MEDICAL TECHNOLOGY LICENSURE EXAM

PREPARATION IN THE PHILIPPINES

CLINICAL CHEMISTRY

PRACTICE EXAM QUESTION

400 QUESTIONS

TEST YOUR KNOWLEDGE AS IF YOU WERE TAKING A BOARD EXAM

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1. 75'F = ‘C
a. 15.5
b. 21. 0
c. 23.8
d. 32.6

2. 20'C = ‘F
a. 25
b. 53
c. 68
d. 86

3. Morphine is the major metabolite of:
a. Cocaine
b. Heroin
c. Marijuana
d. Phnecyclidine

4. Substances with modified structures that are analogs of prescription pharmaceuticals of abused drugs are known as?
a. Designer drugs
b. Generic drugs
c. Trade drugs
d. Toxic drugs

5. All of the following may be used to cleanse the skin when drawing blood for ethanol analysis, except:
a. Alcohol swab
b. Merthiolate
c. Soap and water
d. Zephiran

6. The drug of choice for controlling petit mal (absence seizure)
a. Phenobarbital
b. Carbamazepine
c. Vancomycin
d. Ethosuximide (Zarontin)

7. It is used for treatment of petit mal (absence seizure) and grand mal:
a. Theophylline
b. Lithium
c. Valporic acid (Depakene)
d. Digoxin

8. A Cardiac glycoside that is used in the treatment of congenital heart failure and arrhythmias by increasing the force and velocity by increasing the force and velocity of myocardial contraction is:
a. Digoxin
b. Acetaminophen
c. Lithium
d. Phenytoin

9. Pharmacological parameters that determine serum drug concentration:
1. Liberation
2. absorption
3. Distribution
4. metabolism
5. Excretion

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

10. The most serious effect of methanol ingestion is:
a. Hallucinations
b. Blindness
c. Psychosis
d. Liver damage

11. Zinc protoporphyrin or free erythrocyte protoporphyrin measurements are useful to assess blood concentrations of:
a. Lead
b. Mercury
c. Arsenic
d. Beryllium

12. Estrogen and progesterone receptors assays are useful in assessing prognosis in which of the following?
a. Ovarian cancer
b. Endometriosis
c. Breast cancer
d. Amenorrhea

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13. Which tumor marker is used to determine the usefulness of trastuzumab (Herceptin) therapy for breast cancer ?
a. PR
b. CEA
c. HER-2/ neu
d. Estrogen receptor (ER)

14. Which of the followng tumor markers is used to monitor persons with breast cancer for recurrence of disease?
a. Cathepsin- D
b. Retinoblastoma gene
c. CA- 15-3
d. Estrogen receptor (ER)

15. Body mass index of an obese person?
a. BMI <18.5 kg/m2 UNDERWEIGHT
b. BMI of 18.5 to 24.9 kg/m2 NORMAL
c. BMI 25 to 29.9 k/m2 OVERWEIGHT
d. BMI> 30 kg/m2 OBESE

16. Body mass index of an overweight person?
a. BMI <18.5 kg/m2 UNDERWEIGHT
b. BMI of 18.5 to 24.9 kg/m2 NORMAL
c. BMI 25 to 29.9 k/m2 OVERWEIGHT
d. BMI> 30 kg/m2 OBESE

17. Secondary hypothyroidism:
a. Decreased T3 T4, decreased TSH
b. Increased T3 T4, Increased TSH
c. Normal T3 T4, Increased TSH
b. Decreased T3 T4, Increased TSH

18. Secondary hypothyroidism:
a. Decreased T3 T4, decreased TSH
b. Increased T3 T4, Increased TSH
c. Normal T3 T4, Increased TSH
b. Decreased T3 T4, Increased TSH

19. The thyroid gland produces all of the following except:
a. TSH
b. Thyroglobulin
c. T3
d. T4

20.Most useful test for assessing thyroid function:
a. TSH
b. Serum T3 and T4
c. Thyroglobulin
d. Thyroid autoimmune antibodies

21. The biologically most active, naturally occurring androgen is:
a. Androstenedione
b. Epiandrosterone
c. Dehydroeplandrosterone
4. testosterone

22. Decreases aldosterone:
a. Low serum Na+ and K+
b. High serum Na+ and K+
c. Low serum Na+ and high serum K+
d. High serum Na+, low serum K+

23. Zone fasciculata (F- ZONE) cells, the middle layer of the adrenal cortex produces:
a. Aldosterone
b. Sulfate DHEAs
c. Cortisol and cortisone
d. All of these

24. Its major action is to regulate renal free water excretion and, therefore, has a central role in water balance:
a. Aldosterone
b. Oxytocin
c. Prolactin
d. Vasopressin (ADH)

25. Adrenal cushing's syndrome:
a. Increased ACTH and cortisol
b. Decreased ACTH and cortisol
c. Increased ACTH, decreased cortisol
d. Decreased ACTH, increased cortisol

26. Pituitary cushing’s syndrome (cushing’s disease)
a. Increased ACTH and cortisol
b. Decreased ACTH and cortisol
c. Increased ACTH, decreased cortisol
d. Decreased ACTH, increased cortisol

27. Prolactin, considered a stress hormone, has vital functions in relationship to reproduction. It is produced by the:
a. Anterior pituitary gland
b. Posterior pituitary gland
c. Thyroid gland
d. Ovaries

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28. Which of the following produces hormones?

1. Anterior pituitary gland
2. Posterior pituitary gland
3. Thyroid gland
4. Parathyroid gland

a. 1 and 2
b. 1, 2 and 3
c. 1, 3 and 4
d. 1, 2, 3 and 4

29. The neurohypophysis is the:

a. Hypothalamus
b. Anterior pituitary
c. Thyroid gland
d. Posterior pituitary

30. Which of the following is the primary mechanism causing respiratory alkalosis?

a. Renal failure
b. Hyperventilation
c. Congestive heart failure
d. Too much bicarbonate

31. Which of the following is the primary mechanism of compensation for metabolic acidosis?

a. Hyperventilation
b. Aldosterone release
c. Release of epinephrine
b. Bicarbonate excretion

32. In Emphysema patient suffering from fluid accumulation in the alveolar spaces is likely to be in what metabolic state?

a. Respiratory acidosis
b. Metabolic acidosis
c. Respirator alkalosis
b. Metabolic alkalosis

33. In the circulatory system, bicarbonate leaves the red blood cells and enters the plasma through an exchange mechanism with _____ to maintain electroneutrality.

a. Chloride
b. Carbonic acid
c. Lactate
d. Sodium

34. The normal ratio of carbonic acid to bicarbonate in arterial blood is

a. 1:20
b. 7.4: 6.1
c. 0.003: 1.39
d. 20:1

35. Conditions associated with low anion gap may be caused by:

1. Uremia/ Renal failure
2. Ketoacidosis in starvation or diabetes
3. Methanol, ethanol, ethylene glycol, or salicylate poisoning
4. Lactic acid
5. Hypoalbuminemia
6. Hypercalcemia

a. 1, 2 and 3
b. 1, 2, 3 and 4
c. 5 and 6
d. All of these

36. Conditions associated with elevated anion gap may be caused by:

1. Uremia/ Renal failure
2. Ketoacidosis in starvation or diabetes
3. Methanol, ethanol, ethylene glycol, or salicylate poisoning
4. Lactic acid
5. Hypoalbuminemia
6. Hypercalcemia

a. 1, 2 and 3
b. 1, 2, 3 and 4
c. 5 and 6
d. All of these

37. It is the major anion that counterbalances the major cation, sodium:

a. Potassium
b. Magnesium
c. Chloride
d. Bicarbonate

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38. Which method is not affected by excess lipids or proteins causing falsely decreased sodium (pseudohyponatremia) measurement?
a. Direct ISE
b. Indirect ISE
c. Flame photometry
d. None of these

39. Sodium produces which color in a flame?
a. Red
b. Violet
c. Yellow
d. Magnesium

40. Hyponatremia can be classified according to:
a. Chloride values
b. Anion gap
c. Glucose determination
d. Plasma/ Serum osmolality

41. Which electrolyte is significantly involved in the transmission of nerve impulses?
a. Iron
b. Phosphorus
c. Potassium
b. Sodium

42. Electrolytes important for blood coagulation:
a. Sodium, chloride, potassium
b. Bicarbonate, potassium, chloride
c. Calcium, Magnesium
b. Magnesium, phosphate

43. Electrolytes important for acid base balance:
a. Sodium, chloride, potassium
b. Bicarbonate, potassium, chloride
c. Calcium, Magnesium
b. Magnesium, phosphate

44. Electrolyte essential for myocardial rhythm and contractility:
a. Sodium, chloride, potassium
b. Bicarbonate, potassium, chloride
c. Potassium, magnesium, calcium
d. Calcium, Magnesium

45. CDC reference method for determination of cholesterol:
a. Liebermann Burchardt rreaction
b. Salkowski reaction
c. Cholesterol oxidase reaction
d. Abell, levy and brodie method

46. Friedwald formula (FF) is not valid for triglycerides over ____mg/ dL
a. over 100 mg/dL
b. over 200 mg/dL
c. over 300 mg/dL
d. over 400 mg/dL

47. When TAG and LDL- C are being measured, fasting becomes a requirement. Require fasting of patients:
a. 2 to 4 hours
b. 4 to 6 hours
c. 6 to 8 hours
d. 12 to 14 hours

48. Triglyceride levels, as chylomicrons, peak in the blood ____ hours after ingestion of a meal.
a. 2 to 4 hours
b. 4 to 6 hours
c. 6 to 8 hours
d. 12 to 14 hours

49. Abnormal lipoprotein present in patients with Biliary Cirrhosis or cholestasis and in patients with mutations in lecithin: cholesterol acyltransferase (LCAT)
a. LDL
b. IDL
c. Lp (a)
d. LpX

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50. C-peptide is formed during the conversion of pro- insulin to insulin. The amount of circulating C-peptide provides reliable indicators for pancreatic and insulin secretions (beta cell function), it is decreased in:
a. Insulinoma
b. Ingestion of hypoglycemic drugs
c. Type 1 DM
d. Type 2 DM

51. Dubowski method for glucose utilizes:
a. Phosphomolybdic acid
b. Arsenomolybdic acid
c. Ortho- toluidine
d. Potassium ferricyanide

52. A specimen is appropriate for glucose analysis if serum or plasma is separated from the cells within ___ minutes.
a. 15 minutes
b. 30 minutes
c. 45 minutes
d. 60 minutes

53. It is a sensitive test for cholestasis caused by chronic alcohol or drug ingestion:
a. AST
b. ALP
c. ALT
d. GGT

54. In the bowers and mccomb method for determining alkaline phosphatase activity, the substrate used is:
a. Monophosphate
b. Phenylphosphate
c. Disodium phenylphosphate
b. Para- nitrophenylphosphate

55. Catalyzes the joining of two substrate molecules, coupled with breaking of the pyrophosphate bond in adenosine triphosphate (ATP) or a similar compound:
a. Transferase
b. Hydrolase
c. Ligase
b. Lyase

56. Inorganic cofactors, such as chloride or magnesium ions, are called:
a. Apoenzyme
b. Holoenzyme
c. Coenzyme
d. Activator

57. One international Unit (IU) of enzyme activity is the amount of enzyme that under specified reaction conditions of substrate concentration, ph and temperature, causes usage of substrate at the rate of:
a. 1 Millimole/ min
b. 1 Nanomole/ min
c. 1 Micromole/ min
d. 1 Picomole/ min

58. When measuring ammonia blood levels, which of the following might cause a false increase in this analyte?
a. The patient had two cigarettes 15 minutes prior to blood draw
b. The patient was fasting for hours prior to blood collection
c. Immediately after phlebotomy, the blood sample was maintained on ice
d. The patient has a steak dinner the night before the blood draw

59. A complete deficiency of hypoxanthine guanine phosphoribosyltransferase results in which disease?
a. Lesch- Nyhan syndrome
b. Maple syrup urine disease
c. Megaloblastic anemia
d. Reye's syndrome

60. When plasma creatinine concentration is elevated, GFR is ____, indicating renal damage.
a. Increased
b. Decreased
c. Normal
d. Variable

61. Azotemia due to obstruction of urine flow anywhere in the urinary tract by renal calculi, tumors of the bladder or prostate, or severe infection:
a. Pre- renal azotemia
b. Renal azotemia
c. Post- renal azotemia
d. None of these

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62. Prerenal azotemia is causes by:
a. Acute renal failure
b. Chronic renal failure
c. Congestive heart failure
d. Urinary tract obstruction

63. The term describing patients who are chronically calorie malnourished and lose both adipose and muscle tissue, but who do not demonstrate a protein deficiency, is:
a. Marasmus
b. Kwasgiorkor
c. Debilitated
d. None of these

64. Biochemical marker for bone resorption that can be detected in serum and urine:
a. Troponin
b. Adiponectin
c. Fibronectin
d. Cross- linked C- telopeptides (CTXs)

65. Variants demonstrate a wide variety of cellular interactions, including roles in cell adhesion, tissue differentiation, growth, and wound healing:
a. Troponin
b. Adiponectin
c. Fibronectin
d. Cross- linked C- telopeptides (CTXs)

66. Indicator of nutrition; binds thyroid hormones and retinol (vitamin A) binding protein:
a. Orosomucoid
b. Ceruplasmin
c. Prealbumin
b. Hemopexin

67. In a chemical reaction, the amount of product formed is measured at specific intervals during a specified period and the related to the concentration of the analyte in the unknown. This type of measurement is known as:
a. Colorimetric
b. End-point
c. Rate
b. Ultraviolet

68. The process by which fluorescence of an analyte is reduced due to its energy by interacting with other substances in solution known as:
a. Ionization
b. Quenching
c. Phosphorescence
d. self- absorption

69. Reflectance spectrometry uses which of the following?
a. Luminometer
b. Photomultiplier tube
c. Tungsten- halogen lamp
d. UV lamp

70. The lamps most commonly used for ultraviolet (UV) work are:
a. Deuterium and mercury arc lamps
b. Tungsten- halogen lamps
c. Silicon carbide rod
d. Tungsten lamp

71. The more light absorbed, the higher the concentration of analyte in this technique of measuring the amount of light absorbed by a solution
a. Atomic absorption
b. Fluorometry
c. Nephelometry
d. Spectrophotometry

72. Beer's law states that the concentration of a substance is (1) ___ proportiona to the amount of light absorbed or (2) ___ proportional to the logarithm of the transmitted light
a. Directly, inversely
b. Indirectly, direct
c. Both directly proportional
d. Both inversely proportional

73. Colligative properties include all of the following, except:
a. Osmolality
b. Vapor pressure
c. Freezing point
d. Osmotic pressure

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74. This centrifuge uses a very high- torque and low- inertia motor to spread monolayers of cells rapidly across a special slide for critical morphologic studies:
a. Horizontal centrifuge
b. Fixed- angle centrifuge
c. Ultracentrifuge
d. Cytocentrifuge

75. Chemicals should be stored:
a. Alphabetically, for easy accessibility
b. Inside a safety cabinet with proper ventilation
c. According to their chemical properties and classification
d. Inside a fume hood, if toxic vapors can be released when opened

76. The purest type of reagent water is:
a. Type I
b. Type II
c. Type III
d. All are equal

77. Physical actions can, overtime, contribute to repetitive strain disorders such as tenosynovitis, bursitis, and ganglion cysts:
a. Mechanical hazard
b. Cryogenic hazard
c. Ergonomic hazard
d. Compressed gases hazard

78. No recirculation; total exhaust to the outside through a hepa filter:
a. BSC Class IIA1
b. BSC Class IIA2
c. BSC Class IIB1
b. BSC Class IIB2

79. Thirty percent (30%) recirculated, 70% exhausted air:
a. BSC Class IIA1
b. BSC Class IIA2
c. BSC Class IIB1
b. BSC Class IIB2

80. Seventy percent (70%) recirculated to the cabinet work area through hepa; 30% balance can be exhausted through hepa back into the room or to outside through a canopy unit:
a. BSC Class IIA1
b. BSC Class IIA2
c. BSC Class IIB1
b. BSC Class IIB2

81. These pipettes have an oval bulb in the center and a tapered dispensing end:
a. Mohr
b. Ostwald- Folin
c. Volumetric
d. Serologic

82. These pipettes have the bulb closer to the delivery tip and are used for accurate measurement of viscous fluids, such as blood or serum:
a. Mohr
b. Ostwald- Folin
c. Volumetric
d. Serologic

83. Defined as parts per hundred parts:
a. Concentration
b. Dilution
c. Percent
d. Osmolality

84. An indication of relative concentration:
a. Concentration
b. Dilution
c. Percent
d. Osmolality

85. Gradual change in the control sample results:
a. Shift
b. Trend or drift
c. Dispersion
d. None of these

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86. Chance an individual does not have a given disease or condition if the test is within the reference interval:
a. Diagnostic sensitivity
b. Diagnostic specificity
c. Positive predictive value
d. Negative predictive value

87. The criteria for a good standard curve is/are:
a. The line is straight
b. The line connects all points
c. The line goes through the origin, or intersects, of the two axes
d. all of these

88. All are advantages of POINT-OF-CARE TESTING (POCT) EXCEPT:
a. Smaller blood specimen required
b. Patient convenience
c. Fast turnaround time
d. Lower cost

89. Most evacuated tubes on the market have at least ___ month/s shelf life.
a. 2 Months
b. 3 Months
c. 6 Months
d. 12 Months

90. In situations where blood is drawn at high altitudes (>5,000 FEET):
a. Decrease in draw volume
b. Increased in draw volume
c. Same blood draw volume
b. Cannot be determined

91. If evacuated tubes are stored at low temperature
a. Decrease in draw volume
b. Increased in draw volume
c. Same blood draw volume
b. Cannot be determined

92. Most common complication of phlebotomy:
a. Anemia
b. Cardiovascular
c. Vascular
b. Infection

93. Symptoms of hypoglycemia usually occur when blood glucose has fallen below ___ mg/ dL
a. 50 mg/dL
b. 60 mg/dL
c. 70 mg/dL
d. 80 mg/dL

94. The plasma protein mainly responsible for maintaining colloidal osmotic pressure in vivo is:
a. Albumin
b. Pre-albumin
c. Alpha2- macroglobulin
d. Beta2- microglobulin

