CLINICAL CHEMISTRY MODEL EXAMINATION QUESTIONS

FOR DIPLOMA (MCQ AND ESSAY)

MODEL PAPER 1

M.C.Q: 40 MARKS

Q1. The following indicator is used in Mohr's titration:
- (a) Potassium dichromate
- (b) Diphenyl Carbazone
- (c) Ferric alum
- (d) Ammonium thiocynate
- (e) Potassium chromate

Q2. In gastric analysis total acidity consists of free acid and:
- (a) Carbonic acid
- (b) Hydrochloric acid
- (c) Lactic acid
- (d) Pyruvic acid
- (e) Palmitic acid

Q3. Properties of C.S. F glucose include:
- (a) Determination by Glucometer
- (b) Is lower than blood glucose
- (c) Is higher than blood glucose
- (d) Is same as blood glucose
- (e) Cannot be determined by copper reduction methods

Q4. Pathological increase in serum cholesterol is associated with:
- (a) Certain anaemia
- (b) Diabetes inspidus
- (c) Nephrotic syndrome
- (d) Malnutrition
- (e) Muscle mass

Q5. The icterus index is the comparison of serum yellow pigment to:
- (a) Ferricyanide
- (b) Carotene
- (c) Ammonium sulphate
- (d) Standard potassium permanganate
- (e) Standard potassium dichromate

Q6. In a normal glucose tolerance test, blood glucose:
- (a) Never rises
- (b) Continues to rise for 2 hours
- (c) Rises to 8.3 mmol/l the end of the first hour and returns to normal by the second hour.
- (d) Rises to 8.3 mmol/l the end of the first hour and returns to normal in 24 hours.
- (e) Rises to 5 mmol/l in one hour and than returns slowly to normal by the second hour.

Q7. Insulin is:
- (a) An enzyme
- (b) A hormone
- (c) A hyperglycaemic agent
- (d) A product of vitamins
- (e) Related to gall stones

Q8. The ratio of Plasma to RBC urea concentration is:
- (a) 1: 2
- (b) 4: 5
- (c) 5:4
- (d) 1:5
- (e) 1:3

Q9. Common principles of chromatography include:
- (a) Partition
- (b) Liquid – gas
- (c) Adsorption
- (d) Absorption
- (e) Electron transfer

Q10. Turbidity in C.S.F can be due to the presence of:
- (a) Anticoagulants
- (b) Platelets
- (c) RBC
- (d) WBC
- (e) Glucose

Q11 The main bile pigment(s) are/is:
- (a) Urobilinogen
- (b) Porphobilinogen
- (c) Stercobilinogen
- (d) Urobilin
- (e) Bilirubin

Q12. Bile acids are conjugated in the liver by:
(a) Bilirubin
(b) Amino sulphate
(c) Amino acids
(d) Gluconic acid
(e) Hydrochloric acid

Q13. Which of the following is true for serum sodium and potassium?
(a) Both are not determined using a flame photometer.
(b) Usually potassium remains normal even in disease.
(c) Concentrations of both electrolytes in the body vary according to the health status of an individual.
(d) Usually sodium remains normal even in the diseased.
(e) It is impossible to get very low potassium levels.

Q14. Potential safety risk/s in a clinical chemistry laboratory includes:
(a) Laboratory coats
(b) Working hours
(c) Laboratory itself
(d) Reagents
(e) Workers

Q15. In alkaline pH, azobilirubin appears:
(a) Red
(b) Blue
(c) Purple
(d) Yellow
(e) Violet

Q16. In chromatography the distance travelled by solute over the distance travelled by solvent front is:
(a) Dependent on charge of solute
(b) Rf
(c) Equal to one
(d) More than one
(e) Less than one

Q17. Chemical changes in an atom are controlled by:
(a) Protons
(b) Electrons
(c) Neutrons
(d) Particles weighing 1/1840 of a proton
(e) Electrons and Neutrons

Q18. Urine Preservatives include:
(a) Formaldehyde
(b) Sodium chloride
(c) Sulphuric acid
(d) Hydrochloric acid
(e) Nitric acid

Q19. Green colour in Bial's test indicates presence of:
(a) Maltose
(b) Arabinose
(c) Sucrose
(d) Fructose
(e) Mannose

