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What cardiac markers test was affected by slight hemolysis?

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- (C) Imitation of radiant energy after come in contact with florescent reagent
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50. A 35-year-old patient came to a hospital with major symptoms of severe headache, stiff neck, and vomiting accompanied by delirium and confusion. The clinician suspected third stage meningococcal infections and he wants to collect specimen for laboratory diagnosis, but he fails to decide how and from where to take the sample.

What is the most like site and specimen type to be punctured and collected?

- (A) Lumbar puncture to collect CSF
(B) Throat washing to get throat swab
(C) Nasal aspiration to get nasal secretion
(D) Vein puncture to collect blood sample

51. A 35-year-old man came to an outpatient ward with a tender papule with an erythematous base on the genitalia, painful lesion and inguinal lymphadenopathy. Specimen collected from the lesion inoculated on chocolate agar enriched with 1% IsoVitaleX and vancomycin (3 mg/mL), incubated in 5% carbon dioxide at 33°C which revealed that small, flat, smooth, and translucent to opaque colonies in 60 hours. Gram negative rods to cocci bacterium was isolated.

What is the most possible means of transmission of the causative agent?

- (A) Air-droplet
(B) Blood transfusion
(C) Insect bites
(D) Sexual contact

52. A 40-year-old patient came with complaint of cyanosis, convulsions, cough characterized as "whoop" upon inhalation which leads to rapid exhaustion which is associated with vomiting. On clinical assessment, the physician suspected infection with *B. pertussis* and requested sample to be cultured.

What is the most appropriate biological sample to be collected?

- (A) Cough droplets
(B) Free nasal droplet
(C) Saline mouth wash
(D) Saline nasal wash

53. A watery diarrhea incidence was occurred in a given town of the country. The laboratory personnel participated in route cause analysis of the diarrhea. During investigation, *Vibrio cholerae* was identified as etiological agent of the outbreak in the town.

What is the most likely mode of transmission of the identified pathogen?

- (A) Fecal-oral
(B) Vector
(C) Aerosol
(D) Fomites

28. A laboratory technologist who is working at a central laboratory of a referral hospital received CSF specimen of a 67-year-old male patient with three independent test tubes. During physical examination, he observed that blood content of the test tubes was uniform. What is the reliable test for the above scenario?

- (A) Hematological test
- (B) Immunological test
- (C) Microbiological test
- (D) Chemical test

29. A laboratory technologist who is working at a health center received urine specimen of a 22-year-old male patient with acute tubular necrosis to check for his urinary glucose. The patient's blood glucose was normal and the technologist reported his urinary glucose as +3. Which urine parameter should be done as a further chemical test?

- (A) Odor
- (B) Foam
- (C) Color
- (D) Specific gravity

30. A laboratory technologist who is working at a urinalysis laboratory received urine specimen of a 45-year-old female patient. Then, when the technologist examined the specimen, it had fruity odour. What is the most appropriate test that the technologist should perform next?

- (A) Nitrate
- (B) Protein
- (C) Creatinine
- (D) Ketonebodies

31. A laboratory technologist who is working at a urinalysis laboratory of a referral hospital received urine specimen from a 45-year-old female patient with history of renal disease. The patient has markedly decreased glomerular filtration rate (less than 25 mL/min), steadily rising serum BUN and creatinine values, electrolyte imbalance, lack of renal concentrating ability, proteinuria and glycosuria. Which cast is expected to detect from the urine specimen?

- (A) RBC cast
- (B) Waxy cast
- (C) Hyaline cast
- (D) Granular cast

32. A laboratory technologist received urine specimen of a 13-year-old female patient with a history of urinary tract infection. The technologist analyzed the urine sample and found significant number of pyuria. What magnification is used to report this pyuria?

- (A) Under low power field (4x)
- (B) Under low power field (10x)
- (C) Under high power field (40x)
- (D) Under high power oil immersion (100x)

33. A 33-year-old male patient who was suspected for diabetes mellitus by a physician visited a laboratory for glucose measurement. Post-prandial specimens of both blood and urine were required for glucose tolerance test. The laboratory technologist instructed the patient to void urine before consuming routine meal and collect a specimen

What is the appropriate time the patient should collect the urine specimen?

- (A) Two hours after meal
- (B) Four hours after meal
- (C) Six hours after meal
- (D) Eight hours after meal

34. A laboratory technologist who is working at diagnostic laboratory received urine specimen of a 25-year-old female patient with chronic illness complications. Since the patient was in coma, the specimen was collected by catheterization. The sample was collected for both urine culture and routine urinalysis tests.

What is the right sequence of tests for the urine specimen?

- (A) Microscopic examination, culture test, physical examination, and chemical examination
- (B) Physical examination, culture test, chemical examination, and microscopic examination
- (C) Chemical examination, culture test, physical examination, and microscopic examination
- (D) Culture test, physical examination, chemical examination, and microscopic examination

35. A microbiologist who is working at microbiology laboratory unit in a referral laboratory receives a diarrheic stool specimen from a 23-year-old male patient who is suspected of having a plague.

What level of bio safety and safety cabinet is required to do the test safely?

- (A) Bio safely level 1
- (B) Bio safety level 1 and 2
- (C) Bio safety level 2 and above
- (D) Routinely can be practiced

36. A laboratory scientist who is working at a research laboratory was running a number of renal function tests to collect data for his research. His research sample size and the number of parameters he wanted to check were too many. Therefore, he decided to prepare the working reagent at once to cover all of the tests using "to contain pipetting techniques".

What is the right way the technologist should practice to deliver the fluid?

- (A) He has to deliver all the contents at once
- (B) He has to deliver half of the required
- (C) He has to blow the final drops
- (D) He has to rinse in between

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24. A 23-year-old female patient with history of chronic urinary tract infection visited a physician for follow-up. The physician physically diagnosed and advised her to give urine specimen. Then, the laboratory technologist received urine sample and inoculated it on culture media.

What is the preferable urine specimen to be used for the above test?

- (A) Random urine specimen
(B) 24-hour urine specimen
(C) Mid-stream urine specimen
(D) Post-prandial urine specimen

25. A laboratory technologist received CSF specimen of a 12-year-old male patient for glucose analysis. The lab technologist could not perform the test timely.

What is the next step the technologist should perform?

- (A) Request for another specimen
(B) Preserve the specimen using fluoride-oxalate
(C) Maintain the sample using formaldehyde solution
(D) Keep the sample at room temperature and do the test later

26. A 34-year-old man visited a physician to check his fertility status. The technologist informed the patient to bring semen specimen after three days of sexual abstinence but the patient refused. Therefore, the technologist received the sample and analyzed it immediately.