95. The smallest and most dense lipoprotein particle:
a. LDL
b. HDL
c. VLDL
d. Chylomicrons

96. What is the compound that comprises the majority of the NPN fractions in serum?
a. Uric acid
b. Creatinine
c. Ammonia
d. Urea

97. Most common drug of abuse:
a. Cocaine
b. Ethanol
c. Methanol
d. Marijuana

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98. Which type of cancer is associated with the highest level of AFP?

a. Hepatoma
b. Ovarian cancer
c. Testicular cancer
d. Breast cancer

99. Chemical name of vitamin B2:

a. Retinol
b. Thiamine
c. Riboflavin
d. ascorbic acid

100. The biologically most active, naturally occurring androgen is:

a. DHEA
b. Androstenedione
c. Epiandrosterone
d. Testosterone

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1. The saccharogenic method for amylase determinations measures
a. The amount of product produced
b. The amount of substrate consumed
c. The amount of iodine present
d. The amount of starch present

2. Elevation of tissue enzymes in serum may be used to detect
a. Tissue necrosis or damage
b. Inflammation
c. Infectious diseases
d. Diabetes mellitus

3. Elevation of serum amylase and lipase is commonly seen in
a. Acute pancreatitis
b. Acute appendicitis
c. Gallbladder disease
d. Acid reflux disease

4. The isoenzymes LD-4 and LD-5 are elevated in
a. Liver disease
b. Pulmonary embolism
c. Renal disease
d. Myocardial infarction

5. What is the most heat stable ALP isoenzyme?
a. Placenta
b. Intestine
c. Liver
d. Bone

6. What organ produces vasopressin?
a. Hypothalamus
b. Posterior Pituitary
c. Anterior Pituitary
d. Adrenal cortex

7. What common substrate is used in the biosynthesis of adrenal steroids?
a. Tyrosine
b. pH
c. Progesterone
d. Cholesterol

8. Diurnal, EXCEPT:
a. GH
b. Prolactin
c. ACTH
d. LH

9. Tropic hormones, EXCEPT:
a. TSH
b. ACTH
c. GH
d. FSH

10. A hormone and an enzyme
a. Renin
b. ADH
c. TSH
d. Cortisol

11. Calcium concentration is regulated by:
a. Insulin
b. Parathyroid hormone
c. Thyroxine
d. Vitamin C

12. Fundamental to thyroid physiology
a. Iodine
b. Thyroglobulin
c. TSH
d. TRH

13. Thyroid hormones are derived from which of the following?
a. Histidine
b. Cholesterol
c. Tyrosine
d. Phenylalanine

14. The thyroid gland produces all of the following EXCEPT:
a. TSH
b. Thyroglobulin
c. T3
d. T4

15. Thyroid cells are organized into ____.
a. Follicles
b. Colloids
c. Isthmus
d. Cavities

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16. It is the center of thyroid hormone production
a. Follicle
b. Colloid
c. Isthmus
d. Cavities

17. Thyroxine present in largest amount
a. Free
b. Ionized
c. Bound to albumin
d. Bound to globulin

18. Which is NOT a function of the thyroid gland?
a. Protein synthesis
b. Development of fetal brain
c. Waste excretion
d. Regulation of metabolism

19. All of the following are symptoms of hypothyroidism, EXCEPT:
a. Fatigue
b. Depression
c. Cold intolerance
d. Good appetite

20. Hypothyroidism is generally associated with all of the following EXCEPT:
a. TSH receptor antibodies
b. Depression
c. An elevation of TSH levels
d. TPO antibodies

21. Sensitive marker for hyperfunctioning thyroid gland:
a. TSH
b. T4
c. T3
d. Tg

22. The primary serum test to screen for thyroid disease:
a. TSH
b. T4
c. T3
d. Tg

23. If the screening TSH is high, which test is likely to be ordered next?
a. Cholesterol
b. FT4
c. Ferritin
d. Glucose

24. In patients with developing subclinical hyperthyroidism, TSH levels will likely be _____, and fT4 will likely be _____.
a. Decreased, increased
b. Increased, decreased
c. Decreased, normal
d. Increased, normal

25. Insulin-like growth factor-1 is produced in the:
a. Pituitary gland
b. Thyroid gland
c. Bone
d. Liver

26. All of the following are true for thyroid gland EXCEPT:
a. Depends on TPO to permit iodination of the tyrosyl residues to make MIT and DIT
b. Is an ineffective iodine trap
c. Depends on TPO to permit the joining of two DIT residues to form T3
d. Usually functions independent of TSH levels

27. Causes excess cortisol:
a. Cushing syndrome
b. Addison's disease
c. Conn's syndrome
d. Acromegaly

28. Female born with XX chromosomes develops ambiguous genitalia or genitals that appear male. What is this condition?
a. Klinefelter syndrome
b. Turner syndrome
c. Congenital adrenal hyperplasia
d. Down syndrome

29. Master gland:
a. Hypothalamus
b. Pituitary gland
c. Thyroid gland
d. Adrenal gland

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30. What is the most abundant pituitary hormone?
a. TSH
b. GH
c. LH
d. FSH

31. Which of the following tissues does not secrete steroid hormones?
a. Ovaries
b. Pituitary gland
c. Testes
d. Adrenal cortex

32. Which of the following hormones involved in calcium regulation acts by decreasing both calcium and phosphorous?
a. PTH
b. Calcitonin
c. Vitamin D
d. Cortisol

33. It is measured in plasma and CSF as a marker for bacterial infection.
a. Albumin
b. Troponin
c. Procalcitonin
d. Cortisol

34. The first hormones to respond to stress
a. Cortisol
b. Aldosterone
c. Catecholamine
d. DHEA

35. Which hormone is responsible for an increase in body temperature after ovulation?
a. Estrogen
b. LH
c. Progesterone
d. FSH

36. This hormone is given to a pregnant woman in order to induce contractions:
a. Oxytocin
b. Prolactin
c. Estrogen
d. Progesterone

37. Which test is the most specific for myocardial infarction?
a. CK
b. LDH
c. Myoglobin
d. Troponin

38. In analyzing cardiac markers, which marker increases first?
a. Decreased, increased
b. Increased, decreased
c. Decreased, normal
d. Increased, normal

39. Anticoagulant of choice for TDM
a. EDTA
b. Heparin
c. Sodium fluoride
d. Oxalate

40. What is the most common substance abused?
a. Cannabinoids
b. Ecstasy
c. Shabu
d. Alcohol

41. Specimen for drug analysis EXCEPT:
a. Blood
b. Urine
c. Semen
d. Oral Secretions

42. Validity of drug test result:
a. 6 months
b. 1 year
c. 2 years
d. 3 years

43. An enzyme that is also used as a tumor marker.
a. LD
b. Lipase
c. Aldolase
d. Catalase

44. A tumor marker used in the assessment of choriocarcinoma or hydatidiform mole is
a. B-hCG
b. CEA
c. AFP
d. IgG

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45. Tumor marker tests are used to:
a. Monitor response to therapy
b. Aid in staging of cancer
c. Detect recurrent disease
d. All of these

46. CA 19-9 is what type of tumor marker?
a. Hormone
b. Carbohydrate
c. Protein
d. Enzyme

47. Which of the following is NOT a driving force for more automation?
a. Increased use of chemistry panels
b. High-volume testing
c. Fast turnaround time
d. Expectation of high-quality, accurate results

48. Which of the following steps in automation generally remains a manual process in most laboratories?
a. Preparation of the sample
b. Specimen measurement and delivery
c. Reagent delivery
d. Chemical reaction phase

49. Which of the following are considered medical emergencies?
I. Diabetic ketoacidosis II. Renal Glycosuria III. Marked Hyperkalemia
a. I, II, III
b. I, III
c. I, II
d. I

50. What is the national reference laboratory for Clinical Chemistry?
a. EAMC
b. SLH
c. LCP
d. NKTI

51. Sealed heparinized arterial blood was left at room temperature for 2 hours. The most likely changes in PO2 (mmHg), PCO2(mm Hg), and pH, respectively, are:
A. Increase, increase and increase
B. Decrease, decrease, and decrease
C. Decrease, increase, and decrease
D. Decrease, decrease, and increase

52. The adrenal medulla secretes which of the following in the greatest quantity?
A. Metanephrine
B. Noradrenaline
C. Epinephrine
D. Dopamine

53. Homovanillic acid is the principal urine metabolite of:
A. Norepinephrine
B. Epinephrine
C. Epinephrine
D. Dopamine

54. Diurnal variation is important to consider when collecting blood for the assay of:
A. Catecholamines
B. Creatinine
C. Cortisol
D. Thyroid hormones

55. T-3 uptake is actually a measurement of:
A. T-3
B. T-4
C. TBG
D. Free thyroxine

56. Active hormonal form of T3 an T4:
A. Those bound to TBG
B. Those bound to albumin
C. Those bound to transthyretin
D. Those in free from

57. The principle is based on the reaction of urinary estrogen with a mixture of phenol and sulfuric acid to produce pink color. This refers to:
A. Kober reaction
B. Trinder reaction
C. Zimmermann reaction
D. Porter-Silber reaction

58. The Kober reaction is used in the assay of:
A. Urinary estrogen
B. Glucocorticoids
C. Testosterone
D. Epinephrine

MEDICAL TECHNOLOGY LICENSURE EXAM PREPARATION IN THE PHILIPPINES

CLINICAL CHEMISTRY EXAM

59. In the Porter-Silber assay, the dihydroxyacetone side chain of the steroid hormone reacts with:
A. Sulfuric acid-hydroquinone and forms reddish-brown color
B. m-dinitrobenzene and forms purple color
C. Ceric and arsenite compound and forms a yellow product
D. 2, 4 –dinitrophenylhydrazizne and forms a yellow derivative

60. The assay employed for 17-ketosteroids, in which steroids react with m-dinitrobenzene in alcoholic KOH solution resulting to the formation of a purple color:
A. Kober Reaction
B. Zimmerman reaction
C. Porter-Silber Reaction
D. Pisano Method

61. Zollinger-Ellison syndrome is characterized by elevated blood levels of:
A. Cholecystokinin
B. Trypsin
C. Pepsin
D. Gastrin

62. Tumor marker most useful in the detection of familial medullary carcinoma of the thyroid:
A. Calcitonin
B. CA 125
C. CEA
D. CA 19-9

63. What metal toxin in urine is detected by the Reinsch test?
A. Lead
B. Mercury
C. Bromide
D. Zinc

64. Trinder's reagent (mercuric chloride, HCl, and ferric nitrate) is used in the colometric assay for:
A. Acetaminophen
B. Salicylate
C. Theophylline
D. Ethanol

65. Caffeine is an important metabolite of this drug, which is assayed in newborns and young children to monitor its therapeutic level. What is this?
A. Acetaminophen
B. Digoxin
C. Theophylline
D. Phenobarbital

66. Odor of bitter almond gives a clue of:
A. Cyanide poisoning
B. Ethanol poisoning
C. Arsenic poisoning
D. Carbon monoxide poisoning

67. Benzoylecgonine is the major metabolite of:
A. Heroin
B. Marijuana
C. Cocaine
D. Phencyclidine

68. The formation of this crystal in urine, although not a constant finding is an important diagnostic clue of ethylene glycol poisoning:
A. Uric acid
B. Ammonium biurate
C. Triple phosphate
D. Calcium oxalate

69. What is the major carrier of drugs in the circulation?
A. Albumin
B. Globulin
C. Transferrin
D. Hemoglobin

70. Fire extinguishers designated as Class A are used for:
A. Paper and wood
B. Electrical equipment fire
C. Flammable liquids and gases
D. All of the above

71. It is a specialized colorimeter designed to scan and quantitate electrophoresis patterns:
A. Densitometer
B. Detector
C. Atomizer
D. Monochromator

MEDICAL TECHNOLOGY LICENSURE EXAM PREPARATION IN THE PHILIPPINES

CLINICAL CHEMISTRY EXAM

72. The element that distinguishes proteins from carbohydrate and lipid compounds is:
A. Carbon
B. Oxygen
C. Nitrogen
D. Phosphorus

73. Parfentjev's method is for the determination of:
A. Fibrinogen
B. Albumin
C. Globulin
D. Amylase

74. Apolipoprotein A is the primary protein component of:
A. HDL
B. IDL
C. LDL
D. VLDL

75. It is biologically important, as it serves as the starting point in many metabolic pathways including Vitamin D synthesis, steroid hormone synthesis, and bile acid metabolism
A. Cholesterol
B. Phospholipid
C. Triglycerides
D. Free fatty acids

76. What is the current reference method for cholesterol analysis?
A. Abell-Kendall method
B. Bloor's method
C. Salkowski method
D. Lieberman-Burchardt

77. A mild condition that appears to result from a genetic defect in transport of bilirubin from sinusoidal blood into the hepatocyte:
A. Gilbert Syndrome
B. Crigler-Najjar Syndrome
C. Dubin-Johnson
D. Rotor Syndrome

78. What reagent is used in the Evelyn-Malloy method to dissociate the unconjugated bilirubin from protein?
A. Methanol
B. Ethanol
C. Caffeine
D. Acetic acid

79. The Jaffe reaction is employed for the quantitation of:
A. Urea
B. Creatinine
C. Protein
D. Uric acid

80. Lloyd's reagent improves the specificity of what colorimetric method of determination?
A. Jaffe
B. Caraway
C. Lieberman-Burchardt
D. Biuret

81. What is the major end product of protein and amino acid catabolism?
A. Urea
B. Uric acid
C. Creatine
D. Creatinine

82. Uric acid when oxidized by the enzyme uricase is transformed to:
A. Allantoin
B. Monosodium urate
C. Xanthine
D. Ammonia

83. The sweat chloride test is useful in the diagnosis of:
A. Dehydration
B. Cystic fibrosis
C. Azotemia
D. Diabetes

84. Which trace metal accumulates in Wilson's disease?
A. Cobalt
B. Copper
C. Nickel
D. Zinc

85. What is the anticoagulant of choice for blood gas analysis?
A. EDTA
B. Heparin
C. Oxalate
D. Citrate

MEDICAL TECHNOLOGY LICENSURE EXAM PREPARATION IN THE PHILIPPINES

CLINICAL CHEMISTRY EXAM

86. The pH of blood is critically maintained at what level:
A. 7.00-7.50
B. 7.50-7.70
C. 7.15-7.35
D. 7.35-7.45

87. In which of the following are the thyroid hormones classified:
A. Amino acid derivatives
B. Steroid hormones
C. Fatty acid derivatives
D. Peptide hormones

88. Which of the following polypeptide hormones may be described as having alpha chains that are biochemically identical but beta chains that are biochemically unique?
A. FSH, TSH, ACTH, LH
B. TSH, LH, TRH, HCG
C. LH, ACTH, HCG, TRH
D. HCG, FSH, TSH, LH

89. The thyroid gland produces all of the following hormones EXCEPT:
A. TSH
B. Calcitonin
C. Thyroxine
D. Triidothyronine

90. In hypothyroidism, one would expect the total T4 level to be ____, and the T3 uptake to be ___.
A. Increased, increased
B. Decreased, decreased
C. Decreased, increased
D. Increased, decreased

91. How can primary hypothyroidism be differentiated from secondary hypothyroidism?
A. T3
B. T4
C. TSH
D. Both A and B

92. 5-Hydroxyindoleacetic acid is the primary metabolite of:
A. Epinephrine
B. Prolactin
C. Norepinephrine
D. Serotonin

93. A marked increase in 5-HIAA excretion occurs in patients with:
A. Argentaffinoma
B. Pheochromocytoma
C. Diabetes insipidus
D. Diabetes mellitus

94. Digoxin, procainamide and quinidine are drugs that may be classified as:
A. Aminoglycosides
B. Anticonvulsants
C. Antidepressant
D. Cardioactive

95. Lithium therapy is widely used in the treatment of:
A. Hypertension
B. Hyperactivity
C. Aggression
D. Manic-depression

96. A drug that relaxes the smooth muscles of the bronchial passages is:
A. Acetaminophen
B. Lithium
C. Phenytoin
D. Theophylline

97. Which of the following statements pertains to the effect of ethanol?
1. Ethanol functions as a depressant of the central nervous system
2. Initial effect is an increase in heart rate and blood pressure
3. Long-term abuse can impair most organs of the body; primary tissue affected is the liver
4. Blood alcohol content of 0.35 to 0.50 % is associated with coma and possible death
A. 1 and 3
B. 2 and 4
C. 1, 2 and 3
D. 1, 2, 3 and 4

98. This toxin has high affinity to keratin, can be identified from hair and nails:
A. Lead
B. Cyanide
C. Mercury
D. Arsenic

99. This common substance of abuse is derived from Cannabis sativa leaves and stems. Which of the following is it?
A. Heroine
B. Cocaine
C. Marijuana
D. Amphetamines

100. All of the following vitamins are lipid in nature and classified as fat-soluble, EXCEPT:
A. Vit. A
B. Vit. C
C. Vit. D
D. Vit. K

MEDICAL TECHNOLOGY LICENSURE EXAM PREPARATION IN THE PHILIPPINES

CLINICAL CHEMISTRY EXAM

1. True about analbuminemia EXCEPT:
a. Low/absent levels in serum
b. Congenital
c. Acquired
d. Autosomal recessive

2. A congenital disorder characterized by a split in the in the albumin band when serum is subjected to electrophoresis is known as:
a. Analbuminemia
b. Anodic albuminemia
c. Bisalbuminemia
d. Prealbuminemia

3. Which of the following has been found to be the most sensitive and helpful indicator of nutritional status in very ill patients?
a. Transthyretin
b. Transferrin
c. Albumin
d. Somatomedin C

4. What is the formula for globulin?
a. TP + albumin
b. TP – albumin
c. TP x albumin
d. TP / albumin

5. What is the normal albumin:globulin ratio?
a. 1:2
b. 2:1
c. 5:1
d. 1:5

6. The following are the amino acids where creatine is synthesized from, EXCEPT:
a. Glycine
b. Methionine
c. Arginine
d. Cysteine

7. The uric acid is synthesized from the following, EXCEPT:
a. Adenine
b. Purine
c. Thymidine
d. Guanine

8. What is the indirect measure for urea determination?
a. Fearon
b. Jaffe
c. Uricase
d. Berthelot

9. What is the indirect method for uric acid determination?
a. Urease
b. Uricase
c. Berthelot
d. Nesslerization

10. What is the indirect method for ammonia determination?
a. Nesslerization
b. Glutamate dehydrogenase
c. Uricase
d. Berthelot

11. The sample used for this analyte is EDTA plasma which is placed on ice.
a. Urea
b. Ammonia
c. Creatinine
d. Uric acid

12. The protein content of the diet will affect primarily the test results for:
a. Creatinine
b. Creatine
c. Uric acid
d. Urea

13. Specimen for ammonia should be centrifuged within how many minutes?
a. 10
b. 20
c. 30
d. 60

14. If there is a delay of testing for ammonia, the specimen should be put at what temperature?
a. 37C
b. 22C
c. 4C
d. -20C

15. When measuring ammonia blood levels, which of the following might cause a false increase in this analyte?
a. The patient had two cigarettes 15 minutes prior to blood draw.
b. The patient was fasting for hours prior to blood collection.
c. Immediately after phlebotomy, the blood sample was maintained on ice.
d. The patient had a steak dinner the night before the blood draw.