Q20. The percentage transmittance of a solution of O.D = 0.4 is:
(a) 60
(b) 30
(c) 16
(d) 40
(e) 50

Q21. A sugar that gives a red colour with resorcinol on boiling is:
(a) An aldehyde
(b) Glucose
(c) Maltose
(d) Galactose
(e) A ketone

Q22. The terms oxidation and reduction are said to be:
(a) Complementary
(b) Synonymous
(c) Complex
(d) Useful in organic chemistry only
(e) Useful in metabolic reactions only

Q23. Molar concentration of HCl who's PH = 1.4 is:
(a) 0.26
(b) 0.14
(c) 0.04
(d) 0.06
(e) 0.16

Q24. Reducing disaccharides include:
(a) Ribose
(b) Sucrose
(c) Galactose
(d) Mannose
(e) Maltose

Q25 Glucose may be oxidized to:

(a) Mannitol
(b) An alcohol
(c) Glucoronic acid
(d) Gluconic acid
(e) Carboxylic acid

Q27 Oxidation of bilirubin yields:

(a) Stercobilinogen
(b) Biliverdin
(c) Yellow–orange pigment
(d) Urobilinogen
(e) Bile–salts

Q28. Phenyl pyruvic acid in urine can be detected by:

(a) 10% Ferric chloride
(b) 10% Trichloroacetic acid
(c) 10% Ferric hydroxide
(d) 10% Ferricyanide
(e) 10% Acetic acid

Q29. The most definite method of separating and identifying different sugars in urine is by:

(a) Fermentation
(b) Chemical examination
(c) Chromatography
(d) Electrophoresis
(e) Dialysis

Q30. In urine electrophoresis, Bence Jones proteins will appear between which bands?

(a) Beta and Alpha I
(b) Beta and Gamma
(c) Alpha I and Alpha II
(d) Alpha I and Beta
(e) Albumin and Alpha I

Q31. 1% urinary glucose increase urine specific gravity by:

(a) 0. 030
(b) 0. 010
(c) 0. 002
(d) 0. 003
(e) 0. 004

Q32. Which of the following is the right order of the basic components of a colorimeter?

(a) Light source, filter, cuvette, photodetector
(b) Light source, cuvette, filter, photodetector
(c) Light source, monochromator, cuvette, photodetector
(d) Light source, filter, cuvette, monochromator, photodetector
(e) Light source, cuvette, monochromator, photodetector

Q33. When sodium acetate – acetic acid buffer ($Pk_a = 4.7$) has a PH of 5.0, then the concentration of sodium acetate is:

(a) Equal to that of acetic acid
(b) ½ of acetic acid
(c) 20 times that of acetic acid
(d) Twice that of acetic acid
(e) 0.5 of acetic acid

Q34. The end product of protein metabolism in man is:

(a) Nitrogen
(c) Creatinine
(c) Ammonia
(d) Urea
(e) Uric acid

Q35. Amylase can be determined in both blood and urine by various methods based on its ability to convert starch to:

(a) Glucose
(b) Maltose
(c) Lactose
(d) Galactose
(e) Lactose

Q36. Elevated values of serum alkaline phosphatase indicate diseases of:

(a) Pancreas
(b) Kidney
(c) Liver
(d) Bone
(e) Brain

ESSAY: 60 MARKS

Q1. Discuss the formation and degradation of Bilirubin in the body

(20 marks)

Q2. Derive the Henderson Hasselbach equation. Using the equation, calculate the pH of a buffer if given the pK_a =6.1, acid concentration = 0.01 and base concentration = 0.1

(20 marks)

Q3. Explain briefly how you would technically differentiate the following pairs of substances in a clinical laboratory (Avoid technical details).