What would be the result of the above analysis?

- (A) High semen volume and non-motile sperm cell at all
(B) Low semen volume and decreased sperm cell motility
(C) High semen volume and increased sperm cell motility
(D) High semen volume and decreased sperm cell motility

27. A laboratory technologist who is working at a regional laboratory received CSF specimen of a 15-year-old female patient for glucose measurement. Unfortunately, the colorimeter installed in the laboratory was out of service.

What is the most appropriate alternative method the technologist should use?

- (A) Pansy's test method
(B) Visual comparative method
(C) Benedict's qualitative test method
(D) Benedict's semi-quantitative test method

39. A throat culture was taken from a 6-year-old boy with a gray pseudomembrane covering his oropharynx. A catalase-positive organism was isolated on cysteine-tellurite medium and subcultured to Tinsdale medium, where it grew as black colonies with brown halos. A Gram stain was performed on these colonies. What is the most likely observed cellular morphology?
- Gram-positive branching bacilli
 - Gram-positive cocci in short chains
 - Gram-positive bacilli in irregular clublike shape
 - Gram-positive cocci in grapelike clusters
40. A 49-year-old man develops a pyogenic infection along the suture line after elbow surgery. The laboratory gives a preliminary report of a beta-hemolytic, catalase-positive, coagulase-positive, Gram-positive coccus. What is the most likely causative agent of the case?
- Moraxella catarrhalis*
 - Staphylococcus aureus*
 - Staphylococcus epidermidis*
 - Streptococcus agalactiae*
41. A laboratory technologist collected a clinical specimen from a patient with deep wound. Gram staining of the specimens showed gram positive rod with drumstick appearance. What is the most likely pathogen?
- C. tetani*
 - C. diphtheria*
 - B. anthracis*
 - C. botulinum*
42. A 2-week-old infant was well on discharge from the hospital 10 days ago and remained so until last night, when he appeared having a disease. His temperature was 40°C. Blood culture grew gram-positive cocci in chains. A narrow zone of clear (beta) hemolysis was seen around the colonies. Hippurate hydrolysis test was positive. What is the most likely isolate?
- Streptococcus pneumoniae*
 - Haemophilus influenza*
 - Streptococcus agalactiae*
 - Neisseria gonorrhoeae*
43. Several days after an unprotected sexual encounter, a healthy 21 year old male develops pain and pus on urination. A Gram stain reveals gram negative diplococci. What is the possible structure of adherence of this microbe to the urethral mucosa?
- Capsole
 - Pilli
 - Flagella
 - Peptidoglycan
44. Cerebrospinal fluid from a spinal tap of a patient complaining of a severe headache, fever, and neck rigidity revealed the presence of gram-negative coccobacilli. Further testing revealed growth of the organism on growth factor X₁₀ and V supplemented chocolate agar. Which of the following organisms represents the above description?
- Haemophilus parahaemolyticus*
 - Neisseria meningitidis*
 - Haemophilus influenzae*
 - Haemophilus parainfluenzae*

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76. A 65-year-old male patient came to a specialized hospital laboratory with a request of Philadelphia (Ph) chromosome analysis. A trained and experienced laboratory technologist performed the test following the correct SOP. The laboratory test indicated that Ph chromosome is detected.

What type of leukaemia more likely the patient has developed?

- (A) CLL
(B) ALL
(C) AML
(D) MLL

77. A blood sample, collected from a patient with haemophilia A, was sent to a laboratory for coagulation profile tests and platelet count. The laboratory technician ran the tests and found decreased platelet count, normal PT and prolonged APTT.

What deficiency leads to the above test results?

- (A) Factor VIII
(B) Factor V
(C) Factor X
(D) Factor II

78. A 56-year-old man who has excessive bleeding during tooth extraction came to a referral hospital. He had family history of haemophilia. The haematologist wanted to assess the intrinsic coagulation factors.

What is the appropriate test the haematologist should order?

- (A) PT
(B) TT
(C) INR
(D) APTT

79. A 30-year-old woman with a complaint of arthralgia, fever and skin rash came to a referral hospital. After assessment, the physician requested LE cell examination to the laboratory. The laboratory technologist collected blood with EDTA anticoagulated tube and performed Rotary method of Zinkham and Conley LE demonstration.

What is the feature of LE cell using the above method under the microscope?

- (A) The ingested nucleus is well preserved.
(B) Monocytes are ingesting the nucleus of lymphocyte.
(C) The neutrophils lobe encircles the ingested material.
(D) PMN cells are ingesting the nucleus of lymphocytes.

80. A 35-year-old female patient came to a laboratory for haematological investigations. A phlebotomist has received the request paper and planned to collect venous blood from the patient.

What should be the most appropriate vein preference to collect the blood?

- (A) Jugular vein of the neck
(B) Basilic vein of the forearm
(C) Cephalic vein of the forearm
(D) Median cubital vein of the forearm

BOOKLET CODE: 021

54. A patient in gastroenterology center allowed to ingest ^{14}C radio-labeled urea and carbon dioxide released by urease, which is produced by the bacterium, was detected in breath of the patient using a mass spectrometer.

What is the most likely bacterium diagnosed by the test method?

- (A) *Campylobacter jejuni*
(B) *Klebsiella pneumoniae*
(C) *Helicobacter pylori*
(D) *Pseudomonas aeruginosa*

55. A 56-year-old male patient with numerous nodular skin lesions on face, ear lobes, hands, and feet come to a hospital. A physician suspected for the lepromatous leprosy and requested for microscopic test. A specimen was taken from the skin lesion and Auramine-phenol technique was used to stain the smear.

What is the feature of the pathogen to report as positive result?

- (A) Black-brown rods
(B) White-yellow rods
(C) Red-pink rods
(D) Blue-green rods

56. A 72-year-old male patient who was on anti-tuberculosis with enlarged cervical lymph node comes to a hospital. A physician wants to rule out tuberculosis lymphadenitis.

What is the appropriate specimen for the case?

- (A) Fine needle aspiration
(B) Bone marrow tap
(C) Morning sputum
(D) Pleural fluid

57. A 34-year-old prisoner comes to an OPD of a hospital with symptoms of acute febrile illness. A physician suspected endemic typhus and requested microbiological and serological tests. A laboratory technologist performed serological test by proteus strains OX 19 antigen and positive result was obtained. Whereas, Blood culture of patient specimen had no bacterial isolated.