MEDICAL TECHNOLOGY LICENSURE EXAM PREPARATION IN THE PHILIPPINES

CLINICAL CHEMISTRY EXAM

16. Creatinine concentration in the blood has a direct relationship to:
a. Muscle mass
b. Dietary protein intake
c. Age and gender
d. More than one of the above

17. BUN = 80; Crea = 4
a. Malnutrition
b. Low protein intake
c. Chronic Kidney Disease
d. Overhydration

18. A BUN:Crea ratio of >20:1 with normal crea indicates:
a. Pre-renal disease
b. Renal disease
c. Post-renal disease
d. Normal

19. Any condition that results in a decrease in blood flow to the kidney results to:
a. Pre-renal azotemia
b. Renal azotemia
c. Post-renal azotemia
d. None of the above

20.It comprises the majority of NPNs in serum.
a. Uric acid
b. Creatinine
c. Ammonia
d. Urea

21. Which one of the following is not an NPN substance?
a. Allantoin
b. Ammonia
c. Creatinine
d. Urea

22. An urea N result of 9 mg/dL is obtained by a technologist. What is the urea concentration?
a. 3.2 mg/dL
b. 4.2 mg/dL
c. 18.0 mg/dL
d. 19.3 mg/dL

23. A complete deficiency of hypoxanthine guanine phosphoribosyltransferase results in which disease?
a. Lesch-Nyhan syndrome
b. Modification of diet in renal disease
c. Maple syrup urine disease
d. Reye's syndrome

24. CrCl is used to estimate the
a. Tubular secretion of creatinine
b. Glomerular secretion of creatinine
c. Renal glomerular and tubular mass
d. Glomerular filtration rate

25. What specimen/s is/are collected for the determination of creatinine clearance?
a. Plasma and 24-hour urine
b. Plasma only
c. First morning urine
d. Midstream clean catch urine

26. All of the following are the parameters used for the calculation of estimated GFR (eGFR) EXCEPT:
a. Gender and race
b. Blood Creatinine
c. Urine creatinine
d. BUN and albumin

27. n the Jaffe reaction, a red-orange chromogen is formed when creatinine reacts with:
a. Picric acid
b. Biuret reagent
c. Diacetyl monoxime
d. Both a and b

28. Testing blood from a patient with acute glomerulonephritis would most likely result in which of the laboratory findings?
a. Decreased creatinine
b. Decreased urea
c. Increased glucose
d. Increased creatinine

29. Chylomicron comes from _____ to the thoracic duct and then to the circulation.
a. Blood
b. Peritoneum
c. Pericardium
d. Lymph

30. Which of the following is considered a lipid?
a. Chylomicrons
b. LDL
c. Cholesterol
d. HDL

MEDICAL TECHNOLOGY LICENSURE EXAM PREPARATION IN THE PHILIPPINES

CLINICAL CHEMISTRY EXAM

31. In what major organ of the body is the majority of the body's cholesterol synthesized?
a. Heart
b. Pancreas
c. Gallbladder
d. Liver

32. Which lipoprotein migrates farthest towards the anode during electrophoresis?
a. Chylomicron
b. VLDL
c. LDL
d. HDL

33. What is the patient preparation for lipid?
a. Water not allowed, fast for 10 hrs.
b. Water, smoking, coffee, tea allowed, fast for 10 hrs
c. Water allowed, fast for 12 hrs
d. Water, smoking, coffee, tea allowed, fast for 16 hrs

34. Which of the following would be most adversely affected by a nonfasting sample?
a. HDL
b. LDL
c. Cholesterol
d. Triglycerides

35. What is the current reference method for cholesterol analysis?
a. GC-MS
b. Abell-Kendall method
c. Bloor's method
d. Salkowski method

36. Two step method for cholesterol analysis:
a. Pearson, Stern, and Mac Gavack
b. Bloors
c. Abell-Kendall
d. Schoenheimer

37. What is the end color of the Salkowski reaction?
a. Orange
b. Red
c. Yellow
d. Green

38. What is the end color of the Van Handel and Zilversmith reaction?
a. Orange
b. Red
c. Yellow
d. Blue

39. The most likely cause for serum/plasma to appear "milky" is the presence of
a. Chylomicrons
b. VLDL
c. LDL
d. HDL

40. Which lipoprotein delivers endogenous lipids?
a. Chylomicron
b. VLDL
c. LDL
d. HDL

41. An abnormal lipoprotein found in patients with obstructive biliary disease:
a. B-VLDL
b. LpX
c. Lp(a)
d. LDL

42. Which of the following is referred to as the "good cholesterol"?
a. HDL
b. LDL
c. VLDL
d. Free cholesterol

43. Which of the following apoproteins is responsible for receptor binding for IDL and the chylomicron remnant produced in fat transport?
a. Apo A1
b. Apo C
c. Apo E
d. Apo B

44. Which of the following enzymes is found bound to HDL and LDL in blood plasma and acts to convert free cholesterol into cholesteryl esters?
a. Cholesterol esterase
b. Lipoprotein lipase
c. LCAT
d. CETP

45. Which of the following transfers cholesterol esters to chylomicrons and LDL from the HDL?
a. Cholesterol esterase
b. Lipoprotein lipase
c. LCAT
d. CETP

MEDICAL TECHNOLOGY LICENSURE EXAM PREPARATION IN THE PHILIPPINES

CLINICAL CHEMISTRY EXAM

46. Which is NOT true about unconjugated bilirubin?
a. Direct bilirubin
b. Water insoluble
c. Indirect bilirubin
d. Non-polar

47. The bilirubin fraction that is covalently attached to albumin and contributes to the conjugated bilirubin value is:
a. Direct
b. Indirect
c. Delta
d. Bound

48. Considered as a liver function test, EXCEPT:
a. AST
b. ALT
c. Amylase
d. ALP

49. Hepatocellular damage may be best assessed by which of the following parameters?
a. Serum AST and ALT levels
b. GGT and ALP
c. Bilirubin, GGT, and ALP
d. Ammonia and urea

50. Jendrassik-Grof method reagent
a. Caffeine
b. Methanol
c. N-butanol
d. Acetic acid

51. What is the purpose of the caffeine in the Jendrassik-Grof method?
a. Catalyst
b. Coenzyme
c. Accelerator
d. Cofactor

52. What is the formula for indirect bilirubin?
a. TB + DB
b. TB – DB
c. TB x DB
d. TB / DB

53. In an adult, if total bilirubin value is 3.1 mg/dL and conjugated bilirubin is 1.1 mg/dL, what is the unconjugated bilirubin value?
a. 2.0 mg/dL
b. 4.2 mg/dL
c. 1.0 mg/dL
d. 3.4 mg/dL

54. Liver disease, EXCEPT:
a. Anemia
b. Hemochromatosis
c. ALT
d. AST

55. Gastric enzyme proteolysis:
a. Gastrin
b. Amylase
c. Lipase
d. Trypsin

56. Chief plasma cation whose main function is maintain osmotic pressure:
a. Chloride
b. Calcium
c. Sodium
d. Potassium

57. What formula is this: $Na^+ + K^+ – (Cl^– + HCO3^–)$?
a. Anion gap
b. Osmolal gap
c. Henderson-Hasselbach equation
d. GFR

58. In the Henderson-Hasselbach equation, the numerator denotes the function of:
a. Kidney
b. Liver
c. Lung
d. Heart

59. In the Henderson-Hasselbach equation, the denominator denotes the function of:
a. Kidney
b. Liver
c. Lung
d. Heart

60. Calculation of the anion gap is useful for QC of:
a. Calcium
b. Electrolyte profile
c. Phosphorous
d. Magnesium

MEDICAL TECHNOLOGY LICENSURE EXAM PREPARATION IN THE PHILIPPINES

CLINICAL CHEMISTRY EXAM

61. Considering a normal Gaussian curve distribution, how many values from a population will be within 2 SD?
A. 95.45%
B. 75.30%
C. 68.27%
D. 99.73%

62. A delta check:
A. Relates control difference from mean
B. Reports patient value difference from previous analysis
C. Evaluates statistical drift
D. Flags abnormal results

63. Which of the following instruments is used in the clinical laboratory to detect beta and gamma emissions?
A. Fluorometer
B. Nephelometer
C. Scintillation counter
D. Spectrophotometer

64. In potentiometry, the following are types of reference electrodes, EXCEPT:
A. Glass electrode
B. Standard hydrogen electrode
C. Saturated calomel electrode
D. Silver-silver chloride electrode

65. Which of the following substances are introduced in a continuous-flow analyzer to minimize diffusion of reagents and mixing between samples?
A. Membranes
B. Resins
C. Air bubbles
D. Gel polymers

66. The protein fraction that migrates the fastest toward the anode
A. Albumin
B. Beta-globulin
C. Alpha1-globulin
D. Gamma-globulin

67. Which of the following substances is markedly increased in nephrotic syndrome?
A. Ceruloplasmin
B. Alpha-2-macroglobulin
C. Alpha-1-antitrypsin
D. Albumin

68. The neocuproine method for glucoses is based on:
A. Glucose oxidase reaction
B. Copper reduction by glucose
C. Condenstaion reaction
D. Hexokinase reaction

69. Select the enzyme most specific for beta D-glucose
A. Hexokinase
B. Glucose-6phosphate dehydrogenase
C. Phosphohexisomerase
D. Glucose oxidase

70. All of the following are characteristics of Type II diabetes mellitus except:
A. Insulin levels may or may not be abnormal
B. It is more common than Type I diabetes
C. It requires insulin therapy to control hyperglycemia
D. It is associated with obesity and more common in persons greater than 40 years old

71. Select the order of mobility of lipoproteins electrophoresed on cellulose acetate or agarose at pH 8.6.
A. – Chylomicrons -prebeta- beta - alpha +
B. – Beta - prebeta - alpha- chylomicrons +
C. – Chylomicrons - beta - prebeta - alpha +
D. – Alpha - beta - prebeta- chylomicrons +

72. Select the lipoprotein fraction that carries most of the endogenous triglycerides
A. VLDL
B. LDL
C. HDL
D. Chylomicrons

73. The lipoprotein that transports the exogenous triglycerides:
A. HDL
B. LDL
C. VLDL
D. Chylomicrons

74. Apolipoprotein A is the primary protein component of:
A. HDL
B. LDL
C. VLDL
D. None of these

MEDICAL TECHNOLOGY LICENSURE EXAM PREPARATION IN THE PHILIPPINES

CLINICAL CHEMISTRY EXAM

75.All are TRUE for CRP, EXCEPT
a. Elevated in bacterial infection
b. It may be used as a cardiac marker
c. It is an acute inflammatory marker
d. It is a chronic inflammatory marker

76. Overall process of guaranteeing quality patient care and is regulated throughout the total testing system:
a. Quality Assessment
b. Quality Control
c. Quality Assurance
d. Quality Systems

77. Method A and Method B for cholesterol both give a value of 200 mg/dL for a serum sample; however, the same QC material analyzed by Method A gives 185 mg/dL and by Method B gives 212 mg/dL. What might cause this?
a. Method B is biased
b. Method A is imprecise
c. Both methods are showing a matrix effect for the QC material
d. Any of the above answers may be correct

78. A Gaussian distribution is usually:
A. Bell-shaped
B.Rectangular
C. Bimodal
D. Skewed

79. What type of additive is in a blood collection tube with a red cap?
a. Lithium or sodium heparin
b. Potassium EDTA
c. Thrombin
d. No additive

80. Blood is collected from a patient who has been fasting since midnight; the collection time is 7 am. Which of the following tests would NOT give a valid test result?
a. Cholesterol
b. Triglycerides
c. Total bilirubin
d. Potassium

81. All of the following migrate with the alpha2 globulins, EXCEPT:
a. Alpha2-macroglobulin
b. Ceruloplasmin
c. Haptoglobin
d. Transferrin

82. Hormone that regulates synthesis and release of the thyroid hormones is produced in:
a. Hypothalamus
b. Anterior pituitary gland
c. Posterior pituitary gland
d. Thyroid

83. A drug that relaxes the smooth muscles of the bronchial passage:
a. Acetaminophen
b. Lithium
c. Phenytoin
d. Theophylline

84. Violation of which rule does NOT indicate systematic error?
a. 1:3s
b. 4:1s
c. 2:1s
d. 2:2s

85. Which of the following anticoagulants is generally suitable for most drug analyses (TDM)?
a. Heparin
b. EDTA
c. Citrate
d. Oxalate

86. Effects include thickening of the cervical mucus, reduction of uterine contractions, and thermogenic effect, in which basal body temperature rises after ovulation.
a. Estrogen
b. Progesterone
c. Testosterone
d. None of the above

87. How should a laboratory verify the reference range it uses for a particular test?
a. Call another laboratory
b. Use the numbers form a textbook
c. Test samples from healthy people
d. Look on a medical internet site

88. Releasing factors are produced by the ____, and tropic hormones are produced by the _____.
a. Hypothalamus; pituitary
b. Pituitary; hypothalamus
c. Specific endocrine glands; hypothalamus
d. Pituitary; target gland

MEDICAL TECHNOLOGY LICENSURE EXAM PREPARATION IN THE PHILIPPINES

CLINICAL CHEMISTRY EXAM

89. Hepatocellular damage and necrosis:
a. Serum bilirubin level
b. Ratio of direct and total bilirubin
c. Serum ALP and other “obstructive” enzymes
d. Serum aminotransferase levels

90. How would 6.32 be rounded off to one less decimal place?
a. 6.32
b. 6.4
c. 7.0
d. 6.3

91. Before an OGTT is performed, individuals should ingest at least _____ per day of carbohydrates for the ____ days preceding the test.
a. 75 grams CHO per day for 2 days
b. 100 grams CHO per day for 2 days
c. 100 grams CHO per day for 3 days
d. 150 grams CHO per day for 3 days

92. Which type of analytical error is recognized by an HIL index?
a. Instrument not properly calibrated
b. Presence of interfering substances in sample
c. Presence of bubbles in the light path of a photometric method
d. Analyte concentration so high it depletes the active reagent

93. All are TRUE for B2, EXCEPT:
a. Conjugated bilirubin
b. Water soluble
c. Polar bilirubin
d. Indirect-reacting

94. What is the main reason that causes the following blood gas values:
pH= 7.25 pCO2= 36 mmHg
HCO3= 19 mEq/L

a. Hypoventilation
b. Bicarbonate retention
c. Hyperventilation
d. Bicarbonate loss

95. When selecting quality control reagents for measuring an analyte in urine, the medical technologist should select:
a. A quality control reagent prepared in a urine matrix
b. A quality control reagent prepared in a serum matrix
c. A quality control reagent prepared in deionized water
d. The matrix does not matter; any quality control reagent as long as the analyte of measure is chemically pure

96. For carbon dioxide determination, acidifying the sample:
a. Converts the various forms of CO_2 in plasma to gaseous CO_2 by dilution with an acid buffer
b. Prevents conversion of the various forms of CO_2 in plasma to gaseous CO_2 by dilution with an acid buffer
c. Converts all CO_2 and carbonic acid to HCO_3^-
d. Prevents conversion of all CO_2 and carbonic acid to HCO_3^-

97. Which of the following laboratory values is considered a positive risk factor for the occurrence of coronary heart disease?
a. HDL cholesterol <35 mg/dL
b. LDL cholesterol <30 mg/dL
c. Total cholesterol <200 mg/dL
d. HDL cholesterol >60 mg/dL

98. Lead toxicity can be acquired by the following, EXCEPT:
a. Skin contact
b. Animal bites
c. Inhalation
d. Ingestion

99. The most common method used in a clinical laboratory to measure osmolality is:
a. Vapor pressure
b. Boiling point
c. Freezing point depression
d. Osmotic pressure

100. Which specimen is the sample of choice for lead screening?
a. Whole blood
b. Hair
c. Serum
d. Urine

MEDICAL TECHNOLOGY LICENSURE EXAM PREPARATION IN THE PHILIPPINES

CLINICAL CHEMISTRY EXAM

1. Negative predictive value:
a. Ability of a test to detect a given disease or condition.
b. Ability of a test to correctly identify the absence of a given disease or condition.
c. Chance of an individual having a given disease or condition if the test is abnormal.
d. Chance an individual does not have a given disease or condition if the test is within the reference interval

2. A delta check is a method that:
a. Determines the mean and variance of an instrument
b. Monitors the testing system for precision
c. Monitors patient sample day by day
d. Is determined by each laboratory facility

3. Measures of spread, EXCEPT:
a. Coefficient of variation
b. Range
c. Mode
d. Standard deviation

4. Random errors, EXCEPT:
a. Reagent dispensing
b. Reagent lot variability
c. Variation in handling techniques: pipetting, mixing, timing
d. Variation in operator

5. Type of systemic error where the magnitude changes as a percent of the analyte present; error dependent on analyte concentration.
a. Constant systematic error
b. Proportional systematic error
c. Bias
d. None of the above