(a) Salicylates and acetoacetic acid
(b) Porphobilinogen and urobilinogen
(c) Native proteins and Bence Jones proteins
(d) Albumin and urosectan

(20 marks)

MODEL PAPER 2

SECTION A: MCQ (40 marks)

1. Yeast fermentation will detect which of these sugars
   (a) Arabinose
   (b) Fructose
   (c) Ribose
   (d) Cellulose
   (e) Sucrose

2. Glycosuria without Hyperglycaemia in oral glucose Tolerance Test detects
   (a) Renal Threshold
   (b) Diabetes mellitus
   (c) Diabetes inspidus
   (d) Renal glycosuria
   (e) Flat diabetic curve

3. The reaction of a Carboxylic acid and an alcohol is
   (a) Polymerization
   (b) Saponification
   (c) Peptide bonding
   (d) Glycosidic bonding
   (e) Esterification

4. Commonly used chromogens include
   (a) Arsenomolybdic acid
   (b) Hydrogen peroxide
   (c) Gluconic Acid
   (d) Ortho-tolidine
   (e) Guaiacum

5. The condition whereby enzymes act best is known as
   (a) Catalytic activity
   (b) Optimum activity
   (c) Maximum activity
   (d) Minimum activity
   (e) Acidosis

6. On decarboxylation, acetoacetic acid yields:
   (a) Acetone
   (b) Aldehyde
   (c) Oxaloacetate
   (d) Beta-hydroxybutyric acid
   (e) A ketone

7. Urinometer is used for the estimation of
   (a) SG
   (b) Urea
   (c) Albumin
   (d) Protein
   (e) Glucose

8. Both DNA and RNA contain Pyrimidine bases called
   (a) Guanine
   (b) Xanthine
   (c) Cytosine
   (d) Thymine
   (e) Adenine

9. Bence-Jones Protein in urine can be tested by
   (a) Sulphosalysalic acid
   (b) Nitric acid test (Heller's)
   (c) Bradshaw's test
   (d) Electrophoresis
   (e) Gmelin's test

10. Calculate the Optical Density given percentage transmittance to be 40%
   (a) 0.2
   (b) 0.4
   (c) 0.5
   (d) 0.6
   (e) 0.3

11. Glucose working standards is always preserved in
   (a) Benzoic Acid
   (b) Hydrochloric acid
   (c) Sodium fluoride
   (d) Chloroform
   (e) Diaphenyl Carbazone

12. Conjugated bilirubin is
   (a) Bound to Albumin
   (b) Reduced bilirubin
   (c) Bilirubin glucoronide
   (d) Less-toxic
   (e) Toxic

13. Renal Amino-aciduria is a defect due to
   (a) Tubular reabsorption
   (b) Urinary tract obstruction
   (c) Liver diseases
   (d) Glomerular filtration
   (e) Intestinal obstruction

14. Which of these are Purine Bases?
    (a) Arginine
    (b) Adenosine
    (c) Guanine
    (d) Cytosine
    (e) Thymine

15. Substances that dissolve to form suspensions
    (a) Crystalloids
    (b) Suspensoids
    (c) Emulsoids
    (d) Colloids
    (e) Dialysis

16. During the use of a PH meter, the Silver/Silver Chloride is
    (a) gravimetric analysis
    (b) standard PH electrode
    (c) reference electrode
    (d) potentiometric
    (e) equivalent electrode

17. Uric acid forms as an end product of
    (a) Purine metabolism
    (b) Protein metabolism
    (c) Nucleoprotein metabolism
    (d) Urea metabolism
    (e) Ammonia metabolism

18. The law that relates transmitted light with the thickness of the solution is
    (a) Lamberts' law
    (b) Beers' law
    (c) Charles' law
    (d) Dattons' law
    (e) Boyles' law

19. Augmented histamine test in gastric juice analysis
    (a) Is done when the Patient has fasted
    (b) Is done when the Patient has not fasted
    (c) Antihistamine given first
    (d) Is done to defect renal defect
    (e) Uses dilute alcohol for stimulation

20. Quality Control (QC) in chemical Laboratory
    (a) should be done once a month
    (b) should be done regularly
    (c) should not be performed
    (d) starts when the specimen is being taken

(e) not important

21. Bicarbonate is usually estimated in the laboratory by
    (a) Flame photometry
    (b) Colorimetry
    (c) Titration
    (d) Chromatography
    (e) Neutralization

22. The buffer in alkaline Phosphatase estimation is
    (a) Phenyl Phosphate
    (b) Bicarbonate/Phosphate
    (c) Carbonate /bicarbonate
    (d) 4-aminophenazone
    (e) Phenol