What is the possible reason for the absence of growth on blood culture?

- (A) The disease is caused by virus.
(B) The pathogen requires cell culture.
(C) The disease is caused by extracellular bacteria.
(D) The blood culture cannot grow proteus species.

58. A 19-year-old patient with a symptom characterized by a high fever, headache malaise, myalgias, nausea, vomiting, abdominal pain, and diarrhea comes to a hospital after two weeks of tick bite. *Rickettsia rickettsii* was detected using polymerase chain reaction (PCR).

What disease is caused by the pathogen?

- (A) Epidemic Typhus
(B) Endemic Typhus
(C) Brill-Zinsser Disease
(D) Rocky Mountain spotted fever

72. A laboratory technologist collected blood sample by EDTA tube of a 45-year-old man who encountered car accident today morning. He performed CBC and the result indicated decreased red cell counts, but normal hematocrit value.

What is the most likely type of anaemia the patient has developed?

- (A) Normocytic normochromic anaemia
- (B) Microcytic hypochromic anaemia
- (C) Macrocytic normochromic anaemia
- (D) Macrocytic hyperchromic anaemia

73. A 51-year-old woman with fever, chills, fatigue, malaise, and dark, tea colored urine came to a referral hospital. She had a splenectomy when she was 23-year-old due to a motor vehicle accident. Examination of a peripheral blood smear showed intracellular ring forms of *P. falciparum* in erythrocytes. Besides, the chemical analysis of urine showed the presence of haemoglobinuria.

What substance is more likely decreased in her serum?

- (A) Alkaline phosphatase
- (B) Direct bilirubin
- (C) Haptoglobin
- (D) Lactate dehydrogenase

74. A laboratory technologist collected blood sample, prepared smear and stained with MPO that helps the physician for the differential diagnosis of acute leukemia. The technologist observed that there were moderate deep brown precipitates in WBC's under light microscope with 100% objective.

What is the most likely type of leukemia diagnosed by the staining?

- (A) ALL
- (B) AML
- (C) CLL
- (D) CML

75. A section of lymph node from a patient with lymphadenopathy was sent to the laboratory for tissue processing and examination. The laboratory technologist processed the tissue and stained it using Hematoxylin and Eosin stains. When the stained slide was examined under the microscope using immersion oil, the technologist observed large cells with a bilobed nucleus and abundant cytoplasm, resembling 'owl's eye'.

What is the most probable diagnosis of the patient?

- (A) Hodgkin lymphoma
- (B) Non-Hodgkin lymphoma
- (C) Mantle cell lymphoma
- (D) Follicular lymphoma

59. A mother brought an 8-month-old infant to a pediatric OPD with a symptom of teeth bone malformation, and widespread desquamating maculopapular rash. A physician suspected for syphilis and requested for serological test. The result showed positive for *pallidum*.

What is the possible mode of transmission for the pathogen?

- (A) Congenital
- (B) Mosquito bites

- (C) Aerosol inhalation
- (D) Fecal-oral route

60. A 35-year-old male patient came to a hospital with complaint of acute febrile illness. The physician suspected that the patient might be infected by *Borella* species and requested for microscopic examination.

What is the appropriate specimen and stain used for examination of the pathogen?

- (A) Blood specimen and Giemsa stain
- (B) Stool specimen and Indian ink stain

- (C) Urine specimen and gram stain
- (D) CSF specimen and AFB stain

61. A six-month-old baby girl came to a laboratory for blood film examination. A laboratory technician has received the request paper and planned to collect blood sample from the patient.

What is the most appropriate site of blood collection for this patient?

- (A) Plantar surface of the heel of the baby
- (B) Cephalic vein on the forearm of the baby
- (C) Palmer surface of the ring finger of the baby
- (D) Median cubital vein on the forearm of the baby

62. A physician requested coagulation profile to be done for a patient with bleeding disorder. The nurse collected the blood sample using EDTA vacutainer tube and brought to the laboratory for coagulation analysis. However, the laboratory technologist confirmed that the collected blood was no more required for coagulation analysis.

What is the most likely cause for rejecting the sample?

- (A) Specimen was collected at the wrong time.
- (B) Specimen was contaminated with intravenous fluid.
- (C) Specimen was collected in the wrong anticoagulant.
- (D) Test order requisition and the tube identification do not match.

20. Supravital staining is important for reticulocytes since the cells must be living in order to stain :

- A. Remaining RNA in the cell
- B. Iron in the cell
- C. Denatured hemoglobin in the cell
- D. Nucleus in the cell

21. The aspirate smear should be examined under oil immersion (100x) objective, to assess:

- A. Cellularity
- B. Megakaryocyte numbers
- C. Morphology of abnormal cells
- D. Presence of tumor cell cluster

22. Based on the following data, what is the most likely factor deficiency?

PT Prolonged, APTT Normal, and TT Normal

- A. F-XIII
- B. F-VII
- C. F-II
- D. F-IX

23. If the red cell histogram is Bimodal peak, the probable cause is

- A. Presence of Macrocytic cells
- B. Presence of Schistocytes and extremely small red cells
- C. Large platelets or clumps of platelets
- D. Transfused cells or therapeutic response

24. The common anticoagulant used in Blood bank is

- A. Sodium citrate

- C. Ethylenediaminetetra acetic acid
- D. Heparin sulfate

25. Cells carrying a weak-D antigen require the use of what test to demonstrate its presence?

- A. Indirect antiglobulin test
- B. Addition of low ionic strength substance
- C. Direct antiglobulin test
- D. Reverses grouping Method