6. A pre-analytical error can be introduced by:
a. Drawing a coagulation tube before an EDTA tube
b. Mixing an EDTA tube 8 to 10 times
c. Transporting the specimen in a biohazard bag
d. Vigorously shaking the blood tube to prevent clotting

7. Two (2) consecutive control values exceed the same 2 standard deviation limit
a. 1:2S
b. 2:2S
c. R:4S
d. 4:1S

8. A trend in QC results is most likely caused by
a. Deterioration of the reagent
b. Miscalibration of the instrument
c. Improper dilution of standards
d. Electronic noise

9. Which of the following plots is best for comparison of precision and accuracy among laboratories?
a. Levy–Jennings
b. Tonks–Youden
c. Cusum
d. Linear regression

10. Which of the following terms refers to the closeness with which the measured value agrees with the true value?
a. Random error
b. Precision
c. Accuracy
d. Reliability

11. Beta cell destruction, usually leading to absolute insulin deficiency:
a. Type 1 DM
b. Type 2 DM
c. Type 3 DM
d. All of the above

12. Which of the following conclusions may be made regarding these data?
RANDOM GLUCOSE: 186 mg/dL
FASTING GLUCOSE: 114 mg/dL
2-HOUR OGTT: 153 mg/dL
HbA1c: 5.9%

a. Data represents normal glucose status
b. Data represents an impaired glucose status
c. Data represents the presence of insulinoma
d. Data represents diagnosis of diabetes

CLINICAL CHEMISTRY EXAM

13. Select the enzyme that is most specific for beta D-glucose:
a. Glucose oxidase
b. Glucose-6-phosphate dehydrogenase
c. Hexokinase
d. Phosphohexose isomerase

14. In normal glucose metabolism, blood glucose level increases rapidly after carbohydrates are ingested but returns to a normal level after:
a. 30 minutes
b. 45 minutes
c. 60 minutes (1 hour)
d. 120 minutes (2 hours)

15. Symptoms of hypoglycemia usually occur when blood glucose has fallen below ___ mg/Dl
a. 50 mg/dL
b. 60 mg/dL
c. 70 mg/dL
d. 80 mg/dL

16. Formation of glucose-6-phosphate from noncarbohydrate sources:
a. Glycolysis
b. Gluconeogenesis
c. Glycogenolysis
d. Glycogenesis

17. Long-term estimation of glucose concentration can be followed by measuring:
a. Glycosylated hemoglobin (HbA1c)
b. Fructosamine
c. Glycosylated albumin
d. None of the above

18. The plasma protein mainly responsible for maintaining colloidal osmotic pressure in vivo is:
a. Albumin
b. Prealbumin
c. Alpha2-macroglobulin
d. Beta2-microglobulin

19. Which dye gives a much greater absorbance change at 630 nm than it would at 500 nm?
a. HABA (Hydroxyazobenzene-benzoic acid
b. BCG (Bromcresol green)
c. BCP (Bromcresol purple)
d. Tetrabromosulfophthalein

20. Which of the following conditions is the result of a low alpha-1 antitrypsin level?
a. Asthma
b. Emphysema
c. Pulmonary hypertension
d. Sarcoidosis

21. Which test is the most sensitive in detecting early monoclonal gammopathies?
a. Immunoelectrophoresis
b. Urinary electrophoresis for monoclonal light chains
c. Capillary electrophoresis of serum and urine
d. Serum-free light chain immunoassay

22. “Gold standard” in the diagnosis of acute coronary syndrome (ACS):
a. Brain natriuretic peptide (BNP)
b. Cross-linked c-telopeptides
c. High-sensitivity CRP (hs-CRP)
d. Troponin

23. When should blood specimens for lipid studies be drawn?
a. Immediately after eating
b. Anytime during the day
c. In the fasting state, approximately 2 to 4 hours after eating
d. In the fasting state, approximately 12 hours after eating

24. The turbid, or milky, appearance of serum after fat ingestion is caused by the presence of?
a. Bilirubin
b. Cholesterol
c. Chylomicron
d. Phospholipid

25. Which of the following lipid tests is least affected by the fasting status of the patient?
a. Cholesterol
b. Triglyceride
c. Fatty acid
d. Lipoprotein

26. An abnormal lipoprotein present in patients with biliary cirrhosis or cholestasis:
a. LDL
b. B-VLDL
c. Lp(a)
d. LpX

27. The smallest and most dense lipoprotein particle:
a. LDL
b. HDL
c. VLDL
d. Chylomicrons

MEDICAL TECHNOLOGY LICENSURE EXAM PREPARATION IN THE PHILIPPINES

CLINICAL CHEMISTRY EXAM

28. LDL primarily contains:
a. Apo AI
b. Apo-AII
c. Apo-B100
d. Apo-B48

29. Which of the following apoproteins is inversely related to risk for coronary heart disease?
a. Apo-A1
b. Apo-B
c. Apo-B100
d. Apo-E

30. Select the order of mobility of lipoproteins electrophoresed on cellulose acetate or agarose at pH 8.6.
a. – Chylomicrons → pre-β → β→ α +
b. – β → pre-β → α → chylomicrons +
c. – Chylomicrons → β → pre-β →α +
d. – α → β → pre-β → chylomicrons +

31. . A patient's total cholesterol is 300 mg/dL, his HDL cholesterol is 50 mg/dL, and his triglyceride is 200 mg/dL. What is this patient's calculated LDL cholesterol?
a. 200
b. 210
c. 290
d. 350

32. Which of the following is associated with Tangier disease?
a. Apoprotein C-II deficiency
b. Homozygous apo-B100 deficiency
c. Apoprotein C-II activated lipase
d. Apoprotein A-I deficiency

33. The kinetic methods for quantifying serum triglyceride employ enzymatic hydrolysis. The hydrolysis of triglyceride may be accomplished by what enzyme?
a. Amylase
b. Leucine aminopeptidase
c. Lactate dehydrogenase
d. Lipase

34. It is usually the result of any type of obstruction in which urea is reabsorbed into the circulation.
a. Pre-renal azotemia
b. Renal azotemia
c. Post-renal azotemia
d. None of the above

35. Creatinine is formed from the:
a. Oxidation of creatine
b. Catabolism of proteins and amino acids
c. Catabolism of purines
d. Oxidation of purines

36. Which of the following is measured using glutamate dehydrogenase and is a measure of advanced stages, poor prognosis, and coma in liver disease?
a. Total bilirubin
b. Ammonia
c. Unconjugated bilirubin
d. Urea

37. In the diacetyl method, what does diacetyl react with to form a yellow product?
a. Ammonia
b. Urea
c. Uric acid
d. Nitrogen

38. The red complex developed in the Jaffe method to determine creatinine measurements is a result of the complexing of creatinine with which of the following?
a. Alkaline picrate
b. Diacetyl monoxide
c. Sulfuric acid
d. Sodium hydroxide

39. During chemotherapy for leukemia, which of the following analytes would most likely be elevated in the blood?
a. Uric acid
b. Urea
c. Creatinine
d. Ammonia

40. What is the compound that comprises the majority of the NPN fractions in serum?
a. Uric acid
b. Creatinine
c. Ammonia
d. Urea

41. The reaction rate depends only on enzyme concentration:
a. First-order kinetics
b. Zero-order kinetics
c. Second-order kinetics
d. None of the above

42. To what class of enzymes does lactate dehydrogenase belong?
a. Isomerases
b. Ligases
c. Oxidoreductases
d. Transferases

MEDICAL TECHNOLOGY LICENSURE EXAM PREPARATION IN THE PHILIPPINES

CLINICAL CHEMISTRY EXAM

43. Increase in the serum enzyme levels indicate:
a. Decreased enzyme catabolism
b. Accelerated enzyme production
c. Tissue damage and necrosis
d. Increased glomerular filtration rate

44. The highest levels of total LD are seen in:
a. AMI and pulmonary infarction
b. Pernicious anemia and hemolytic disorders
c. Skeletal muscle disorders
d. Viral hepatitis and cirrhosis

45. In what order (first to last) will the enzymes AST, CK, and LD become elevated in the serum during AMI?
a. AST, LD, CK
b. CK, LD, AST
c. CK, AST, LD
d. LD, CK, AST

46. Macroenzymes, EXCEPT:
a. ALT and AST
b. CK
c. GGT
d. G6PD

47. All of the following factors will adversely affect the accurate quantification of bilirubin in serum, EXCEPT:
a. Lipemia
b. Hemolysis
c. Exposure to light
d. Specimen refrigeration

48. What enzyme catalyzes the conjugation of bilirubin?
a. Leucine aminopeptidase
b. Glucose-6-phosphate dehydrogenase
c. Uridine diphosphate glucuronyltransferase
d. Carbamoyl phosphate synthetase

49. Which bilirubin fraction is conjugated and covalently bound to albumin?
a. Alpha
b. Beta
c. Delta
d. Gamma

50. Direct bilirubin, EXCEPT:
a. Insoluble in water
b. Conjugated in the liver
c. Conjugated with glucuronic acid
d. Excreted in the urine of jaundiced patients

51. Crigler-Najjar syndrome
a. Inability to transport bilirubin from the sinusoidal membrane to the microsomal region
b. Deficiency of the enzyme system required for conjugation of bilirubin
c. Inability to transport bilirubin glucuronides to the bile canaliculi
d. Severe liver cell damage accompanied by necrosis

52. Indirect-reacting bilirubin may be quantified by reacting it initially in which reagent?
a. Dilute hydrochloric acid
b. Dilute sulfuric acid
c. Caffeine-sodium benzoate
d. Sodium hydroxide

53. Which substrate is used in the Bowers–McComb method for ALP?
a. p-Nitrophenyl phosphate
b. β-Glycerophosphate
c. Phenylphosphate
d. α-Naphthylphosphate

54. Major intracellular cation:
a. Bicarbonate
b. Chloride
c. Potassium
d. Sodium

55. Electrolyte(s) essential for blood coagulation:
a. Calcium
b. Calcium and magnesium
c. Sodium and chloride
d. Bicarbonate, potassium and chloride

56. Hyponatremia due to increased water retention, EXCEPT:
a. Congestive heart failure
b. Hepatic cirrhosis
c. Diuretic use
d. Renal failure

57. _____ can occur when sodium is measured using indirect ion-selective electrodes (ISEs) in a patient who is hyperproteinemic or hyperlipidemic.
a. Hyponatremia
b. Hypernatremia
c. Pseudohyponatremia
d. Pseudohypernatremia

MEDICAL TECHNOLOGY LICENSURE EXAM PREPARATION IN THE PHILIPPINES

CLINICAL CHEMISTRY EXAM

58. Hyperkalemia, EXCEPT:
a. Acidosis
b. Alkalosis
c. Oral or intravenous potassium therapy
d. Diuretics

59. A disorder characterized by increased production of chloride in sweat:
a. Multiple myeloma
b. Hypoparathyroidism
c. Cystic fibrosis
d. Wilson disease

60. The anticoagulant of choice for arterial blood gas measurements is _____ in the _____ state.
a. Lithium heparin; dry
b. EDTA; dry
c. Lithium heparin; liquid
d. Sodium citrate; dry

61. Elevated anion gap, EXCEPT:
a. Hypernatremia
b. Hypercalcemia
c. Ketoacidosis
d. Renal failure

62. A patient's blood gas results are: pH = 7.50 pCO2 = 55 mm Hg HCO3– = 40 mmol/L. This indicates:
a. Respiratory acidosis
b. Respiratory alkalosis
c. Metabolic acidosis
d. Metabolic alkalosis

63. In the Henderson-Hasselbalch equation, the denominator denotes:
a. Kidney function
b. Lung function
c. Liver function
d. Renal function

64. Fever:
a. Will decrease pCO2 by 3%
b. Will increase pCO2 by 3%
c. Will decrease pCO2 by 7%
d. Will increase pCO2 by 7%

65. Which of the following blood gas parameters are measured directly by the blood gas analyzer electrochemically?
a. pH, HCO3- and total CO2
b. pCO2, HCO3- and pO2
c. pH, pCO2 and pO2
d. pO2, HCO3- and total CO2

66. The normal ratio of carbonic acid to bicarbonate in arterial blood is:
a. 1:20
b. 7.4:6.1
c. 0.003:1.39
d. 20:1

67. How would blood gas parameters change if a sealed specimen is left at room temperature for 2 or more hours?
a. pO2 increases, pCO2 increases, pH increases
b. pO2 decreases, pCO2 decreases, pH decreases
c. pO2 decreases, pCO2 increases, pH decreases
d. pO2 increases, pCO2 increases, pH decreases

68. Manganese toxicity resembles:
a. Parkinson's disease
b. Wilson's disease
c. Alzheimer's disease
d. Menkes disease

69. Which trace metal is contained in glucose tolerance factor?
a. Chromium
b. Copper
c. Selenium
d. Zinc

70. To what metal does ceruloplasmin firmly bind?
a. Chromium
b. Copper
c. Zinc
d. Iron

71. Tropic hormones, EXCEPT:
a. ACTH
b. FSH
c. TSH
d. GH

72. Select the most appropriate single screening test for thyroid disease.
a. Free thyroxine index
b. Total T3 assay
c. Total T4
d. TSH assay

73. A patient has an elevated serum T3 and free T4 and undetectable TSH. What is the most likely cause of these results?
a. Primary hyperthyroidism
b. Secondary hyperthyroidism
c. Euthyroid with increased thyroxine-binding proteins
d. Euthyroid sick syndrome

MEDICAL TECHNOLOGY LICENSURE EXAM PREPARATION IN THE PHILIPPINES

CLINICAL CHEMISTRY EXAM

74. The biologically most active, naturally occurring androgen is:
a. DHEA
b. Androstenedione
c. Epiandrosterone
d. Testosterone

75. Diabetes insipidus:
a. Vasopressin deficiency
b. Vasopressin excess
c. High specific gravity
d. None of the above

76. Most widely used screening test for Cushing's syndrome:
a. Overnight low-dose dexamethasone suppression test
b. Corticotropin-releasing hormone stimulation test
c. Petrosal sinus sampling
d. Metyrapone stimulation test

77. The definitive suppression test to prove autonomous production of growth hormone is:
a. Oral glucose loading
b. Somatostatin infusion
c. Estrogen priming
d. Dexamethasone suppression

78. Zollinger–Ellison (Z–E) syndrome is characterized by great elevation of:
a. Gastrin
b. Cholecystokinin
c. Pepsin
d. Glucagon

79. Critical to blood glucose homeostasis and blood pressure:
a. Aldosterone
b. Cortisol
c. Catecholamine
d. Cholesterol

80. The main estrogen produced by the ovaries and used to evaluate ovarian function:
a. Estriol (E3)
b. Estradiol (E2)
c. Epiestriol
d. Hydroxyestrone

81. Heroin is synthesized from what drug?
a. Diazepam
b. Morphine
c. Ecgonine
d. Chlorpromazine

82. Characterized by odor of bitter almonds, altered mental status and tachypnea in the absence of cyanosis.
a. Arsenic toxicity
b. Carbon monoxide intoxication
c. Cyanide overdose
d. Iron poisoning

83. Acetaminophen is particularly toxic to what organ?
a. Heart
b. Kidney
c. Spleen
d. Liver

84. All of the following requires TDM, EXCEPT:
a. Salicylates
b. Acetaminophen
c. Ibuprofen
d. All of the above

85. Most common drug of abuse:
a. Cocaine
b. Ethanol
c. Methanol
d. Marijuana

86. Specimen of choice for the determination of circulating concentrations of most drugs:
a. Expectorated sputum
b. Gastric fluid
c. Serum or plasma
d. Urine

87. Single most important factor in therapeutic drug monitoring (TDM):
a. Amount of WBCs in the specimen
b. Presence of glucose in the specimen
c. Timing of specimen collection
d. Volume of specimen

88. In pharmacokinetics, the concentration of the drug _____ as the rate of elimination and distribution exceeds absorption.
a. Declines
b. Spuriously declines
c. Rises
d. Spuriously rises

MEDICAL TECHNOLOGY LICENSURE EXAM PREPARATION IN THE PHILIPPINES

CLINICAL CHEMISTRY EXAM

89. Most common route of drug delivery:
a. Intravenous
b. Oral
c. Rectal
d. Transcutaneous

90. Select the five pharmacological parameters that determine serum drug concentration:
a. Absorption, anabolism, perfusion, bioactivation, excretion
b. Liberation, equilibration, biotransformation, reabsorption, elimination
c. Liberation, absorption, distribution, metabolism, excretion
d. Ingestion, conjugation, integration, metabolism, elimination

91. An anti-neoplastic drug that inhibits DNA synthesis in all cells
a. Clozapine
b. Ethosuximide
c. Methotrexate
d. Procainamide

92. All of the following are immunosuppressive drugs, EXCEPT:
a. Cyclosporine
b. Phenytoin
c. Sirolimus (rapamycin)
d. Tacrolimus

93. All of the following are cardioactive drugs, EXCEPT:
a. Aminoglycoside
b. Digixon
c. Procainamide
d. Quinidine

94. An orally administered drug used to treat manic depression (bipolar disorder):
a. Digoxin
b. Lithium
c. Phenytoin
d. Theophylline

95. When measuring trace metals in blood other than lead, what type of tube should be used?
a. Navy blue top
b. Green top
c. Purple top
d. Red top

96. Chemical name of Vitamin B2:
a. Retinol
b. Thiamine
c. Riboflavin
d. Ascorbic acid

97. Plays a role in the synthesis of amino acids and DNA:
a. Folic acid
b. Pteroylglutamic acid
c. Both of these
d. None of these

98. A deficiency of this vitamin results to rickets and osteomalacia:
a. Vitamin A
b. Vitamin D
c. Vitamin E
d. Vitamin K

99. Which is used to determine trastuzumab (Herceptin) therapy for breast cancer?
a. PR
b. CEA
c. HER-2/neu
d. CA-15-3

100. Which type of cancer is associated with the highest level of AFP?
a. Hepatoma
b. Ovarian cancer
c. Testicular cancer
d. Breast cancer