23. When urea is heated above melting point (over 180^{o}C)
    (a) Citrulline is formed
    (b) Biuret is formed
    (c) Ammonia is formed
    (d) Carbon dioxide is formed
    (e) Urochrome is formed

24. Which of these reagents are used in Cholesterol Estimation?
    (a) Hydrochloric acid
    (b) Methanol
    (c) Chloroform
    (d) Nitric acid
    (e) Acetic anhydride/Sulphuric acid

25. Serum glutamate-Pyruvate acid transaminase (SGPT) has the substrate as
    (a) Alanine
    (b) Pyruvate
    (c) Aspirate
    (d) Beta Oxaloacetate
    (e) Glutamic acid

26. Amylase always act on starch and the end point can be determined by
    (a) Potassium Iodide
    (b) Iodine
    (c) Fluorine
    (d) Bromine
    (e) Chlorine

27. CSF normal Protein range is
    (a) 6-8gm%
    (b) 15-40mg%
    (c) 3-4mg%
    (d) 0.15-0.4mg%
    (e) 0.15-0.4gm/L

SECTION B: ESSAY (60 marks)

1. Write briefly on

    a) Sodium fluoride (5 marks)
    b) Amphoteric nature of Amino Acids (5 marks)
    c) Four (4) factors which affect enzyme activity (8 marks)
    d) Handling of specimen for Potassium Assay (2 marks)

    TOTAL = (20 MARKS)

2. Convert the following

    a) 38mg% Urea to mmol/L
    b) 60mg% glucose to mmol/L
    c) 138mEq/L of Sodium to mmol/L
    d) Calculate optical Density given percentage transmittance =50%

    Mw Urea=60, Mw Glucose= 180, Na=23

    TOTAL = 20 MARKS

3. With the aid of a clearly labelled diagram describe the formation of Urine

    TOTAL= 20 MARKS

MODEL PAPER 3

SECTION A: MCQ (40 marks)

Q1. A molar solution contains: -
- (a) One mole /litre of solvent
- (b) One gram molecular weight of solute/litre of solution
- (c) One mole /litre of solvent
- (d) Gram molecular weight of solute/litre of solvent
- (e) One mole solute/litre of solution

Q2. During the detection of pentoses, the reagent used: -
- (a) Has barium chloride
- (b) Gives a red colour when positive
- (c) Has orcinol
- (d) Has hydrochloric acid
- (e) Yields a blue colour when positive

Q3. To make a buffer solution one needs: -
- (a) a weak acid and conjugate salt
- (b) strong acid and weak base
- (c) weak acid and conjugate acid
- (d) strong base and conjugate salt
- (e) strong acid and conjugate base

Q4. The non-sugar reducing substances which can be detected in urine include:-
- (a) Gluconic acid
- (b) creatinine
- (c) Urea
- (d) Uric acid
- (e) Diacetic acid

Q5. Gastric disorders may be diagnosed by:-
- (a) Acid level assessment
- (b) Hart’s test
- (c) Radiography
- (d) Clinical history
- (e) Acidaemia

Q6. Urea is formed in the body from:-
- (a) Acetyl- CoA
- (b) Uric acid
- (c) Ammonia
- (d) Carbamide
- (e) Proteins

Q7. Below their PI proteins:-
(a) Migrate as cations
(b) Migrate towards anode
(c) Are anions
(d) Move towards cathode
(e) Are dipolar

Q8. Harding's solution 'B' has:-
(a) Copper sulphate
(b) Alkaline tartrate
(c) Glucose oxidase
(d) Peroxidase enzyme
(e) Sodium sulphate

Q9. The direct reacting bilirubin is also:-
(a) Water insoluble
(b) Water soluble
(c) Alcohol soluble
(d) Toxic
(e) Non- conjugated

Q10. Gerhardt's reagent detects the presence of:-
(a) Acetic acid
(b) Dimethylketone
(c) Acetone
(d) Acetoacetic acid
(e) Diacetic acid

Q11. Gastric stimulants include:-
(a) Insulin
(b) Pentagastrin
(c) Glucagon
(d) Milk
(e) Enterokinase

