c 7 – a 12 - c 17 – b 22 - a 27 – a 32 – d

3 – b 8 – b 13 – c 18 – c 23 – d 28 – d

4 – c 9 – c 14 – d 19 – a 24 – d 29 – d

5 – a 10 - d 15 – c 20 – b 25 – d 30 – d

1. **Transcrinption and regulation**

1 - a 6 - c

2 – b 7 – a

3 – a

4 – c

5 – a

**5. Biochemistry of blood**

1.a 6. b 11. a

2. a 7. A 12. b

3. c 8. a

4. b 9.b

5. d 10. A

**Plasma proteins**

1c, 2d, 3a, 4b, 5b

**Hemoglobin and porphyrins**

1a, 2a, 3b, 4d, 5c

**Biochemistry of liver**

1d, 2d, 3b, 4b, 5d, 6d, 7c, 8c, 9c, 10c, 11b, 12b, 13c, 14c, 15c, 16c, 17c, 18a, 20a, 21d, 22d, 23b, 24a, 25a, 26a, 27c, 28d, 29b, 30d, 31d, 32d, 33b