45. Your patient is a 20-years-old woman with diarrhea. She told you that she ate some raw shellfish at her home. She now has severe watery diarrhea, perhaps 20 bowel movements a day, and is feeling quite weak. A Gram stain of the stool reveals curved gram-negative rods. Culture of the stool on MacConkey's agar shows colorless colonies. Which one of the following bacteria is the most likely cause of this infection?
- A. *Escherichia coli*
 - B. *Salmonella enteritidis*
 - C. *Shigella dysenteriae*
 - D. *Vibrio cholerae*
46. A specimen of thick, bloody sputum from a hospitalized 80-year-old patient with diabetes mellitus and difficulty in breathing is sent for laboratory analyses. The tests yield heavy growth of a lactose-positive, non motile, gram-negative rod with a large capsule. Which of the following bacteria is most likely to be the cause of the pulmonary problems?
- A. *Enterobacter aerogenes*
 - B. *Escherichia coli*
 - C. *Klebsiella pneumonia*
 - D. *Pseudomonas aeruginosa*
47. A child experience fever and pharyngitis that result in laryngo tracheo bronchitis. It has also harsh, bark like cough and hoarseness. What is most likely causative agent of the disease?
- A. Respiratory syncytial virus
 - B. Coxsackie virus
 - C. Parainfluenza virus
 - D. Rhinovirus
48. An outbreak of jaundice occurs in several young children who attend in the same day care center. If the outbreak was caused by a virus, which one of the following is the most likely cause?
- A. Hepatitis A virus
 - B. Hepatitis B virus
 - C. Hepatitis C virus
 - D. Hepatitis D virus
49. A 15 year old boy is taken to his pediatrician after experiencing fever, malaise, and anorexia followed by tender swelling of his parotid glands. What is the most likely complication occurred in this patient?
- A. Guillain Barré syndrome
 - B. Oophoritis
 - C. Myocarditis
 - D. Orchitis
50. An 8-month-old infant is brought to the emergency room with a suspected RSV infection. Which of the following clinical illnesses would be most concerned about this child as a result of infection with this virus?
- A. Bronchiolitis
 - B. Encephalitis
 - C. Meningitis
 - D. Pancreatitis
51. A 3-year-old child presents at the physician's office with symptoms of conjunctivitis, low-grade fever, and Koplik's spots. The causative agent of this disease belongs to which group of viruses?
- A. Retroviridae
 - B. Picornaviridae
 - C. Orthomyxoviridae
 - D. Paramyxoviridae
52. An India ink test was performed on CSF from an HIV-infected male patient. No encapsulated yeast cells were seen in the centrifuged sample. Further testing revealed positive urease test and growth of brown colonies on bird/niger-seed agar. What is the most likely causative agent?
- A. *Candida albicans*
 - B. *Cryptococcus neoformans*
 - C. *Cryptococcus laurentii*
 - D. *Candida tropicalis*

53. *H. capsulatum*, a dimorphic fungus, is found in soil heavily contaminated with bird droppings. A person acquires the pathogen from the environment and develops histoplasmosis. What is the most likely phase of *H. capsulatum* isolated from tissue biopsies?

- A. Yeasts with broad-based bud
- B. mold with Arthrospores
- C. Oval budding yeasts inside macrophages
- D. Spherules containing endospores.

54. A significant number of yeast was isolated from a vaginal culture of a patient attending adult hospital. It exhibited the following characteristics: Microscopic: Clusters of blastoconidia along pseudohyphae, terminal chlamydoconidia, Positive germ tube, and Positive sucrose. what is the most likely identification of this fungi?

- A. *Candida tropicalis*
- B. *Candida albicans*
- C. *Candida glabrata*
- D. *Candida krusei*

55. A 50 year old man, newly employed by a commercial farm that supplies eggs and chickens to industry, develops flu like syndrome with fever, chills, myalgia, headache, and cough. He is diagnosed with histoplasmosis. A positive tissue biopsy would show the presence of:

- A. Arthrospores
- B. Oval budding yeast cells inside macrophages
- C. Spherules containing endospores
- D. Tuberculate macroconidia

56. A patient who is a recent immigrant from a tropical, remote, rural area with no medical care is now working with a group of migrant crop harvesters. He has a large, raised, colored, cauliflower-like ankle lesion. Darkly pigmented, yeast-like **sclerotic bodies** are seen in the tissue biopsy. What is the most likely diagnosis?

- A. Actinomycetomycetoma
- B. Chromoblastomycosis
- C. Eumycetomycetoma
- D. Sporotrichosis

57. A 42-year-old obese female presented to the emergency center with complaints of worsening nausea, vomiting, and abdominal pain. Blood biochemistry revealed high serum amylase level. What is the probable diagnosis for this patient?

- A) Viral hepatitis
- B) Acute pancreatitis

58. A person having an abnormally low serum cortisol baseline level is given ACTH. A subsequent serum cortisol measurement taken 1 hour after ACTH shows no change in the serum cortisol level. What is the most probable diagnosis of the patient?

- A) Addison's syndrome
- B) Adrenal tumor
- C) Adrenal tumor
- D) Hypopituitarism

- A). The size of the DNA fragments
- B). The number of DNA fragments
- C). The size of the wells of the gel
- D). The volume of the DNA sample loaded

84. Which of the following is true about Real time PCR and conventional PCR

- A. Real time PCR amplify and detects nucleic acid as the same time
- B. Conventional PCR detects nucleic acid without amplification
- C. Real time PCR amplify without detection
- D. Conventional PCR measure the amount of nucleic acid after each cycle

85. What public health laboratories do as opposed to clinical laboratories?

- A. Routine blood testing
- B. Disease surveillance

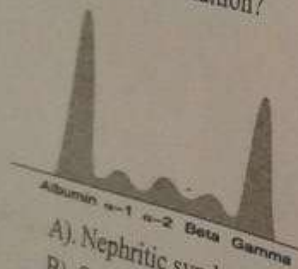
- C. Cholesterol screening
- D. Diagnostic testing

59. A 52-year-old man had a myocardial infarction 8 hour ago. Which of the following pairs of plasma enzyme activity measurements is most likely to be abnormal?
- Creatine kinase-MB and lactate dehydrogenase
 - Creatine kinase-MB and aspartate aminotransferase
 - Aspartate aminotransferase and lactate dehydrogenase
 - Aspartate aminotransferase and alanine aminotransferase
60. A 13 year old boy was brought unconscious into emergency room. Blood gases were performed pH 7.26, PCO_2 54 mmHg, HCO_3 38 mmol/L. This patient demonstrates:
- Metabolic alkalosis
 - Metabolic acidosis
 - Respiratory acidosis
 - Respiratory alkalosis
61. A diagnosis of hemolytic anemia in 11-years-old boy would be supported by the following findings:
- Urinary urobilinogen excretion increased
 - Increased plasma ALP
 - Increased plasma ALT
 - Increased plasma haptoglobin
62. A patient's blood urea is 30 mg/dl and his creatinine is 5.0 mg/dl. What conclusion would you draw from these results?
- Patient is normal
 - Patient is in early stage of renal failure
 - Patient protein intake is quite low
 - One of the values is in error
63. A 60-year-old chronic alcoholic was brought to the hospital with complaints of protuberant abdomen (ascites) and edema feet. He also had history of hemorrhages. Blood biochemistry revealed- High serum transaminases, low serum total proteins, Albumin and a prolonged prothrombin time. Urine analysis was normal. What could be the possible diagnosis?
- Renal failure
 - Protein malnutrition
 - Cirrhosis of liver
 - Heart failure
64. A physician calls to request a creatine kinase on a sample already sent to the laboratory for coagulation studies. The sample is 4-hour-old citrated blood and has been stored at 4°C. The plasma shows very slight hemolysis. What is the best course of action and the reason for it?
- Perform the CK assay on the sample because no interferent is present.
 - Reject the sample because it is slightly hemolyzed.
 - Reject the sample because it has been stored too long.
 - Reject the sample because the citrate will interfere.