Q12. Complexing bilirubin and diazo reagent yields:-
(a) Bilirubin glucoronide
(b) Reduced bilirubin
(c) Diazotised sulphanilic acid
(d) Biliverdin
(e) Azobilirubin

Q13. In the body biological catalysts are:-
- (a) Salt in nature
- (b) Enzymes
- (c) Hormones
- (d) Specific in activity
- (e) Inorganic

Q14. To preserve glucose standards one *can* use:-
- (a) Copper hydroxide
- (b) Tartrate solution
- (c) Ammonium oxalate
- (d) Thymol
- (e) Benzoic acid

Q15. A strong base has a pH of 11.8 what is its molarity:-
- (a) 0.3
- (b) 1.5
- (c) 2.2
- (d) 3.4
- (e) 0.006

Q16. Features associated with obstructive jaundice include:-
- (a) High direct bilirubin
- (b) Bilirubinuria
- (c) Elevated indirect bilirubin
- (d) Normal direct bilirubin
- (e) High urobilinogen

Q17. The PH of 0.001M HCl is
- (a) Above 3
- (b) Above 4
- (c) 3
- (d) Below 5
- (e) 11

Q18. Markers of bone metabolism include: -
- (a) Acid phosphatase
- (b) Calcium
- (c) Vitamin A
- (d) Phosphates
- (e) Corticoids

Q19. The body requires trace amounts of:
- (a) Amino acids
- (b) Tyrosine
- (c) Magnesium
- (d) Carbohydrates
- (e) Aldosterone

Q20. Carcinogenic reagents used in the laboratory include:-
(a) Guaiacum
(b) Methyl red
(c) Congo red
(d) Ortho-tolidine
(e) Clinitest tablet

Q21. A peptide chain consists of:-
(a) Amide bonds
(b) Glycosidic bonds
(c) Amino acid residues
(d) Hydrogen bonds
(e) Amides

Q22. If 20 ml of 80 mg/dl glucose standard is diluted to one litre, the resulting solution would be:-
(a) 16 mg/dl
(b) 1.6 mg/dl
(c) 1.6 mg/l
(d) 40 mg/dl
(e) 16 mg/l

Q23. Total proteins in CSF may be estimated using
(a) Maulemann's reagent
(b) Biuret reagent
(c) 22.6% sodium sulphate
(d) 3% Sulphosalysalic Acid
(e) Pandy's reagent

Q24. Buffering capacity:-
(a) Depends on the salts
(b) Is best above pK
(c) Is best near pK of buffer
(d) Is best below pK
(e) Depends on the acid

Q25. The following tests can be used to detect occult blood in stool:-
(a) Haematest
(b) Phenolphthalein
(c) Phenol hypochlorite
(d) Copper reduction
(e) Methylamine

12. In the indirect pregnancy kit method, agglutination is interpreted as
(a) Positive
(b) Negative
(c) False positive
(d) Not pregnant

(e) Pregnant

SECTION B: ESSAY (60 marks)

Q1. Write briefly on:-
(a) Sodium fluoride
(b) Pre-hepatic jaundice
(c) Glucagon
(d) Rothera's reagent

(20 marks)

Q2. State the principles behind the following tests:
(a) The estimation of urea using Diacetyl monoxime
(b) Estimation of tryptic activity in stool
(c) Detection of excess globulins in CSF using Pandy's reagent
(d) The Biuret reaction

(20 marks)

Q3. With the aid of a simple diagram, explain the working of a de-ioniser.

(20 marks)

MODEL PAPER 4

SECTION A: MCQS (40 marks)

Q1. The PH of a solution is given as 6, what is the concentration of a hydroxyl ion (OH-)?
(a) 0.000001
(b) 10^{6}
(c) 10^{-6}
(d) 10^{-8}
(e) 10^{8}

Q2. The percentage transmittance of solution who's OD = 0.7 is:
(a) 20%
(b) 40%
(c) 30%
(d) 50%
(e) 10%

Q3. 10 ml of 0.1 M NaOH neutralizes 5 ml of HCl the concentration of the acid is therefore:
(a) 2 M
(b) 0.2 M
(c) 0.1 M
(d) 0.02 M
(e) 0.5 M

Q4. Water, which is prepared by still apparatus, is:
(a) Sterile but has soluble salts
(b) Sterile and free from water soluble salts
(c) Not sterile but free from soluble salts
(d) Sterile and free from insoluble salts.
(e) Sterile only.