MEDICAL TECHNOLOGY LICENSURE EXAM PREPARATION IN THE PHILIPPINES

CLINICAL CHEMISTRY EXAM

1. 75'F = ‘C

a. 15.5
b. 21. 0
c. 23.8
d. 32.6

2. 20'C = ‘F

a. 25
b. 53
c. 68
d. 86

3. Morphine is the major metabolite of:

a. Cocaine
b. Heroin
c. Marijuana
d. Phnecyclidine

4. Substances with modified structures that are analogs of prescription pharmaceuticals of abused drugs are known as?

a. Designer drugs
b. Generic drugs
c. Trade drugs
d. Toxic drugs

5. All of the following may be used to cleanse the skin when drawing blood for ethanol analysis, except:

a. Alcohol swab
b. Merthiolate
c. Soap and water
d. Zephiran

6. The drug of choice for controlling petit mal (absence seizure)

a. Phenobarbital
b. Carbamazepine
c. Vancomycin
d. Ethosuximide (Zarontin)

7. It is used for treatment of petit mal (absence seizure) and grand mal:

a. Theophylline
b. Lithium
c. Valporic acid (Depakene)
d. Digoxin

8. A Cardiac glycoside that is used in the treatment of congenital heart failure and arrhythmias by increasing the force and velocity by increasing the force and velocity of myocardial contraction is:

a. Digoxin
b. Acetaminophen
c. Lithium
d. Phenytoin

9. Pharmacological parameters that determine serum drug concentration:

1. Liberation
2. absorption
3. Distribution
4. metabolism
5. Excretion

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

10. The most serious effect of methanol ingestion is:

a. Hallucinations
b. Blindness
c. Psychosis
d. Liver damage

11. Zinc protoporphyrin or free erythrocyte protoporphyrin measurements are useful to assess blood concentrations of:

a. Lead
b. Mercury
c. Arsenic
d. Beryllium

12. Estrogen and progesterone receptors assays are useful in assessing prognosis in which of the following?

a. Ovarian cancer
b. Endometriosis
c. Breast cancer
d. Amenorrhea

MEDICAL TECHNOLOGY LICENSURE EXAM PREPARATION IN THE PHILIPPINES

CLINICAL CHEMISTRY EXAM

13. Which tumor marker is used to determine the usefulness of trastuzumab (Herceptin) therapy for breast cancer ?

a. PR
b. CEA
c. HER-2/ neu
d. Estrogen receptor (ER)

14. Which of the followng tumor markers is used to monitor persons with breast cancer for recurrence of disease?

a. Cathepsin- D
b. Retinoblastoma gene
c. CA- 15-3
d. Estrogen receptor (ER)

15. Body mass index of an obese person?

a. BMI <18.5 kg/m2 UNDERWEIGHT
b. BMI of 18.5 to 24.9 kg/m2 NORMAL
c. BMI 25 to 29.9 k/m2 OVERWEIGHT
d. BMI> 30 kg/m2 OBESE

16. Body mass index of an overweight person?

a. BMI <18.5 kg/m2 UNDERWEIGHT
b. BMI of 18.5 to 24.9 kg/m2 NORMAL
c. BMI 25 to 29.9 k/m2 OVERWEIGHT
d. BMI> 30 kg/m2 OBESE

17. Secondary hypothyroidism:

a. Decreased T3 T4, decreased TSH
b. Increased T3 T4, Increased TSH
c. Normal T3 T4, Increased TSH
b. Decreased T3 T4, Increased TSH

18. Primary hypothyroidism:

a. Decreased T3 T4, decreased TSH
b. Increased T3 T4, Increased TSH
c. Normal T3 T4, Increased TSH
b. Decreased T3 T4, Increased TSH

19. The thyroid gland produces all of the following except:

a. TSH
b. Thyroglobulin
c. T3
d. T4

20.Most useful test for assessing thyroid function:

a. TSH
b. Serum T3 and T4
c. Thyroglobulin
d. Thyroid autoimmune antibodies

21. The biologically most active, naturally occurring androgen is:

a. Androstenedione
b. Epiandrosterone
c. Dehydroeplandrosterone
4. testosterone

22. Decreases aldosterone:

a. Low serum Na+ and K+
b. High serum Na+ and K+
c. Low serum Na+ and high serum K+
d. High serum Na+, low serum K+

23. Zone fasciculata (F- ZONE) cells, the middle layer of the adrenal cortex produces:

a. Aldosterone
b. Sulfate DHEAs
c. Cortisol and cortisone
d. All of these

24. Its major action is to regulate renal free water excretion and, therefore, has a central role in water balance:

a. Aldosterone
b. Oxytocin
c. Prolactin
d. Vasopressin (ADH)

25. Adrenal cushing's syndrome:

a. Increased ACTH and cortisol
b. Decreased ACTH and cortisol
c. Increased ACTH, decreased cortisol
d. Decreased ACTH, increased cortisol

26. Pituitary cushing's syndrome (cushing's disease)

a. Increased ACTH and cortisol
b. Decreased ACTH and cortisol
c. Increased ACTH, decreased cortisol
d. Decreased ACTH, increased cortisol

27. Prolactin, considered a stress hormone, has vital functions in relationship to reproduction. It is produced by the:

a. Anterior pituitary gland
b. Posterior pituitary gland
c. Thyroid gland
d. Ovaries

MEDICAL TECHNOLOGY LICENSURE EXAM PREPARATION IN THE PHILIPPINES

CLINICAL CHEMISTRY EXAM

28. Which of the following produces hormones?

1. Anterior pituitary gland
2. Posterior pituitary gland
3. Thyroid gland
4. Parathyroid gland

a. 1 and 2
b. 1, 2 and 3
c. 1, 3 and 4
d. 1, 2, 3 and 4

29. The neurohypophysis is the:

a. Hypothalamus
b. Anterior pituitary
c. Thyroid gland
d. Posterior pituitary

30. Which of the following is the primary mechanism causing respiratory alkalosis?

a. Renal failure
b. Hyperventilation
c. Congestive heart failure
d. Too much bicarbonate

31. Which of the following is the primary mechanism of compensation for metabolic acidosis?

a. Hyperventilation
b. Aldosterone release
c. Release of epinephrine
b. Bicarbonate excretion

32. In Emphysema patient suffering from fluid accumulation in the alveolar spaces is likely to be in what metabolic state?

a. Respiratory acidosis
b. Metabolic acidosis
c. Respirator alkalosis
b. Metabolic alkalosis

33. In the circulatory system, bicarbonate leaves the red blood cells and enters the plasma through an exchange mechanism with _____ to maintain electroneutrality.

a. Chloride
b. Carbonic acid
c. Lactate
d. Sodium

34. The normal ratio of carbonic acid to bicarbonate in arterial blood is

a. 1:20
b. 7.4: 6.1
c. 0.003: 1.39
d. 20:1

35. Conditions associated with low anion gap may be caused by:

1. Uremia/ Renal failure
2. Ketoacidosis in starvation or diabetes
3. Methanol, ethanol, ethylene glycol, or salicylate poisoning
4. Lactic acid
5. Hypoalbuminemia
6. Hypercalcemia

a. 1, 2 and 3
b. 1, 2, 3 and 4
c. 5 and 6
d. All of these

36. Conditions associated with elevated anion gap may be caused by:

1. Uremia/ Renal failure
2. Ketoacidosis in starvation or diabetes
3. Methanol, ethanol, ethylene glycol, or salicylate poisoning
4. Lactic acid
5. Hypoalbuminemia
6. Hypercalcemia

a. 1, 2 and 3
b. 1, 2, 3 and 4
c. 5 and 6
d. All of these

37. It is the major anion that counterbalances the major cation, sodium:

a. Potassium
b. Magnesium
c. Chloride
d. Bicarbonate

MEDICAL TECHNOLOGY LICENSURE EXAM PREPARATION IN THE PHILIPPINES

CLINICAL CHEMISTRY EXAM

38. Which method is not affected by excess lipids or proteins causing falsely decreased sodium (pseudohyponatremia) measurement?
a. Direct ISE
b. Indirect ISE
c. Flame photometry
d. None of these

39. Sodium produces which color in a flame?
a. Red
b. Violet
c. Yellow
d. Magnesium

40. Hyponatremia can be classified according to:
a. Chloride values
b. Anion gap
c. Glucose determination
d. Plasma/ Serum osmolality

41. Which electrolyte is significantly involved in the transmission of nerve impulses?
a. Iron
b. Phosphorus
c. Potassium
b. Sodium

42. Electrolytes important for blood coagulation:
a. Sodium, chloride, potassium
b. Bicarbonate, potassium, chloride
c. Calcium, Magnesium
b. Magnesium, phosphate

43. Electrolytes important for acid base balance:
a. Sodium, chloride, potassium
b. Bicarbonate, potassium, chloride
c. Calcium, Magnesium
b. Magnesium, phosphate

44. Electrolyte essential for myocardial rhythm and contractility:
a. Sodium, chloride, potassium
b. Bicarbonate, potassium, chloride
c. Potassium, magnesium, calcium
d. Calcium, Magnesium

45. CDC reference method for determination of cholesterol:
a. Liebermann Burchardt rreaction
b. Salkowski reaction
c. Cholesterol oxidase reaction
d. Abell, levy and brodie method

46. Friedwald formula (FF) is not valid for triglycerides over ____mg/ dL
a. over 100 mg/dL
b. over 200 mg/dL
c. over 300 mg/dL
d. over 400 mg/dL

47. When TAG and LDL- C are being measured, fasting becomes a requirement. Require fasting of patients:
a. 2 to 4 hours
b. 4 to 6 hours
c. 6 to 8 hours
d. 12 to 14 hours

48. Triglyceride levels, as chylomicrons, peak in the blood ____ hours after ingestion of a meal.
a. 2 to 6 hours
b. 6 to 8 hours
c. 6 to 8 hours
d. 12 to 14 hours

49. Abnormal lipoprotein present in patients with Biliary Cirrhosis or cholestasis and in patients with mutations in lecithin: cholesterol acyltransferase (LCAT)
a. LDL
b. IDL
c. Lp (a)
d. LpX

MEDICAL TECHNOLOGY LICENSURE EXAM PREPARATION IN THE PHILIPPINES

CLINICAL CHEMISTRY EXAM

50. C-peptide is formed during the conversion of pro- insulin to insulin. The amount of circulating C-peptide provides reliable indicators for pancreatic and insulin secretions (beta cell function), it is decreased in:
a. Insulinoma
b. Ingestion of hypoglycemic drugs
c. Type 1 DM
d. Type 2 DM

51. Dubowski method for glucose utilizes:
a. Phosphomolybdic acid
b. Arsenomolybdic acid
c. Ortho- toluidine
d. Potassium ferricyanide

52. A specimen is appropriate for glucose analysis if serum or plasma is separated from the cells within ___ minutes.
a. 15 minutes
b. 30 minutes
c. 45 minutes
d. 60 minutes

53. It is a sensitive test for cholestasis caused by chronic alcohol or drug ingestion:
a. AST
b. ALP
c. ALT
d. GGT

54. In the bowers and mccomb method for determining alkaline phosphatase activity, the substrate used is:
a. Monophosphate
b. Phenylphosphate
c. Disodium phenylphosphate
b. Para- nitrophenylphosphate

55. Catalyzes the joining of two substrate molecules, coupled with breaking of the pyrophosphate bond in adenosine triphosphate (ATP) or a similar compound:
a. Transferase
b. Hydrolase
c. Ligase
b. Lyase

56. Inorganic cofactors, such as chloride or magnesium ions, are called:
a. Apoenzyme
b. Holoenzyme
c. Coenzyme
d. Activator

57. One international Unit (IU) of enzyme activity is the amount of enzyme that under specified reaction conditions of substrate concentration, ph and temperature, causes usage of substrate at the rate of:
a. 1 Millimole/ min
b. 1 Nanomole/ min
c. 1 Micromole/ min
d. 1 Picomole/ min

58. When measuring ammonia blood levels, which of the following might cause a false increase in this analyte?
a. The patient had two cigarettes 15 minutes prior to blood draw
b. The patient was fasting for hours prior to blood collection
c. Immediately after phlebotomy, the blood sample was maintained on ice
d. The patient has a steak dinner the night before the blood draw

59. A complete deficiency of hypoxanthine guanine phosphoribosyltransferase results in which disease?
a. Lesch- Nyhan syndrome
b. Maple syrup urine disease
c. Megaloblastic anemia
d. Reye's syndrome

60. When plasma creatinine concentration is elevated, GFR is ____, indicating renal damage.
a. Increased
b. Decreased
c. Normal
d. Variable

61. Azotemia due to obstruction of urine flow anywhere in the urinary tract by renal calculi, tumors of the bladder or prostate, or severe infection:
a. Pre- renal azotemia
b. Renal azotemia
c. Post- renal azotemia
d. None of these

62. Prerenal azotemia is causes by:
a. Acute renal failure
b. Chronic renal failure
c. Congestive heart failure
d. Urinary tract obstruction

63. The term describing patients who are chronically calorie malnourished and lose both adipose and muscle tissue, but who do not demonstrate a protein deficiency, is:
a. Marasmus
b. Kwasgiorkor
c. Debilitated
d. None of these

64. Biochemical marker for bone resorption that can be detected in serum and urine:
a. Troponin
b. Adiponectin
c. Fibronectin
d. Cross- linked C- telopeptides (CTXs)

65. Variants demonstrate a wide variety of cellular interactions, including roles in cell adhesion, tissue differentiation, growth, and wound healing:
a. Troponin
b. Adiponectin
c. Fibronectin
d. Cross- linked C- telopeptides (CTXs)

66. Indicator of nutrition; binds thyroid hormones and retinol (vitamin A) binding protein:
a. Orosomucoid
b. Ceruplasmin
c. Prealbumin
b. Hemopexin

67. In a chemical reaction, the amount of product formed is measured at specific intervals during a specified period and the related to the concentration of the analyte in the unknown. This type of measurement is known as:
a. Colorimetric
b. End-point
c. Rate
b. Ultraviolet

68. The process by which fluorescence of an analyte is reduced due to its energy by interacting with other substances in solution known as:
a. Ionization
b. Quenching
c. Phosphorescence
d. self- absorption

69. Reflectance spectrometry uses which of the following?
a. Luminometer
b. Photomultiplier tube
c. Tungsten- halogen lamp
d. UV lamp

70. The lamps most commonly used for ultraviolet (UV) work are:
a. Deuterium and mercury arc lamps
b. Tungsten- halogen lamps
c. Silicon carbide rod
d. Tungsten lamp

71. The more light absorbed, the higher the concentration of analyte in this technique of measuring the amount of light absorbed by a solution
a. Atomic absorption
b. Fluorometry
c. Nephelometry
d. Spectrophotometry

72. Beer's law states that the concentration of a substance is (1) ___ proportiona to the amount of light absorbed or (2) ___ proportional to the logarithm of the transmitted light
a. Directly, inversely
b. Indirectly, direct
c. Both directly proportional
d. Both inversely proportional

73. Colligative properties include all of the following, except:
a. Osmolality
b. Vapor pressure
c. Freezing point
d. Osmotic pressure

MEDICAL TECHNOLOGY LICENSURE EXAM PREPARATION IN THE PHILIPPINES

CLINICAL CHEMISTRY EXAM

74. This centrifuge uses a very high- torque and low- inertia motor to spread monolayers of cells rapidly across a special slide for critical morphologic studies:
a. Horizontal centrifuge
b. Fixed- angle centrifuge
c. Ultracentrifuge
d. Cytocentrifuge

75. Chemicals should be stored:
a. Alphabetically, for easy accessibility
b. Inside a safety cabinet with proper ventilation
c. According to their chemical properties and classification
d. Inside a fume hood, if toxic vapors can be released when opened

76. The purest type of reagent water is:
a. Type I
b. Type II
c. Type III
d. All are equal

77. Physical actions can, overtime, contribute to repetitive strain disorders such as tenosynovitis, bursitis, and ganglion cysts:
a. Mechanical hazard
b. Cryogenic hazard
c. Ergonomic hazard
d. Compressed gases hazard

78. No recirculation; total exhaust to the outside through a hepa filter:
a. BSC Class IIA1
b. BSC Class IIA2
c. BSC Class IIB1
b. BSC Class IIB2

79. Thirty percent (30%) recirculated, 70% exhausted air:
a. BSC Class IIA1
b. BSC Class IIA2
c. BSC Class IIB1
b. BSC Class IIB2

80. Seventy percent (70%) recirculated to the cabinet work area through hepa; 30% balance can be exhausted through hepa back into the room or to outside through a canopy unit:
a. BSC Class IIA1
b. BSC Class IIA2
c. BSC Class IIB1
b. BSC Class IIB2

81. These pipettes have an oval bulb in the center and a tapered dispensing end:
a. Mohr
b. Ostwald- Folin
c. Volumetric
d. Serologic

82. These pipettes have the bulb closer to the delivery tip and are used for accurate measurement of viscous fluids, such as blood or serum:
a. Mohr
b. Ostwald- Folin
c. Volumetric
d. Serologic

83. Defined as parts per hundred parts:
a. Concentration
b. Dilution
c. Percent
d. Osmolality

84. An indication of relative concentration:
a. Concentration
b. Dilution
c. Percent
d. Osmolality

85. Gradual change in the control sample results:
a. Shift
b. Trend or drift
c. Dispersion
d. None of these

MEDICAL TECHNOLOGY LICENSURE EXAM PREPARATION IN THE PHILIPPINES

CLINICAL CHEMISTRY EXAM

86. Chance an individual does not have a given disease or condition if the test is within the reference interval:
a. Diagnostic sensitivity
b. Diagnostic specificity
c. Positive predictive value
d. Negative predictive value

87. The criteria for a good standard curve is/are:
a. The line is straight
b. The line connects all points
c. The line goes through the origin, or intersects, of the two axes
d. all of these

88. All are advantages of POINT-OF-CARE TESTING (POCT) EXCEPT:
a. Smaller blood specimen required
b. Patient convenience
c. Fast turnaround time
d. Lower cost

89. Most evacuated tubes on the market have at least ___ month/s shelf life.
a. 2 Months
b. 3 Months
c. 6 Months
d. 12 Months

90. In situations where blood is drawn at high altitudes (>5,000 FEET):
a. Decrease in draw volume
b. Increased in draw volume
c. Same blood draw volume
b. Cannot be determined

91. If evacuated tubes are stored at low temperature
a. Decrease in draw volume
b. Increased in draw volume
c. Same blood draw volume
b. Cannot be determined