65. Following an acute myocardial infarction, activity of LDH usually peaks:
- Within 1 day post-infarction and returns to normal after 3 days
 - Twenty-four to 36 hours post-infarction and returns to normal after 3 days
 - Forty-eight hours post-infarction and returns to normal after 4 days
 - Three days post-infarction and returns to normal after 1 week

66. The estimated LDL cholesterol = Total cholesterol - (HDL cholesterol + triglycerides/5) becomes inaccurate and thus, LDL cholesterol must be directly measured, if serum triglycerides are

- Greater than 200 mg/dL
 - Greater than 300 mg/dL,
 - Greater than 400 mg/dL,
 - Greater than 600 mg/dL
67. The serum protein electrophoresis pattern given below is suggestive of which of the following condition?



- Nephritic syndrome
 - Severe liver disease
 - Renal disease
 - Multiple myeloma
68. A 35-year-old diabetic woman is suspected of developing renal insufficiency. Which of the following specimens should be obtained to determine the amount of creatinine being excreted in the urine?
- 2-hour postprandial
 - 12-hour timed collection
 - 24-hour timed collection
 - Midstream "clean catch"
69. An unpreserved urine specimen collected at midnight is kept at room temperature until the morning hospital shift. Which of the following changes will most likely occur?
- Decrease in urine color and clarity
 - Decrease in pH and specific gravity
 - Decrease in glucose and ketones
 - Decrease in bacteria and nitrite
70. A 45-year-old female African American had her serum and urine creatinine determined using Jaffe kinetic method. Her serum creatinine was 1.2 mg/dL, urine creatinine: 500 mg/L and urine volume: 1440 mL/24 hr. What is her creatinine clearance?
- 41.7 mL/min
 - 41.7 L/min
 - 416.7 mL/min
 - 416.7 mg/mL/min

26. An individual presents with the following ABO grouping results:

Anti-A	Anti-B	Anti-A,B	A1 cells	B cells
4+	0	4+	0	4+

What is the individual's blood group?

- A. A
- B. B
- C. AB
- D. O

27. The following test results are obtained:

Anti-D	Anti-C	Anti-c	Anti-E	Anti-e
0	+	+	0	+

The most probable genotype is:

- A. π
- B. $R1r$
- C. Ror
- D. $r'r$

28. A woman recipient is AB negative, the supply of type specific blood has been exhausted. The best choice for substitution is:

- A. O negative
- B. A negative
- C. B positive
- D. AB positive

29. The optimum storage temperature for platelets is:

- A. -20°C
- B. -12°C
- C. 4°C
- D. 22°C

30. The microtome used for cutting frozen tissues is:

- A. Rocking microtome
- B. Sliding microtome
- C. Cryomicrotome
- D. Ultra microtome

31. The sequence of reagents used in the routine processing of tissue are

- A. Formalin - 100% alcohol - 95% alcohol - 70% alcohol - xylene - paraffin wax
- B. Formalin - 100% alcohol - 95% alcohol - 100% alcohol - xylene - paraffin wax
- C. Formalin - 70% alcohol - 95% alcohol - 100% alcohol - 70% alcohol - paraffin wax
- D. Formalin - xylene - 100% alcohol - 95% alcohol - 70% alcohol - paraffin wax

32. The basic steps in staining and mounting paraffin sections are
- De waxing → Dehydration → Staining with H&E → Hydration and clearing → Mounting
 - De waxing → Hydration → Staining with H&E → Mounting → Dehydration and clearing
 - De waxing → Dehydration and clearing → Staining with H&E → Hydration → Mounting
 - De waxing → Hydration → Staining with H&E → Dehydration and clearing → Mounting
33. What is the importance of floating the ribbon of sections on warm water (water bath)?
- To fix the section with slide
 - To reduce detachment of the section during staining
 - To compress the section
 - To make the section creases free
34. What is the most commonly used dye with Eosin to stain paraffin wax embedded sections in histopathology laboratory?
- Tungsten hematoxylin
 - lead hematoxylin
 - Alum hematoxylin
 - Iron hematoxylin
35. By heating serum at 56°C for 30 minutes, which of the following substances will be inactivated?
- IgM
 - IgG
 - C3
 - Ag
36. The immunoglobline involved in host defence against helmenthing parasitic infection is
- IgM
 - IgG
 - IgA
 - IgE
37. A urine specimen was collected at 8.am. The nurse labeled the sample and placed it next to the tube station to be sent to the laboratory for testing. The specimen was received in the microbiology laboratory for culture at 1 p.m on the same day. What is the appropriate action that should be done by a microbiologist?
- rejects the specimen
 - set up a routine bacteriology culture
 - set up a routine bacteriology culture and notes the time
 - explain to the nurse why the specimen is rejected and requests a new sample
38. A microbiologist inoculated a clinical specimen from patient developing meningitis and identified an isolate which is susceptible to bile and optochin, and alpha-hemolytic. What is the most likely associated pathogen?
- Enterococcus faecalis
 - Streptococcus pneumonia
 - Streptococcus pyogenes
 - Streptococcus agalactiae

Choose the best answer and write your answer on the answer sheet only.