92. Most common complication of phlebotomy:
a. Anemia
b. Cardiovascular
c. Vascular
b. Infection

93. Symptoms of hypoglycemia usually occur when blood glucose has fallen below ___ mg/ dL
a. 50 mg/dL
b. 60 mg/dL
c. 70 mg/dL
d. 80 mg/dL

94. The plasma protein mainly responsible for maintaining colloidal osmotic pressure in vivo is:
a. Albumin
b. Pre-albumin
c. Alpha2- macroglobulin
d. Beta2- microglobulin

95. The smallest and most dense lipoprotein particle:
a. LDL
b. HDL
c. VLDL
d. Chylomicrons

96. What is the compound that comprises the majority of the NPN fractions in serum?
a. Uric acid
b. Creatinine
c. Ammonia
d. Urea

97. Most common drug of abuse:
a. Cocaine
b. Ethanol
c. Methanol
d. Marijuana

MEDICAL TECHNOLOGY LICENSURE EXAM PREPARATION IN THE PHILIPPINES

CLINICAL CHEMISTRY EXAM

98. Which type of cancer is associated with the highest level of AFP?

a. Hepatoma

b. Ovarian cancer

c. Testicular cancer

d. Breast cancer

99. Chemical name of vitamin B2:

a. Retinol

b. Thiamine

c. Riboflavin

d. ascorbic acid

100. The biologically most active, naturally occurring androgen is:

a. DHEA

b. Androstenedione

c. Epiandrosterone

d. Testosterone

MEDICAL TECHNOLOGY LICENSURE EXAM PREPARATION IN THE PHILIPPINES

CLINICAL CHEMISTRY EXAM

1. The saccharogenic method for amylase determinations measures
a. The amount of product produced
b. The amount of substrate consumed
c. The amount of iodine present
d. The amount of starch present

2. Elevation of tissue enzymes in serum may be used to detect
a. Tissue necrosis or damage
b. Inflammation
c. Infectious diseases
d. Diabetes mellitus

3. Elevation of serum amylase and lipase is commonly seen in
a. Acute pancreatitis
b. Acute appendicitis
c. Gallbladder disease
d. Acid reflux disease

4. The isoenzymes LD-4 and LD-5 are elevated in
a. Liver disease
b. Pulmonary embolism
c. Renal disease
d. Myocardial infarction

5. What is the most heat stable ALP isoenzyme?
a. Placenta
b. Intestine
c. Liver
d. Bone

6. What organ produces vasopressin?
a. Hypothalamus
b. Posterior Pituitary
c. Anterior Pituitary
d. Adrenal cortex

7. What common substrate is used in the biosynthesis of adrenal steroids?
a. Tyrosine
b. pH
c. Progesterone
d. Cholesterol

8. Diurnal, EXCEPT:
a. GH
b. Prolactin
c. ACTH
d. LH

9. Tropic hormones, EXCEPT:
a. TSH
b. ACTH
c. GH
d. FSH

10. A hormone and an enzyme
a. Renin
b. ADH
c. TSH
d. Cortisol

11. Calcium concentration is regulated by:
a. Insulin
b. Parathyroid hormone
c. Thyroxine
d. Vitamin C

12. Fundamental to thyroid physiology
a. Iodine
b. Thyroglobulin
c. TSH
d. TRH

13. Thyroid hormones are derived from which of the following?
a. Histidine
b. Cholesterol
c. Tyrosine
d. Phenylalanine

14. The thyroid gland produces all of the following EXCEPT:
a. TSH
b. Thyroglobulin
c. T3
d. T4

15. Thyroid cells are organized into ____.
a. Follicles
b. Colloids
c. Isthmus
d. Cavities

CLINICAL CHEMISTRY EXAM

16. It is the center of thyroid hormone production
a. Follicle
b. Colloid
c. Isthmus
d. Cavities

17. Thyroxine present in largest amount
a. Free
b. Ionized
c. Bound to albumin
d. Bound to globulin

18. Which is NOT a function of the thyroid gland?
a. Protein synthesis
b. Development of fetal brain
c. Waste excretion
d. Regulation of metabolism

19. All of the following are symptoms of hypothyroidism, EXCEPT:
a. Fatigue
b. Depression
c. Cold intolerance
d. Good appetite

20. Hypothyroidism is generally associated with all of the following EXCEPT:
a. TSH receptor antibodies
b. Depression
c. An elevation of TSH levels
d. TPO antibodies

21. Sensitive marker for hyperfunctioning thyroid gland:
a. TSH
b. T4
c. T3
d. Tg

22. The primary serum test to screen for thyroid disease:
a. TSH
b. T4
c. T3
d. Tg

23. If the screening TSH is high, which test is likely to be ordered next?
a. Cholesterol
b. FT4
c. Ferritin
d. Glucose

24. In patients with developing subclinical hyperthyroidism, TSH levels will likely be _____, and fT4 will likely be _____.
a. Decreased, increased
b. Increased, decreased
c. Decreased, normal
d. Increased, normal

25. Insulin-like growth factor-1 is produced in the:
a. Pituitary gland
b. Thyroid gland
c. Bone
d. Liver

26. All of the following are true for thyroid gland EXCEPT:
a. Depends on TPO to permit iodination of the tyrosyl residues to make MIT and DIT
b. Is an ineffective iodine trap
c. Depends on TPO to permit the joining of two DIT residues to form T3
d. Usually functions independent of TSH levels

27. Causes excess cortisol:
a. Cushing syndrome
b. Addison's disease
c. Conn's syndrome
d. Acromegaly

28. Female born with XX chromosomes develops ambiguous genitalia or genitals that appear male. What is this condition?
a. Klinefelter syndrome
b. Turner syndrome
c. Congenital adrenal hyperplasia
d. Down syndrome

29. Master gland:
a. Hypothalamus
b. Pituitary gland
c. Thyroid gland
d. Adrenal gland

MEDICAL TECHNOLOGY LICENSURE EXAM PREPARATION IN THE PHILIPPINES

CLINICAL CHEMISTRY EXAM

30. What is the most abundant pituitary hormone?
a. TSH
b. GH
c. LH
d. FSH

31. Which of the following tissues does not secrete steroid hormones?
a. Ovaries
b. Pituitary gland
c. Testes
d. Adrenal cortex

32. Which of the following hormones involved in calcium regulation acts by decreasing both calcium and phosphorous?
a. PTH
b. Calcitonin
c. Vitamin D
d. Cortisol

33. It is measured in plasma and CSF as a marker for bacterial infection.
a. Albumin
b. Troponin
c. Procalcitonin
d. Cortisol

34. The first hormones to respond to stress
a. Cortisol
b. Aldosterone
c. Catecholamine
d. DHEA

35. Which hormone is responsible for an increase in body temperature after ovulation?
a. Estrogen
b. LH
c. Progesterone
d. FSH

36. This hormone is given to a pregnant woman in order to induce contractions:
a. Oxytocin
b. Prolactin
c. Estrogen
d. Progesterone

37. Which test is the most specific for myocardial infarction?
a. CK
b. LDH
c. Myoglobin
d. Troponin

38. In analyzing cardiac markers, which marker increases first?
a. Myoglobin
b. CK-MB
c. Troponin T
d. Troponin I

39. Anticoagulant of choice for TDM
a. EDTA
b. Heparin
c. Sodium fluoride
d. Oxalate

40. What is the most common substance abused?
a. Cannabinoids
b. Ecstasy
c. Shabu
d. Alcohol

41. Specimen for drug analysis EXCEPT:
a. Blood
b. Urine
c. Semen
d. Oral Secretions

42. Validity of drug test result:
a. 6 months
b. 1 year
c. 2 years
d. 3 years

43. An enzyme that is also used as a tumor marker.
a. LD
b. Lipase
c. Aldolase
d. Catalase

44. A tumor marker used in the assessment of choriocarcinoma or hydatidiform mole is
a. B-hCG
b. CEA
c. AFP
d. IgG

MEDICAL TECHNOLOGY LICENSURE EXAM PREPARATION IN THE PHILIPPINES

CLINICAL CHEMISTRY EXAM

45. Tumor marker tests are used to:
a. Monitor response to therapy
b. Aid in staging of cancer
c. Detect recurrent disease
d. All of these

46. CA 19-9 is what type of tumor marker?
a. Hormone
b. Carbohydrate
c. Protein
d. Enzyme

47. Which of the following is NOT a driving force for more automation?
a. Increased use of chemistry panels
b. High-volume testing
c. Fast turnaround time
d. Expectation of high-quality, accurate results

48. Which of the following steps in automation generally remains a manual process in most laboratories?
a. Preparation of the sample
b. Specimen measurement and delivery
c. Reagent delivery
d. Chemical reaction phase

49. Which of the following are considered medical emergencies?
I. Diabetic ketoacidosis II. Renal Glycosuria III. Marked Hyperkalemia

a. I, II, III
b. I, III
c. I, II
d. I

50. What is the national reference laboratory for Clinical Chemistry?
a. EAMC
b. SLH
c. LCP
d. NKTI

51. Sealed heparinized arterial blood was left at room temperature for 2 hours. The most likely changes in PO2 (mmHg), PCO2(mm Hg), and pH, respectively, are:
A. Increase, increase and increase
B. Decrease, decrease, and decrease
C. Decrease, increase, and decrease
D. Decrease, decrease, and increase

52. The adrenal medulla secretes which of the following in the greatest quantity?
A. Metanephrine
B. Noradrenaline
C. Epinephrine
D. Dopamine

53. Homovanillic acid is the principal urine metabolite of:
A. Norepinephrine
B. Epinephrine
C. Epinephrine
D. Dopamine

54. Diurnal variation is important to consider when collecting blood for the assay of:
A. Catecholamines
B. Creatinine
C. Cortisol
D. Thyroid hormones

55. T-3 uptake is actually a measurement of:
A. T-3
B. T-4
C. TBG
D. Free thyroxine

56. Active hormonal form of T3 an T4:
A. Those bound to TBG
B. Those bound to albumin
C. Those bound to transthyretin
D. Those in free from

57. The principle is based on the reaction of urinary estrogen with a mixture of phenol and sulfuric acid to produce pink color. This refers to:
A. Kober reaction
B. Trinder reaction
C. Zimmermann reaction
D. Porter-Silber reaction

58. The Kober reaction is used in the assay of:
A. Urinary estrogen
B. Glucocorticoids
C. Testosterone
D. Epinephrine

MEDICAL TECHNOLOGY LICENSURE EXAM PREPARATION IN THE PHILIPPINES

CLINICAL CHEMISTRY EXAM

59. In the Porter-Silber assay, the dihydroxyacetone side chain of the steroid hormone reacts with:
A. Sulfuric acid-hydroquinone and forms reddish-brown color
B. m-dinitrobenzene and forms purple color
C. Ceric and arsenite compound and forms a yellow product
D. 2, 4 –dinitrophenylhydrazizne and forms a yellow derivative

60. The assay employed for 17-ketosteroids, in which steroids react with m-dinitrobenzene in alcoholic KOH solution resulting to the formation of a purple color:
A. Kober Reaction
B. Zimmerman reaction
C. Porter-Silber Reaction
D. Pisano Method

61. Zollinger-Ellison syndrome is characterized by elevated blood levels of:
A. Cholecystokinin
B. Trypsin
C. Pepsin
D. Gastrin

62. Tumor marker most useful in the detection of familial medullary carcinoma of the thyroid:
A. Calcitonin
B. CA 125
C. CEA
D. CA 19-9

63. What metal toxin in urine is detected by the Reinsch test?
A. Lead
B. Mercury
C. Bromide
D. Zinc

64. Trinder's reagent (mercuric chloride, HCl, and ferric nitrate) is used in the colometric assay for:
A. Acetaminophen
B. Salicylate
C. Theophylline
D. Ethanol

65. Caffeine is an important metabolite of this drug, which is assayed in newborns and young children to monitor its therapeutic level. What is this?
A. Acetaminophen
B. Digoxin
C. Theophylline
D. Phenobarbital

66. Odor of bitter almond gives a clue of:
A. Cyanide poisoning
B. Ethanol poisoning
C. Arsenic poisoning
D. Carbon monoxide poisoning

67. Benzoylecgonine is the major metabolite of:
A. Heroin
B. Marijuana
C. Cocaine
D. Phencyclidine

68. The formation of this crystal in urine, although not a constant finding is an important diagnostic clue of ethylene glycol poisoning:
A. Uric acid
B. Ammonium biurate
C. Triple phosphate
D. Calcium oxalate

69. What is the major carrier of drugs in the circulation?
A. Albumin
B. Globulin
C. Transferrin
D. Hemoglobin

70. Fire extinguishers designated as Class A are used for:
A. Paper and wood
B. Electrical equipment fire
C. Flammable liquids and gases
D. All of the above

71. It is a specialized colorimeter designed to scan and quantitate electrophoresis patterns:
A. Densitometer
B. Detector
C. Atomizer
D. Monochromator

MEDICAL TECHNOLOGY LICENSURE EXAM PREPARATION IN THE PHILIPPINES

CLINICAL CHEMISTRY EXAM

72. The element that distinguishes proteins from carbohydrate and lipid compounds is:
A. Carbon
B. Oxygen
C. Nitrogen
D. Phosphorus

73. Parfentjev's method is for the determination of:
A. Fibrinogen
B. Albumin
C. Globulin
D. Amylase

74. Apolipoprotein A is the primary protein component of:
A. HDL
B. IDL
C. LDL
D. VLDL

75. It is biologically important, as it serves as the starting point in many metabolic pathways including Vitamin D synthesis, steroid hormone synthesis, and bile acid metabolism
A. Cholesterol
B. Phospholipid
C. Triglycerides
D. Free fatty acids

76. What is the current reference method for cholesterol analysis?
A. Abell-Kendall method
B. Bloor's method
C. Salkowski method
D. Lieberman-Burchardt

77. A mild condition that appears to result from a genetic defect in transport of bilirubin from sinusoidal blood into the hepatocyte:
A. Gilbert Syndrome
B. Crigler-Najjar Syndrome
C. Dubin-Johnson
D. Rotor Syndrome

78. What reagent is used in the Evelyn-Malloy method to dissociate the unconjugated bilirubin from protein?
A. Methanol
B. Ethanol
C. Caffeine
D. Acetic acid

79. The Jaffe reaction is employed for the quantitation of:
A. Urea
B. Creatinine
C. Protein
D. Uric acid

80. Lloyd's reagent improves the specificity of what colorimetric method of determination?
A. Jaffe
B. Caraway
C. Lieberman-Burchardt
D. Biuret

81. What is the major end product of protein and amino acid catabolism?
A. Urea
B. Uric acid
C. Creatine
D. Creatinine

82. Uric acid when oxidized by the enzyme uricase is transformed to:
A. Allantoin
B. Monosodium urate
C. Xanthine
D. Ammonia

83. The sweat chloride test is useful in the diagnosis of:
A. Dehydration
B. Cystic fibrosis
C. Azotemia
D. Diabetes

84. Which trace metal accumulates in Wilson's disease?
A. Cobalt
B. Copper
C. Nickel
D. Zinc

85. What is the anticoagulant of choice for blood gas analysis?
A. EDTA
B. Heparin
C. Oxalate
D. Citrate

MEDICAL TECHNOLOGY LICENSURE EXAM PREPARATION IN THE PHILIPPINES

CLINICAL CHEMISTRY EXAM

86. The pH of blood is critically maintained at what level:
A. 7.00-7.50
B. 7.50-7.70
C. 7.15-7.35
D. 7.35-7.45

87. In which of the following are the thyroid hormones classified:
A. Amino acid derivatives
B. Steroid hormones
C. Fatty acid derivatives
D. Peptide hormones

88. Which of the following polypeptide hormones may be described as having alpha chains that are biochemically identical but beta chains that are biochemically unique?
A. FSH, TSH, ACTH, LH
B. TSH, LH, TRH, HCG
C. LH, ACTH, HCG, TRH
D. HCG, FSH, TSH, LH

89. The thyroid gland produces all of the following hormones EXCEPT:
A. TSH
B. Calcitonin
C. Thyroxine
D. Triidothyronine

90. In hypothyroidism, one would expect the total T4 level to be ____, and the T3 uptake to be ___.
A. Increased, increased
B. Decreased, decreased
C. Decreased, increased
D. Increased, decreased

91. How can primary hypothyroidism be differentiated from secondary hypothyroidism?
A. T3
B. T4
C. TSH
D. Both A and B

92. 5-Hydroxyindoleacetic acid is the primary metabolite of:
A. Epinephrine
B. Prolactin
C. Norepinephrine
D. Serotonin

93. A marked increase in 5-HIAA excretion occurs in patients with:
A. Argentaffinoma
B. Pheochromocytoma
C. Diabetes insipidus
D. Diabetes mellitus

94. Digoxin, procainamide and quinidine are drugs that may be classified as:
A. Aminoglycosides
B. Anticonvulsants
C. Antidepressant
D. Cardioactive

95. Lithium therapy is widely used in the treatment of:
A. Hypertension
B. Hyperactivity
C. Aggression
D. Manic-depression

96. A drug that relaxes the smooth muscles of the bronchial passages is:
A. Acetaminophen
B. Lithium
C. Phenytoin
D. Theophylline

97. Which of the following statements pertains to the effect of ethanol?
1. Ethanol functions as a depressant of the central nervous system
2. Initial effect is an increase in heart rate and blood pressure
3. Long-term abuse can impair most organs of the body; primary tissue affected is the liver
4. Blood alcohol content of 0.35 to 0.50 % is associated with coma and possible death
A. 1 and 3
B. 2 and 4
C. 1, 2 and 3
D. 1, 2, 3 and 4

98. This toxin has high affinity to keratin, can be identified from hair and nails:
A. Lead
B. Cyanide
C. Mercury
D. Arsenic

99. This common substance of abuse is derived from Cannabis sativa leaves and stems. Which of the following is it?
A. Heroine
B. Cocaine
C. Marijuana
D. Amphetamines

100. All of the following vitamins are lipid in nature and classified as fat-soluble, EXCEPT:
A. Vit. A
B. Vit. C
C. Vit. D
D. Vit. K

MEDICAL TECHNOLOGY LICENSURE EXAM PREPARATION IN THE PHILIPPINES

CLINICAL CHEMISTRY EXAM

1. True about analbuminemia EXCEPT:
a. Low/absent levels in serum
b. Congenital
c. Acquired
d. Autosomal recessive

2. A congenital disorder characterized by a split in the in the albumin band when serum is subjected to electrophoresis is known as:
a. Analbuminemia
b. Anodic albuminemia
c. Bisalbuminemia
d. Prealbuminemia

3. Which of the following has been found to be the most sensitive and helpful indicator of nutritional status in very ill patients?
a. Transthyretin
b. Transferrin
c. Albumin
d. Somatomedin C

4. What is the formula for globulin?
a. TP + albumin
b. TP – albumin
c. TP x albumin
d. TP / albumin

5. What is the normal albumin:globulin ratio?
a. 1:2
b. 2:1
c. 5:1
d. 1:5

6. The following are the amino acids where creatine is synthesized from, EXCEPT:
a. Glycine
b. Methionine
c. Arginine
d. Cysteine

7. The uric acid is synthesized from the following, EXCEPT:
a. Adenine
b. Purine
c. Thymidine
d. Guanine

8. What is the indirect measure for urea determination?
a. Fearon
b. Jaffe
c. Uricase
d. Berthelot

9. What is the indirect method for uric acid determination?
a. Urease
b. Uricase
c. Berthelot
d. Nesslerization

10. What is the indirect method for ammonia determination?
a. Nesslerization
b. Glutamate dehydrogenase
c. Uricase
d. Berthelot

11. The sample used for this analyte is EDTA plasma which is placed on ice.
a. Urea
b. Ammonia
c. Creatinine
d. Uric acid

12. The protein content of the diet will affect primarily the test results for:
a. Creatinine
b. Creatine
c. Uric acid
d. Urea

13. Specimen for ammonia should be centrifuged within how many minutes?
a. 10
b. 20
c. 30
d. 60

14. If there is a delay of testing for ammonia, the specimen should be put at what temperature?
a. 37C
b. 22C
c. 4C
d. -20C

15. When measuring ammonia blood levels, which of the following might cause a false increase in this analyte?
a. The patient had two cigarettes 15 minutes prior to blood draw.
b. The patient was fasting for hours prior to blood collection.
c. Immediately after phlebotomy, the blood sample was maintained on ice.
d. The patient had a steak dinner the night before the blood draw.

MEDICAL TECHNOLOGY LICENSURE EXAM PREPARATION IN THE PHILIPPINES

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16. Creatinine concentration in the blood has a direct relationship to:
a. Muscle mass
b. Dietary protein intake
c. Age and gender
d. More than one of the above

17. BUN = 80; Crea = 4
a. Malnutrition
b. Low protein intake
c. Chronic Kidney Disease
d. Overhydration

18. A BUN:Crea ratio of >20:1 with normal crea indicates:
a. Pre-renal disease
b. Renal disease
c. Post-renal disease
d. Normal

19. Any condition that results in a decrease in blood flow to the kidney results to:
a. Pre-renal azotemia
b. Renal azotemia
c. Post-renal azotemia
d. None of the above

20.It comprises the majority of NPNs in serum.
a. Uric acid
b. Creatinine
c. Ammonia
d. Urea

21. Which one of the following is not an NPN substance?
a. Allantoin
b. Ammonia
c. Creatinine
d. Urea

22. An urea N result of 9 mg/dL is obtained by a technologist. What is the urea concentration?
a. 3.2 mg/dL
b. 4.2 mg/dL
c. 18.0 mg/dL
d. 19.3 mg/dL

23. A complete deficiency of hypoxanthine guanine phosphoribosyltransferase results in which disease?
a. Lesch-Nyhan syndrome
b. Modification of diet in renal disease
c. Maple syrup urine disease
d. Reye's syndrome

24. CrCl is used to estimate the
a. Tubular secretion of creatinine
b. Glomerular secretion of creatinine
c. Renal glomerular and tubular mass
d. Glomerular filtration rate

25. What specimen/s is/are collected for the determination of creatinine clearance?
a. Plasma and 24-hour urine
b. Plasma only
c. First morning urine
d. Midstream clean catch urine

26. All of the following are the parameters used for the calculation of estimated GFR (eGFR) EXCEPT:
a. Gender and race
b. Blood Creatinine
c. Urine creatinine
d. BUN and albumin

27. n the Jaffe reaction, a red-orange chromogen is formed when creatinine reacts with:
a. Picric acid
b. Biuret reagent
c. Diacetyl monoxime
d. Both a and b

28. Testing blood from a patient with acute glomerulonephritis would most likely result in which of the laboratory findings?
a. Decreased creatinine
b. Decreased urea
c. Increased glucose
d. Increased creatinine

29. Chylomicron comes from _____ to the thoracic duct and then to the circulation.
a. Blood
b. Peritoneum
c. Pericardium
d. Lymph

30. Which of the following is considered a lipid?
a. Chylomicrons
b. LDL
c. Cholesterol
d. HDL

MEDICAL TECHNOLOGY LICENSURE EXAM PREPARATION IN THE PHILIPPINES

CLINICAL CHEMISTRY EXAM

31. In what major organ of the body is the majority of the body's cholesterol synthesized?
a. Heart
b. Pancreas
c. Gallbladder
d. Liver

32. Which lipoprotein migrates farthest towards the anode during electrophoresis?
a. Chylomicron
b. VLDL
c. LDL
d. HDL

33. What is the patient preparation for lipid?
a. Water not allowed, fast for 10 hrs.
b. Water, smoking, coffee, tea allowed, fast for 10 hrs
c. Water allowed, fast for 12 hrs
d. Water, smoking, coffee, tea allowed, fast for 16 hrs

34. Which of the following would be most adversely affected by a nonfasting sample?
a. HDL
b. LDL
c. Cholesterol
d. Triglycerides

35. What is the current reference method for cholesterol analysis?
a. GC-MS
b. Abell-Kendall method
c. Bloor's method
d. Salkowski method

36. Two step method for cholesterol analysis:
a. Pearson, Stern, and Mac Gavack
b. Bloors
c. Abell-Kendall
d. Schoenheimer

37. What is the end color of the Salkowski reaction?
a. Orange
b. Red
c. Yellow
d. Green

38. What is the end color of the Van Handel and Zilversmith reaction?
a. Orange
b. Red
c. Yellow
d. Blue

39. The most likely cause for serum/plasma to appear "milky" is the presence of
a. Chylomicrons
b. VLDL
c. LDL
d. HDL

40. Which lipoprotein delivers endogenous lipids?
a. Chylomicron
b. VLDL
c. LDL
d. HDL

41. An abnormal lipoprotein found in patients with obstructive biliary disease:
a. B-VLDL
b. LpX
c. Lp(a)
d. LDL

42. Which of the following is referred to as the "good cholesterol"?
a. HDL
b. LDL
c. VLDL
d. Free cholesterol

43. Which of the following apoproteins is responsible for receptor binding for IDL and the chylomicron remnant produced in fat transport?
a. Apo A1
b. Apo C
c. Apo E
d. Apo B

44. Which of the following enzymes is found bound to HDL and LDL in blood plasma and acts to convert free cholesterol into cholesteryl esters?
a. Cholesterol esterase
b. Lipoprotein lipase
c. LCAT
d. CETP

45. Which of the following transfers cholesterol esters to chylomicrons and LDL from the HDL?
a. Cholesterol esterase
b. Lipoprotein lipase
c. LCAT
d. CETP

MEDICAL TECHNOLOGY LICENSURE EXAM PREPARATION IN THE PHILIPPINES

CLINICAL CHEMISTRY EXAM

46. Which is NOT true about unconjugated bilirubin?
a. Direct bilirubin
b. Water insoluble
c. Indirect bilirubin
d. Non-polar

47. The bilirubin fraction that is covalently attached to albumin and contributes to the conjugated bilirubin value is:
a. Direct
b. Indirect
c. Delta
d. Bound

48. Considered as a liver function test, EXCEPT:
a. AST
b. ALT
c. Amylase
d. ALP

49. Hepatocellular damage may be best assessed by which of the following parameters?
a. Serum AST and ALT levels
b. GGT and ALP
c. Bilirubin, GGT, and ALP
d. Ammonia and urea

50. Jendrassik-Grof method reagent
a. Caffeine
b. Methanol
c. N-butanol
d. Acetic acid

51. What is the purpose of the caffeine in the Jendrassik-Grof method?
a. Catalyst
b. Coenzyme
c. Accelerator
d. Cofactor

52. What is the formula for indirect bilirubin?
a. TB + DB
b. TB – DB
c. TB x DB
d. TB / DB

53. In an adult, if total bilirubin value is 3.1 mg/dL and conjugated bilirubin is 1.1 mg/dL, what is the unconjugated bilirubin value?
a. 2.0 mg/dL
b. 4.2 mg/dL
c. 1.0 mg/dL
d. 3.4 mg/dL

54. Liver disease, EXCEPT:
a. Anemia
b. Hemochromatosis
c. ALT
d. AST

55. Gastric enzyme proteolysis:
a. Gastrin
b. Amylase
c. Lipase
d. Trypsin

56. Chief plasma cation whose main function is maintain osmotic pressure:
a. Chloride
b. Calcium
c. Sodium
d. Potassium

57. What formula is this: $Na^+ + K^+ – (Cl^– + HCO3^–)$?
a. Anion gap
b. Osmolal gap
c. Henderson-Hasselbach equation
d. GFR

58. In the Henderson-Hasselbach equation, the numerator denotes the function of:
a. Kidney
b. Liver
c. Lung
d. Heart

59. In the Henderson-Hasselbach equation, the denominator denotes the function of:
a. Kidney
b. Liver
c. Lung
d. Heart

60. Calculation of the anion gap is useful for QC of:
a. Calcium
b. Electrolyte profile
c. Phosphorous
d. Magnesium

MEDICAL TECHNOLOGY LICENSURE EXAM PREPARATION IN THE PHILIPPINES

CLINICAL CHEMISTRY EXAM

61. Considering a normal Gaussian curve distribution, how many values from a population will be within 2 SD?
A. 95.45%
B. 75.30%
C. 68.27%
D. 99.73%

62. A delta check:
A. Relates control difference from mean
B. Reports patient value difference from previous analysis
C. Evaluates statistical drift
D. Flags abnormal results

63. Which of the following instruments is used in the clinical laboratory to detect beta and gamma emissions?
A. Fluorometer
B. Nephelometer
C. Scintillation counter
D. Spectrophotometer

64. In potentiometry, the following are types of reference electrodes, EXCEPT:
A. Glass electrode
B. Standard hydrogen electrode
C. Saturated calomel electrode
D. Silver-silver chloride electrode

65. Which of the following substances are introduced in a continuous-flow analyzer to minimize diffusion of reagents and mixing between samples?
A. Membranes
B. Resins
C. Air bubbles
D. Gel polymers

66. The protein fraction that migrates the fastest toward the anode
A. Albumin
B. Beta-globulin
C. Alpha1-globulin
D. Gamma-globulin

67. Which of the following substances is markedly increased in nephrotic syndrome?
A. Ceruloplasmin
B. Alpha-2-macroglobulin
C. Alpha-1-antitrypsin
D. Albumin

68. The neocuproine method for glucoses is based on:
A. Glucose oxidase reaction
B. Copper reduction by glucose
C. Condenstaion reaction
D. Hexokinase reaction

69. Select the enzyme most specific for beta D-glucose
A. Hexokinase
B. Glucose-6phosphate dehydrogenase
C. Phosphohexisomerase
D. Glucose oxidase

70. All of the following are characteristics of Type II diabetes mellitus except:
A. Insulin levels may or may not be abnormal
B. It is more common than Type I diabetes
C. It requires insulin therapy to control hyperglycemia
D. It is associated with obesity and more common in persons greater than 40 years old

71. Select the order of mobility of lipoproteins electrophoresed on cellulose acetate or agarose at pH 8.6.
A. – Chylomicrons -prebeta- beta - alpha +
B. – Beta - prebeta - alpha- chylomicrons +
C. – Chylomicrons - beta - prebeta - alpha +
D. – Alpha - beta - prebeta- chylomicrons +

72. Select the lipoprotein fraction that carries most of the endogenous triglycerides
A. VLDL
B. LDL
C. HDL
D. Chylomicrons

73. The lipoprotein that transports the exogenous triglycerides:
A. HDL
B. LDL
C. VLDL
D. Chylomicrons

74. Apolipoprotein A is the primary protein component of:
A. HDL
B. LDL
C. VLDL
D. None of these

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CLINICAL CHEMISTRY EXAM

75.All are TRUE for CRP, EXCEPT
a. Elevated in bacterial infection
b. It may be used as a cardiac marker
c. It is an acute inflammatory marker
d. It is a chronic inflammatory marker

76. Overall process of guaranteeing quality patient care and is regulated throughout the total testing system:
a. Quality Assessment
b. Quality Control
c. Quality Assurance
d. Quality Systems

77. Method A and Method B for cholesterol both give a value of 200 mg/dL for a serum sample; however, the same QC material analyzed by Method A gives 185 mg/dL and by Method B gives 212 mg/dL. What might cause this?
a. Method B is biased
b. Method A is imprecise
c. Both methods are showing a matrix effect for the QC material
d. Any of the above answers may be correct

78. A Gaussian distribution is usually:
A. Bell-shaped
B.Rectangular
C. Bimodal
D. Skewed

79. What type of additive is in a blood collection tube with a red cap?
a. Lithium or sodium heparin
b. Potassium EDTA
c. Thrombin
d. No additive

80. Blood is collected from a patient who has been fasting since midnight; the collection time is 7 am. Which of the following tests would NOT give a valid test result?
a. Cholesterol
b. Triglycerides
c. Total bilirubin
d. Potassium

81. All of the following migrate with the alpha2 globulins, EXCEPT:
a. Alpha2-macroglobulin
b. Ceruloplasmin
c. Haptoglobin
d. Transferrin

82. Hormone that regulates synthesis and release of the thyroid hormones is produced in:
a. Hypothalamus
b. Anterior pituitary gland
c. Posterior pituitary gland
d. Thyroid

83. A drug that relaxes the smooth muscles of the bronchial passage:
a. Acetaminophen
b. Lithium
c. Phenytoin
d. Theophylline

84. Violation of which rule does NOT indicate systematic error?
a. 1:3s
b. 4:1s
c. 2:1s
d. 2:2s

85. Which of the following anticoagulants is generally suitable for most drug analyses (TDM)?
a. Heparin
b. EDTA
c. Citrate
d. Oxalate

86. Effects include thickening of the cervical mucus, reduction of uterine contractions, and thermogenic effect, in which basal body temperature rises after ovulation.
a. Estrogen
b. Progesterone
c. Testosterone
d. None of the above

87. How should a laboratory verify the reference range it uses for a particular test?
a. Call another laboratory
b. Use the numbers form a textbook
c. Test samples from healthy people
d. Look on a medical internet site

88. Releasing factors are produced by the ____, and tropic hormones are produced by the _____.
a. Hypothalamus; pituitary
b. Pituitary; hypothalamus
c. Specific endocrine glands; hypothalamus
d. Pituitary; target gland

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CLINICAL CHEMISTRY EXAM

89. Hepatocellular damage and necrosis:
a. Serum bilirubin level
b. Ratio of direct and total bilirubin
c. Serum ALP and other "obstructive" enzymes
d. Serum aminotransferase levels

90. How would 6.32 be rounded off to one less decimal place?
a. 6.32
b. 6.4
c. 7.0
d. 6.3

91. Before an OGTT is performed, individuals should ingest at least _____ per day of carbohydrates for the ____ days preceding the test.
a. 75 grams CHO per day for 2 days
b. 100 grams CHO per day for 2 days
c. 100 grams CHO per day for 3 days
d. 150 grams CHO per day for 3 days

92. Which type of analytical error is recognized by an HIL index?
a. Instrument not properly calibrated
b. Presence of interfering substances in sample
c. Presence of bubbles in the light path of a photometric method
d. Analyte concentration so high it depletes the active reagent

93. All are TRUE for B2, EXCEPT:
a. Conjugated bilirubin
b. Water soluble
c. Polar bilirubin
d. Indirect-reacting

94. What is the main reason that causes the following blood gas values:
pH= 7.25 pCO2= 36 mmHg
HCO3= 19 mEq/L

a. Hypoventilation
b. Bicarbonate retention
c. Hyperventilation
d. Bicarbonate loss

95. When selecting quality control reagents for measuring an analyte in urine, the medical technologist should select:
a. A quality control reagent prepared in a urine matrix
b. A quality control reagent prepared in a serum matrix
c. A quality control reagent prepared in deionized water
d. The matrix does not matter; any quality control reagent as long as the analyte of measure is chemically pure

96. For carbon dioxide determination, acidifying the sample:
a. Converts the various forms of CO_2 in plasma to gaseous CO_2 by dilution with an acid buffer
b. Prevents conversion of the various forms of CO_2 in plasma to gaseous CO_2 by dilution with an acid buffer
c. Converts all CO_2 and carbonic acid to HCO_3^-
d. Prevents conversion of all CO_2 and carbonic acid to HCO_3^-

97. Which of the following laboratory values is considered a positive risk factor for the occurrence of coronary heart disease?
a. HDL cholesterol <35 mg/dL
b. LDL cholesterol <30 mg/dL
c. Total cholesterol <200 mg/dL
d. HDL cholesterol >60 mg/dL

98. Lead toxicity can be acquired by the following, EXCEPT:
a. Skin contact
b. Animal bites
c. Inhalation
d. Ingestion

99. The most common method used in a clinical laboratory to measure osmolality is:
a. Vapor pressure
b. Boiling point
c. Freezing point depression
d. Osmotic pressure

100. Which specimen is the sample of choice for lead screening?
a. Whole blood
b. Hair
c. Serum
d. Urine

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1. Negative predictive value:
a. Ability of a test to detect a given disease or condition.
b. Ability of a test to correctly identify the absence of a given disease or condition.
c. Chance of an individual having a given disease or condition if the test is abnormal.
d. Chance an individual does not have a given disease or condition if the test is within the reference interval

2. A delta check is a method that:
a. Determines the mean and variance of an instrument
b. Monitors the testing system for precision
c. Monitors patient sample day by day
d. Is determined by each laboratory facility