1. Medical laboratory technologist, who was on duty, received a stool sample for examination. He wanted to perform concentration technique to enhance parasite detection. What stage of parasite will not be able to detect after concentration technique?
A. Protozoan trophozoites
B. Protozoan cysts
C. Helminth larvae
D. Helminth eggs
2. A laboratory technician received a stool sample for microscopic examination of parasite. He prepared saline wet mount and started examination using 10X objective lens. He observed an egg with oval shape, flattened on one side and rounded on the other side, double smooth and thin shell. What is the most likely parasite seen?
A. *Ascaris lumbricoides*
B. *Trichuris trichuria*
C. *Enterobius vermicularis*
D. *Necator americanus*
3. A farmer comes to a laboratory for stool sample examination. The microscopic examination revealed that an oval egg with thin layer and the internal mass of the egg has four segments. What is the most possible parasite?
A. *Ascaris lumbricoides*
B. *Trichuris trichuria*
C. *Ancylostoma doudnale*
D. *Entrobious vermicularis*
4. Laboratory personnel working in a hospital examined a specimen for blood and tissue nematodes. After appropriate laboratory procedures sheathed microfilaria were seen. What are the nematodes observed under microscope?
A. *W. bancrofti* and *O. volvulus*
B. *B. malayi* and *M. perstance*
C. *W. bancrofti* and *Lo*
D. *M. ozardi* and *W. b*
5. A patient suspected of malaria was referred to the laboratory for microscopic examination. Laboratory personnel was not sure when is the best time to collect blood for the plasmodium parasites. When do you recommend him to collect blood sample?
A. Between paroxysms
B. During paroxysms
C. Morning
D. Evening
6. A man who was complaining abdominal pain sent to the laboratory for stool examination. Examination showed that blood and mucus on the sample and microscopic examination with stain revealed a trophozoite with one nucleus and small central kerosene inside. There was an inclusion body in the cytoplasm of the trophozoite. What is the most possible cause?
A. *E. histolytica/dispar*
B. *E. hartmani*
C. *E. dispar*
D. *E. histolytica*

7. Giemsa-stained blood smears from malaria suspected patient demonstrated normal-size red blood cells containing ring form trophozoites with double chromatin and uniform cytoplasm which was situated on the membrane of the red blood cells. What is the most possible plasmodium parasite?

A. *Plasmodium vivax*

B. *Plasmodium falciparum*

C. *Plasmodium ovale*

D. *Plasmodium malariae*

8. Wet mount examination of a stool sample showed that an oval egg with one well rounded pole and terminal spine at another pole. What is the most likely parasite seen under microscope?

A. *Schistosoma mansoni*

B. *Schistosoma hematobium*

C. *Schistosoma japonicum*

D. *Schistosoma intercalatum*

9. What examination technique is considered as microscopic examination of stool specimens for parasites?

A. Determining specimen consistency

B. Wet mount examination after concentration technique

C. Examining sample for gross abnormalities

D. Analyzing sample for color

10. Stool sample from HIV infected patient who had chronic and severe diarrhea lasting for months was examined by modified acid fast staining technique. The microscopic result revealed a small round/oval red oocyst which contains 4 sporozoites. What is the most probable parasite?

A. *Cryptosporidium parvum*

B. *Cyclospora cayentanensis*

C. *Isospora belli*

D. *Sarcocystis hominis*

11. A person who is living in Kutaber werda went to Boru Meda Hospital due to the lesion on his face. The physician suspected cutaneous leishmaniasis and requested laboratory for leishmaniasis examination. Laboratory personnel decided to take biopsy sample from the ulcer. What is the best site of the ulcer to collect biopsy sample?

A. Center of the ulcer

B. Edge of the ulcer

C. Skin around the ulcer

D. Lymph node draining the ulcer

12. The anticoagulant of choice for most routine coagulation studies is:

A. Sodium oxalate

B. Sodium citrate

C. Heparin

D. Ethylene diamine tetra acetic acid

71. The urine specimen was placed in a refrigerator. When the specimen was later removed to prepare an aliquot for microscopic analysis, the specimen was still orange but was now cloudy. The statement that best explains this increase in urine turbidity is?
- A). The delay in analysis has allowed bacteria to proliferate.
 - B). Squamous epithelial cells in the urine have degenerated.
 - C). Because of the temperature change, normal urine solutes have precipitated.
 - D). The specimen was contaminated with vaginal fluids, and yeast has propagated.
72. A patient with a +1 protein reading in the afternoon is asked to submit a first morning specimen. The second specimen also has a +1 protein. This patient is:
- A). Positive for orthostatic proteinuria
 - B). Negative for orthostatic proteinuria
 - C). Positive for Bence Jones protein
 - D). Negative for clinical proteinuria
73. A 56-year-old patient was admitted to the hospital with normal blood glucose. Urine analysis revealed a positive glucose reading. The patient should be further checked for:
- A). Diabetes mellitus
 - B). Renal disease
 - C). Gestational diabetes
 - D). Pancreatitis
74. Upon arriving at work, a technologist notices that a urine specimen left beside the sink by personnel on the nightshift has a black color and a pH of 8.0. The initial report describes the specimen as yellow with a pH of 6.0. The best explanation for these results is that the urine specimen:
- A). Is from a patient with a urinary tract infection
 - B). Contains abnormally high levels of melanin
 - C). Is old and has allowed bacteria to proliferate
 - D). Is contaminated with vaginal fluids, and yeast has propagated.
75. An unidentified fluid is received in the laboratory with a request to determine if the fluid is urine or another body fluid. Using routine laboratory tests, what tests would determine that the fluid is most probably urine?
- A). Glucose and ketones
 - B). Urea and creatinine
 - C). Uric acid and amino acids
 - D). Protein and amino acids
76. A routine urinalysis specimen is sent to the laboratory from a 23-year-old patient. When the laboratorian performs the microscopic examination of urine sediment, which of the following are enumerated using low-power magnification?
- A). Bacteria
 - B). Casts
 - C). Red blood cells
 - D). Renal tubular cells

77. A 51-year-old man has painful swelling in both knees. A synovial fluid is aspirated from the right knee and submitted to the laboratory. The specimen has a high cell count and requires dilution to be counted. What diluents should be used?

- A). Normal saline
- B). Dilute acetic acid (2%)
- C). Dilute methanol (1%)
- D). Phosphate buffer solution (0.050 mol/L)

78. A urine specimen delivered to the laboratory in a gray-top vacutainer may require:

- A). Collection of a fresh specimen
- B). Centrifugation
- C). Dilution for specific gravity
- D). Testing for glucose

79. A yellow-colored semen specimen is received in the laboratory. The analysis is normal except for decreased sperm motility. The possible connection between the two abnormal findings may be caused by:

- A). Urine contamination
- B). Prolonged abstinence
- C). Medications
- D). Acute infection and inflammatory cells in semen

80. The following protozoa can be detected in patient's urine

- A. Cyclospora oocysts
- B. Trichomonas vaginalis cyst
- C. Isospora oocysts
- D. Trichomonas vaginalis trophozoite

81. When a clinician suspects reickettsial infection for his/her febrile patients and request Weil-felix test. What bacteria is the source of the antigen in Weil-felix reagent?