3. Measures of spread, EXCEPT:
a. Coefficient of variation
b. Range
c. Mode
d. Standard deviation

4. Random errors, EXCEPT:
a. Reagent dispensing
b. Reagent lot variability
c. Variation in handling techniques: pipetting, mixing, timing
d. Variation in operator

5. Type of systemic error where the magnitude changes as a percent of the analyte present; error dependent on analyte concentration.
a. Constant systematic error
b. Proportional systematic error
c. Bias
d. None of the above

6. A pre-analytical error can be introduced by:
a. Drawing a coagulation tube before an EDTA tube
b. Mixing an EDTA tube 8 to 10 times
c. Transporting the specimen in a biohazard bag
d. Vigorously shaking the blood tube to prevent clotting

7. Two (2) consecutive control values exceed the same 2 standard deviation limit
a. 1:2S
b. 2:2S
c. R:4S
d. 4:1S

8. A trend in QC results is most likely caused by
a. Deterioration of the reagent
b. Miscalibration of the instrument
c. Improper dilution of standards
d. Electronic noise

9. Which of the following plots is best for comparison of precision and accuracy among laboratories?
a. Levy–Jennings
b. Tonks–Youden
c. Cusum
d. Linear regression

10. Which of the following terms refers to the closeness with which the measured value agrees with the true value?
a. Random error
b. Precision
c. Accuracy
d. Reliability

11. Beta cell destruction, usually leading to absolute insulin deficiency:
a. Type 1 DM
b. Type 2 DM
c. Type 3 DM
d. All of the above

12. Which of the following conclusions may be made regarding these data?
RANDOM GLUCOSE: 186 mg/dL
FASTING GLUCOSE: 114 mg/dL
2-HOUR OGTT: 153 mg/dL
HbA1c: 5.9%

a. Data represents normal glucose status
b. Data represents an impaired glucose status
c. Data represents the presence of insulinoma
d. Data represents diagnosis of diabetes

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13. Select the enzyme that is most specific for beta D-glucose:
a. Glucose oxidase
b. Glucose-6-phosphate dehydrogenase
c. Hexokinase
d. Phosphohexose isomerase

14. In normal glucose metabolism, blood glucose level increases rapidly after carbohydrates are ingested but returns to a normal level after:
a. 30 minutes
b. 45 minutes
c. 60 minutes (1 hour)
d. 120 minutes (2 hours)

15. Symptoms of hypoglycemia usually occur when blood glucose has fallen below ___ mg/Dl
a. 50 mg/dL
b. 60 mg/dL
c. 70 mg/dL
d. 80 mg/dL

16. Formation of glucose-6-phosphate from noncarbohydrate sources:
a. Glycolysis
b. Gluconeogenesis
c. Glycogenolysis
d. Glycogenesis

17. Long-term estimation of glucose concentration can be followed by measuring:
a. **Glycosylated hemoglobin (HbA1c)**
b. Fructosamine
c. Glycosylated albumin
d. None of the above

18. The plasma protein mainly responsible for maintaining colloidal osmotic pressure in vivo is:
a. Albumin
b. Prealbumin
c. Alpha2-macroglobulin
d. Beta2-microglobulin

19. Which dye gives a much greater absorbance change at 630 nm than it would at 500 nm?
a. HABA (Hydroxyazobenzene-benzoic acid
b. BCG (Bromcresol green)
c. BCP (Bromcresol purple)
d. Tetrabromosulfophthalein

20. Which of the following conditions is the result of a low alpha-1 antitrypsin level?
a. Asthma
b. Emphysema
c. Pulmonary hypertension
d. Sarcoidosis

21. Which test is the most sensitive in detecting early monoclonal gammopathies?
a. Immunoelectrophoresis
b. Urinary electrophoresis for monoclonal light chains
c. Capillary electrophoresis of serum and urine
d. Serum-free light chain immunoassay

22. "Gold standard" in the diagnosis of acute coronary syndrome (ACS):
a. Brain natriuretic peptide (BNP)
b. Cross-linked c-telopeptides
c. High-sensitivity CRP (hs-CRP)
d. Troponin

23. When should blood specimens for lipid studies be drawn?
a. Immediately after eating
b. Anytime during the day
c. In the fasting state, approximately 2 to 4 hours after eating
d. In the fasting state, approximately 12 hours after eating

24. The turbid, or milky, appearance of serum after fat ingestion is caused by the presence of?
a. Bilirubin
b. Cholesterol
c. Chylomicron
d. Phospholipid

25. Which of the following lipid tests is least affected by the fasting status of the patient?
a. Cholesterol
b. Triglyceride
c. Fatty acid
d. Lipoprotein

26. An abnormal lipoprotein present in patients with biliary cirrhosis or cholestasis:
a. LDL
b. B-VLDL
c. Lp(a)
d. LpX

27. The smallest and most dense lipoprotein particle:
a. LDL
b. HDL
c. VLDL
d. Chylomicrons

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28. LDL primarily contains:
a. Apo AI
b. Apo-AII
c. Apo-B100
d. Apo-B48

29. Which of the following apoproteins is inversely related to risk for coronary heart disease?
a. Apo-A1
b. Apo-B
c. Apo-B100
d. Apo-E

30. Select the order of mobility of lipoproteins electrophoresed on cellulose acetate or agarose at pH 8.6.
a. – Chylomicrons → pre-β → β→ α +
b. – β → pre-β → α → chylomicrons +
c. – Chylomicrons → β → pre-β →α +
d. – α → β → pre-β → chylomicrons +

31. . A patient's total cholesterol is 300 mg/dL, his HDL cholesterol is 50 mg/dL, and his triglyceride is 200 mg/dL. What is this patient's calculated LDL cholesterol?
a. 200
b. 210
c. 290
d. 350

32. Which of the following is associated with Tangier disease?
a. Apoprotein C-II deficiency
b. Homozygous apo-B100 deficiency
c. Apoprotein C-II activated lipase
d. Apoprotein A-I deficiency

33. The kinetic methods for quantifying serum triglyceride employ enzymatic hydrolysis. The hydrolysis of triglyceride may be accomplished by what enzyme?
a. Amylase
b. Leucine aminopeptidase
c. Lactate dehydrogenase
d. Lipase

34. It is usually the result of any type of obstruction in which urea is reabsorbed into the circulation.
a. Pre-renal azotemia
b. Renal azotemia
c. Post-renal azotemia
d. None of the above

35. Creatinine is formed from the:
a. Oxidation of creatine
b. Catabolism of proteins and amino acids
c. Catabolism of purines
d. Oxidation of purines

36. Which of the following is measured using glutamate dehydrogenase and is a measure of advanced stages, poor prognosis, and coma in liver disease?
a. Total bilirubin
b. Ammonia
c. Unconjugated bilirubin
d. Urea

37. In the diacetyl method, what does diacetyl react with to form a yellow product?
a. Ammonia
b. Urea
c. Uric acid
d. Nitrogen

38. The red complex developed in the Jaffe method to determine creatinine measurements is a result of the complexing of creatinine with which of the following?
a. Alkaline picrate
b. Diacetyl monoxide
c. Sulfuric acid
d. Sodium hydroxide

39. During chemotherapy for leukemia, which of the following analytes would most likely be elevated in the blood?
a. Uric acid
b. Urea
c. Creatinine
d. Ammonia

40. What is the compound that comprises the majority of the NPN fractions in serum?
a. Uric acid
b. Creatinine
c. Ammonia
d. Urea

41. The reaction rate depends only on enzyme concentration:
a. First-order kinetics
b. Zero-order kinetics
c. Second-order kinetics
d. None of the above

42. To what class of enzymes does lactate dehydrogenase belong?
a. Isomerases
b. Ligases
c. Oxidoreductases
d. Transferases

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43. Increase in the serum enzyme levels indicate:
a. Decreased enzyme catabolism
b. Accelerated enzyme production
c. Tissue damage and necrosis
d. Increased glomerular filtration rate

44. The highest levels of total LD are seen in:
a. AMI and pulmonary infarction
b. Pernicious anemia and hemolytic disorders
c. Skeletal muscle disorders
d. Viral hepatitis and cirrhosis

45. In what order (first to last) will the enzymes AST, CK, and LD become elevated in the serum during AMI?
a. AST, LD, CK
b. CK, LD, AST
c. CK, AST, LD
d. LD, CK, AST

46. Macroenzymes, EXCEPT:
a. ALT and AST
b. CK
c. GGT
d. G6PD

47. All of the following factors will adversely affect the accurate quantification of bilirubin in serum, EXCEPT:
a. Lipemia
b. Hemolysis
c. Exposure to light
d. Specimen refrigeration

48. What enzyme catalyzes the conjugation of bilirubin?
a. Leucine aminopeptidase
b. Glucose-6-phosphate dehydrogenase
c. Uridine diphosphate glucuronyltransferase
d. Carbamoyl phosphate synthetase

49. Which bilirubin fraction is conjugated and covalently bound to albumin?
a. Alpha
b. Beta
c. Delta
d. Gamma

50. Direct bilirubin, EXCEPT:
a. Insoluble in water
b. Conjugated in the liver
c. Conjugated with glucuronic acid
d. Excreted in the urine of jaundiced patients

51. Crigler-Najjar syndrome
a. Inability to transport bilirubin from the sinusoidal membrane to the microsomal region
b. Deficiency of the enzyme system required for conjugation of bilirubin
c. Inability to transport bilirubin glucuronides to the bile canaliculi
d. Severe liver cell damage accompanied by necrosis

52. Indirect-reacting bilirubin may be quantified by reacting it initially in which reagent?
a. Dilute hydrochloric acid
b. Dilute sulfuric acid
c. Caffeine-sodium benzoate
d. Sodium hydroxide

53. Which substrate is used in the Bowers–McComb method for ALP?
a. p-Nitrophenyl phosphate
b. β-Glycerophosphate
c. Phenylphosphate
d. α-Naphthylphosphate

54. Major intracellular cation:
a. Bicarbonate
b. Chloride
c. Potassium
d. Sodium

55. Electrolyte(s) essential for blood coagulation:
a. Calcium
b. Calcium and magnesium
c. Sodium and chloride
d. Bicarbonate, potassium and chloride

56. Hyponatremia due to increased water retention, EXCEPT:
a. Congestive heart failure
b. Hepatic cirrhosis
c. Diuretic use
d. Renal failure

57. _____ can occur when sodium is measured using indirect ion-selective electrodes (ISEs) in a patient who is hyperproteinemic or hyperlipidemic.
a. Hyponatremia
b. Hypernatremia
c. Pseudohyponatremia
d. Pseudohypernatremia

MEDICAL TECHNOLOGY LICENSURE EXAM PREPARATION IN THE PHILIPPINES

CLINICAL CHEMISTRY EXAM

58. Hyperkalemia, EXCEPT:
a. Acidosis
b. Alkalosis
c. Oral or intravenous potassium therapy
d. Diuretics

59. A disorder characterized by increased production of chloride in sweat:
a. Multiple myeloma
b. Hypoparathyroidism
c. Cystic fibrosis
d. Wilson disease

60. The anticoagulant of choice for arterial blood gas measurements is _____ in the _____ state.
a. Lithium heparin; dry
b. EDTA; dry
c. Lithium heparin; liquid
d. Sodium citrate; dry

61. Elevated anion gap, EXCEPT:
a. Hypernatremia
b. Hypercalcemia
c. Ketoacidosis
d. Renal failure

62. A patient's blood gas results are: pH = 7.50 pCO2 = 55 mm Hg HCO3– = 40 mmol/L. This indicates:
a. Respiratory acidosis
b. Respiratory alkalosis
c. Metabolic acidosis
d. Metabolic alkalosis

63. In the Henderson-Hasselbalch equation, the denominator denotes:
a. Kidney function
b. Lung function
c. Liver function
d. Renal function

64. Fever:
a. Will decrease pCO2 by 3%
b. Will increase pCO2 by 3%
c. Will decrease pCO2 by 7%
d. Will increase pCO2 by 7%

65. Which of the following blood gas parameters are measured directly by the blood gas analyzer electrochemically?
a. pH, HCO3- and total CO2
b. pCO2, HCO3- and pO2
c. pH, pCO2 and pO2
d. pO2, HCO3- and total CO2

66. The normal ratio of carbonic acid to bicarbonate in arterial blood is:
a. 1:20
b. 7.4:6.1
c. 0.003:1.39
d. 20:1

67. How would blood gas parameters change if a sealed specimen is left at room temperature for 2 or more hours?
a. pO2 increases, pCO2 increases, pH increases
b. pO2 decreases, pCO2 decreases, pH decreases
c. pO2 decreases, pCO2 increases, pH decreases
d. pO2 increases, pCO2 increases, pH decreases

68. Manganese toxicity resembles:
a. Parkinson's disease
b. Wilson's disease
c. Alzheimer's disease
d. Menkes disease

69. Which trace metal is contained in glucose tolerance factor?
a. Chromium
b. Copper
c. Selenium
d. Zinc

70. To what metal does ceruloplasmin firmly bind?
a. Chromium
b. Copper
c. Zinc
d. Iron

71. Tropic hormones, EXCEPT:
a. ACTH
b. FSH
c. TSH
d. GH

72. Select the most appropriate single screening test for thyroid disease.
a. Free thyroxine index
b. Total T3 assay
c. Total T4
d. TSH assay

73. A patient has an elevated serum T3 and free T4 and undetectable TSH. What is the most likely cause of these results?
a. Primary hyperthyroidism
b. Secondary hyperthyroidism
c. Euthyroid with increased thyroxine-binding proteins
d. Euthyroid sick syndrome

MEDICAL TECHNOLOGY LICENSURE EXAM PREPARATION IN THE PHILIPPINES

CLINICAL CHEMISTRY EXAM

74. The biologically most active, naturally occurring androgen is:
a. DHEA
b. Androstenedione
c. Epiandrosterone
d. Testosterone

75. Diabetes insipidus:
a. Vasopressin deficiency
b. Vasopressin excess
c. High specific gravity
d. None of the above

76. Most widely used screening test for Cushing's syndrome:
a. Overnight low-dose dexamethasone suppression test
b. Corticotropin-releasing hormone stimulation test
c. Petrosal sinus sampling
d. Metyrapone stimulation test

77. The definitive suppression test to prove autonomous production of growth hormone is:
a. Oral glucose loading
b. Somatostatin infusion
c. Estrogen priming
d. Dexamethasone suppression

78. Zollinger–Ellison (Z–E) syndrome is characterized by great elevation of:
a. Gastrin
b. Cholecystokinin
c. Pepsin
d. Glucagon

79. Critical to blood glucose homeostasis and blood pressure:
a. Aldosterone
b. Cortisol
c. Catecholamine
d. Cholesterol

80. The main estrogen produced by the ovaries and used to evaluate ovarian function:
a. Estriol (E3)
b. Estradiol (E2)
c. Epiestriol
d. Hydroxyestrone

81. Heroin is synthesized from what drug?
a. Diazepam
b. Morphine
c. Ecgonine
d. Chlorpromazine

82. Characterized by odor of bitter almonds, altered mental status and tachypnea in the absence of cyanosis.
a. Arsenic toxicity
b. Carbon monoxide intoxication
c. Cyanide overdose
d. Iron poisoning

83. Acetaminophen is particularly toxic to what organ?
a. Heart
b. Kidney
c. Spleen
d. Liver

84. All of the following requires TDM, EXCEPT:
a. Salicylates
b. Acetaminophen
c. Ibuprofen
d. All of the above

85. Most common drug of abuse:
a. Cocaine
b. Ethanol
c. Methanol
d. Marijuana

86. Specimen of choice for the determination of circulating concentrations of most drugs:
a. Expectorated sputum
b. Gastric fluid
c. Serum or plasma
d. Urine

87. Single most important factor in therapeutic drug monitoring (TDM):
a. Amount of WBCs in the specimen
b. Presence of glucose in the specimen
c. Timing of specimen collection
d. Volume of specimen

88. In pharmacokinetics, the concentration of the drug ____ as the rate of elimination and distribution exceeds absorption.
a. Declines
b. Spuriously declines
c. Rises
d. Spuriously rises

MEDICAL TECHNOLOGY LICENSURE EXAM PREPARATION IN THE PHILIPPINES

CLINICAL CHEMISTRY EXAM

89. Most common route of drug delivery:
a. Intravenous
b. Oral
c. Rectal
d. Transcutaneous

90. Select the five pharmacological parameters that determine serum drug concentration:
a. Absorption, anabolism, perfusion, bioactivation, excretion
b. Liberation, equilibration, biotransformation, reabsorption, elimination
c. Liberation, absorption, distribution, metabolism, excretion
d. Ingestion, conjugation, integration, metabolism, elimination

91. An anti-neoplastic drug that inhibits DNA synthesis in all cells
a. Clozapine
b. Ethosuximide
c. Methotrexate
d. Procainamide

92. All of the following are immunosuppressive drugs, EXCEPT:
a. Cyclosporine
b. Phenytoin
c. Sirolimus (rapamycin)
d. Tacrolimus

93. All of the following are cardioactive drugs, EXCEPT:
a. Aminoglycoside
b. Digixon
c. Procainamide
d. Quinidine

94. An orally administered drug used to treat manic depression (bipolar disorder):
a. Digoxin
b. Lithium
c. Phenytoin
d. Theophylline

95. When measuring trace metals in blood other than lead, what type of tube should be used?
a. Navy blue top
b. Green top
c. Purple top
d. Red top

96. Chemical name of Vitamin B2:
a. Retinol
b. Thiamine
c. Riboflavin
d. Ascorbic acid

97. Plays a role in the synthesis of amino acids and DNA:
a. Folic acid
b. Pteroylglutamic acid
c. Both of these
d. None of these

98. A deficiency of this vitamin results to rickets and osteomalacia:
a. Vitamin A
b. Vitamin D
c. Vitamin E
d. Vitamin K

99. Which is used to determine trastuzumab (Herceptin) therapy for breast cancer?
a. PR
b. CEA
c. HER-2/neu
d. CA-15-3

100. Which type of cancer is associated with the highest level of AFP?
a. Hepatoma
b. Ovarian cancer
c. Testicular cancer
d. Breast cancer