- A. Rickettsia
- B. Borrelia
- C. Salmonella
- D. Proteus

82. In a given serial dilution we have five test tubes and there is 1ml of saline in each tube. In the first test tube we add 1ml of serum containing a given analyte. Then we pour 1ml of solution from test tube 1 to test tube 2. Again we pour 1ml of solution from test tube 2 to test tube 3. And again we pour 1ml of solution from test tube 3 to test tube 4. Finally we pour 1ml of solution from test tube 4 to test tube 5. So, what is the dilution in test tube 3

- A. 1:4
- B. 1:8
- C. 1:16
- D. 1:32

83. The rate of migration of DNA within an agarose gel in the gel electrophoresis technique is primarily based on what factor?

squares of a Neubauer hemacytometer. The dilution is 1:100. What is the total WBC count counted in the four large squares?

A. $4.0 \times 10^9/L$

B. $8.0 \times 10^9/L$

C. $20.0 \times 10^9/L$

D. $200.0 \times 10^9/L$

14. A patient has a HCT of 30%, a hemoglobin of 8 g/dL, and RBC count of $4.0 \times 10^{12}/L$. What is the morphological classification of this anemia?

A. Normocytic normochromic

B. Macrocytic hypochromic

C. Microcytic hypochromic

D. Normocytic hyperchromic

15. A patient has the following laboratory results:

RBC: $2 \times 10^6/\mu l$ HCT: 24%, Hb: 6.8 g/dl, Reticulocyte: 0.8%

What is the mean corpuscular volume (MCV)?

A. 34 fl

B. 83 fl

C. 120 fl

D. 150 fl

16. A common source of interference in the Cyanmethemoglobin method is:

A. Hemolysis

B. Very High WBC count

C. Cold agglutinins

D. Clumped platelets

17. A patient's peripheral blood smear and bone marrow both show 70% blasts. These cells are negative for Sudan Black B stain. Based on these data, what is the most likely diagnosis?

A. Acute myeloid leukemia

B. Chronic lymphocytic leukemia

C. Acute promyelocytic leukemia

D. Acute lymphocytic leukemia

18. An automated leukocyte count is $18 \times 10^3/\mu l$ and the peripheral blood smear of the same specimen shows 80 nucleated RBCs per 100 leukocytes. What is the corrected WBC count?

A. $17.2 \times 10^3/\mu l$

B. $9 \times 10^3/\mu l$

C. $10 \times 10^3/\mu l$

D. $13.4 \times 10^3/\mu l$

19. The RDW-CV and RDW-SD performed by automated hematological analyzers provide:

A. Distribution of RBCs volume

B. Variation of RBCs shape

C. Mean RBC volume

D. Distribution of RBC hemoglobin concentration

mg/dL, ALT 42 IU/L, AST 35 IU/L, and ALP 1,205 IU/L. Based on these laboratory findings, where is the most likely site of a lesion?

- A. Prehepatic B. Intrahepatic C. Post hepatic D. Renal

27. A patient's urinalysis revealed a negative bilirubin and an increased urobilinogen level. These results are associated with:

- A) Hemolytic disease B) Hepatic disease
C) Biliary obstruction D) Urinary tract infection

28. A 58-year-old man presents with gradual onset of yellow discoloration of the skin, itching, anorexia and weight loss of 9 pounds over the past two months. He also recently noted dark yellow discoloration of his urine. The physical exam reveals an emaciated male who is jaundiced. What is the likely reason behind the dark urine?

- A) Increased indirect bilirubin in the blood B) Increased biliverdin in urine
C) Increased heme oxygenase activity in the urine D) Increased conjugated bilirubin excretion in urine

29. A 65-year-old male presented with yellowish discoloration of the skin. He reports abdominal pain and fatigue for the past two days. At what level of total serum bilirubin is the earliest clinical recognition of his discoloration possible?

- A. 1.0 mg/dL B. 2.0 mg/dL C. 3.0 mg/dL D. 4.0 mg/dL

30. A 17-year-old male presents to the emergency department with tachypnea. The patient has been experiencing polyuria and polydipsia for the past two weeks. Specifically, in the last three days, he has complained of increasing nausea and four episodes of vomiting. Diabetic ketoacidosis is suspected. What kind of acid-base values would be expected, and what corresponding anion gap would be plausible?

- A) pH 7.54 and anion gap of 10 mEq/L B) pH 7.25 and anion gap of 25 mEq/L
C) pH 7.41 and anion gap of 27 mEq/L D) All of the above

31. A 17-year-old boy presents with moderate to severe epigastric pain. Physical examination reveals extensive eruptive xanthomas and hepatosplenomegaly. A blood sample reveals milky plasma. Which of the following is the most likely lipoprotein to be elevated in this patient's plasma?

- A. Chylomicrons B. HDL C. IDL D. LDL

32. A 42-year-old obese female presented to the emergency center with complaints of worsening nausea, vomiting, and abdominal pain. Blood biochemistry revealed high serum amylase level. What is the probable diagnosis for this patient?

- A) Viral hepatitis B) Acute pancreatitis C) Renal colic D) Acute gastritis

33. A 52-year-old man had a myocardial infarction 8 hour ago. Which of the following pairs of plasma enzyme activity measurements is most likely to be abnormal?

- A. Creatine kinase-MB and lactate dehydrogenase

11. The following is TRUE about the diagnosis of Syphilis infection:
- VDRL is a specific test for syphilis
 - VDRL is more specific than RPR
 - RPR can be used to diagnose tertiary syphilis
 - Neither RPR nor VDRL are specific tests for syphilis

12. Serum was not used within 2 hours of inactivation, what should be done to the sample?
- Repeat the inactivation process for 30 minutes at 56 degrees Celsius
 - Inactivate the serum for 10 minutes at 56 degrees Celsius
 - Refrigerate the sample and use after 1 hour
 - No need to prepare the sample, it can be used for testing

13. The antigen used for the diagnosis of Rickettsia infection comes from:

- Rickettsia
- Escherichia
- Proteus
- Salmonella

14. A person found positive for HBsAg but has no anti-HBsAg is:

- Currently infected with Hepatitis B
- Had been infected with Hepatitis B but now cured
- A carrier of Hepatitis B
- Case of past infection but not cured

HBsAg (+)
anti-HBsAg (-)

15. IgM type of antibodies against Toxoplasma gondii, when found in the blood of the baby, is indicative of:

- Baby has Acute infection with Toxoplasma
- Baby has Chronic infection with Toxoplasma
- Maternal antibodies are passed to the baby
- Mother is infected with Toxoplasma but not the baby

16. A person vaccinated against Hepatitis B would show:

- (+) HBsAg ; (-) anti-HBsAg
- (-) HBsAg ; (+) anti-HBsAg
- (-) HBsAg ; (+) anti-HBsAg
- (-) HBsAg ; (-) anti-HBsAg

17. A plastic cassette was used to detect antigen or antibody against a virus. Serum was added and the result was observed after a few minutes. One or two lines are developed in the reading area of the cassette. This test follows:

- Solid phase ELISA
- Immunochromatography
- Immunofluorescence
- FAT

18. Pregnancy test can be reliable if used at least _____ days after the day of conception.
- 1
 - 5
 - 8
 - 10

19. By heating serum at 56°C for 30 minutes, which of the following substances will be destroyed?

- D. yolk sac
C. red bone marrow—liver and spleen—yolk sac
D. liver and spleen—yolk sac—red bone marrow

2. If a male patient has a reticulocyte count of 6.0% and a packed cell volume of 45%, what is his reticulocyte production index?

- A. 1.5 B. 3.0 C. 4.5 D. 6.0

3. A 37-year-old man patient is complained of weakness. He is pale and gave a history of petechia and hematuria. He is tired and his laboratory data showed that Hgb = 70g/L, WBC = $2.2 \times 10^9/L$, Plt = $30 \times 10^9/L$, Neut = 23 %, Lymph = 70 %, Mono = 3%, Eos = 3 %, Baso = 1%. The peripheral blood smear showed normocytic/normochromic RBCs. The possible diagnosis for this patient is:

- A. Iron deficiency Anemia C. Megaloblastic Anemia
B. Aplastic Anemia D. thalassemia syndrome

4. One of the following WBC marker cannot be detected by FACS count

- A. CD4 B. CD45 C. CD8 D. CD3

5. A prolonged APTT, normal PT, a low factor VIII level, but a normal factor VII level are characteristic of an Inherited coagulopathy associated with ----- condition.

- A. Hemophilia A B. Disseminated intravascular coagulopathy
C. Hemophilia B D. Vitamin K deficiency

6. Some automated hematology analyzer estimated the size and number of blood cells by light scatter principle, so forward light scatter is used to measure:

- A. Nuclear density C. Internal complexity of the cell
B. Cellular granularity D. Cell size

7. A donor presented with the following vital signs: Blood pressure: 150/120; Temperature: 37.2°C, Pulse: 37 beats/minute and Hemoglobin: 15.8 g/dl., the donor's donation status is:

- A. acceptable for donation
B. unacceptable for donation due to hemoglobin value and temperature
C. unacceptable for donation due to blood pressure and pulse
D. unacceptable for donation due to temperature and pulse

LB = ...

8. According to Landsteiner's Law, if an individual's red cells have negative reactions with anti-A and anti-B antiserum, what antibodies will one find in his/her serum?

- A. anti-A B. anti-B C. anti-A and anti-B D. Neither anti-A nor anti-B

9. Mr. X is a laboratory technologist and he is working in histopathology laboratory and a pathologist sent fine needle aspirated soft tissue sample. The pathologist requested him to process the sample for microscopic examination, the correct processing steps he is going to follow is

- A. fixation --- dehydration --- clearing --- embedding --- microtomy --- staining
B. fixation --- clearing --- dehydration --- embedding --- microtomy --- staining
C. fixation --- calcification --- dehydration --- clearing --- embedding --- microtomy --- staining
D. fixation --- decalcification --- dehydration --- clearing --- embedding --- microtomy --- staining
E. fixation --- decalcification --- dehydration --- clearing --- embedding --- microtomy --- staining
F. fixation --- dehydration --- decalcification --- clearing --- embedding --- microtomy --- staining

B. Creatine kinase-MB and aspartate aminotransferase

C. Aspartate aminotransferase and lactate dehydrogenase

D. Aspartate aminotransferase and alanine aminotransferase

34. A person having an abnormally low serum cortisol baseline level is given ACTH. A subsequent serum cortisol measurement taken 1 hour after ACTH shows no change in the serum cortisol level. The most probable diagnosis of the patient

A) Cushing's syndrome B) Addison's disease C) Adrenal tumor D) Hypopituitarism

35. A 12-year-old boy was brought unconscious into emergency room. Blood gases were performed pH 7.28, PCO_2 54 mmHg, HCO_3^- 38 mmol/L. This patient demonstrates

A) Metabolic alkalosis B) Metabolic acidosis C) Respiratory acidosis D) Respiratory alkalosis

36. A diagnosis of hemolytic anemia in an 11-year-old boy would be supported by the following findings:

A) Urinary urobilinogen excretion increased

C. Increased plasma ALT

B) Increased plasma ALP

D. Increased plasma haptoglobin

37. A patient's blood urea is 30 mg/dl and his creatinine is 5.0 mg/dl. What conclusion would you draw from these results?

A. Patient is normal

C. Patient protein intake is quite low

B. Patient is in early stage of renal failure

D. One of the values is in error

38. A 60-year-old chronic alcoholic was brought to the hospital with complaints of protuberant abdomen (ascites) and edema feet. He also had history of hemorrhages. Blood biochemistry revealed: High serum transaminases, low serum total proteins, Albumin and a prolonged prothrombin time. Urine analysis was normal. What could be the possible diagnosis?

A) Renal failure

B. Protein malnutrition

C. Cirrhosis of liver

D. Heart failure

39. A physician calls to request a creatine kinase on a sample already sent to the laboratory for coagulation studies. The sample is 4-hour-old citrated blood and has been stored at 4°C. The plasma shows very slight hemolysis. What is the best course of action and the reason for it?

A) Perform the CK assay on the sample because no interferent is present

B) Reject the sample because it is slightly hemolyzed.

C) Reject the sample because it has been stored too long.

D) Reject the sample because the citrate will interfere.

40. The following results were obtained on a urine specimen at 8:00 am: pH 5.5, protein 2+, glucose 1+, ketones 1+, blood negative, bilirubin positive, nitrite positive. If this urine specimen was stored uncapped at 5°C without preservation and retested at 2pm, which of the following test results would be changed due to these storage conditions?

A. Protein

B. Glucose

C. Nitrite

D. Ketones