Q5. In flame photometry, specimen is sprayed into the burner by:
(a) Monochromator
(b) Photodetector
(c) Nebulizer
(d) Capillary tube
(e) Atomizer

Q6. Thin layer chromatography techniques are based on which principles:

(a) Partition and Adsorption
(b) Partition and Gel-filtration
(c) Gel-filtration and ion-exchange
(d) Absorption and Gel-filtration
(e) Absorption and Ion-exchange

Q7. Tetrabromphenol blue is an indicator used in:
(a) Clinitest
(b) Clinistix
(c) Albustix
(d) Ictostix
(e) Azostix

Q8. To make 8 ml of a 1 in 200 serum dilution, you need:
(a) 1 ml of serum
(b) 0.04 ml of serum
(c) 8 ml of serum
(d) 0.4 ml of serum
(e) 0.02 ml of serum

Q9. In pre-hepatic jaundice, indirect Bilirubin in serum is:
(a) Low
(b) Normal
(c) High
(d) Nil
(e) Not affected

Q10. In Schales and Schales method for Cl^- ion determination, the indicator used in the titration is:
(a) Diphenyl Carbazone
(b) Phenolphthalein
(c) Phenol red
(d) Methyl red
(e) Neutral red

Q11. The common test/s for detecting glucose, fructose and lactose in urine is/are:
(a) Clinistix
(b) Methylamine
(c) Osazone test
(d) Clinitest
(e) Benedict reagent

Q12. The following are ketone bodies formed as a result of loss of carbon dioxide?
(a) Aceto-acetic acid
(b) Acetone
(c) Beta-hydroxybutyric acid
(d) B – hydroxybutyric acid
(e) Ketones

Q13. Phenistix is a paper strip for detecting:
(a) Ketonemia
(b) Salicylates and phenylepyruvic acid
(c) Beta-hydroxybutyric acid and Salicylates
(d) Acetone and Acetoacetic acid
(e) Acetone and β- hydroxybutyric acid

Q14. Proteins are coagulated by heat in a slightly acid medium. Which acid is commonly used?
(a) 5% acetic acid
(b) 5% aceto-acetic acid
(c) 5% sulphosalicyclic acid
(d) 3% sulphosalicyclic acid
(e) Conc. nitric acid

Q15. Esbach's test is used to detect:
(a) Protein in urine
(b) Glucose in urine
(c) Ketones in urine
(d) Bence-Junes protein
(e) Salicylates in urine

Q16. Which of these products is/are structurally the same as stercobilinogen?
(a) Stercobilin
(b) Urobilinogen
(c) Indirect bilirubin
(d) Direct bilirubin
(e) Urobilin

Q17. Which of the following are characteristics of direct bilirubin, which assist in its estimation in serum?
(a) Conjugated
(b) Non-toxicity
(c) Water solubility
(d) Alcohol insoluble
(e) Alcohol soluble

Q18. Liebermann – Burchard method measures:-
(a) Triglyceride
(b) Cholesterol
(c) Lipids
(d) Steroids
(e) Proteins

Q19. Which of the following hormones are involved in gastric juice secretion?
(a) Rennin
(b) Pepsin
(c) Sucrose
(d) Trypsin
(e) Insulin

Q20. In paper electrophoresis, the serum protein is usually presented as:
(a) 4 bands
(b) 5 bands
(c) 6 bands
(d) 7 bands
(e) 8 bands

Q21. Lambert's Law relates transmitted light from a coloured solution to:
(a) Thickness of the solution
(b) Concentration of the solution
(c) Extinction of the solution
(d) Blank of the solution
(e) Specific gravity of the solution

Q22. Diazo reagent is composed of:
(a) Conc. Sulphuric acid
(b) Hydrochloric acid
(c) Sodium Nitrate
(d) 4-aminophenazone
(e) sulphosalicyclic acid

Q23. Mohr's indicator is:
(a) Ferric chloride
(b) Ferric Alum
(c) Potassium Dichromate
(d) Potassium chromate
(e) Ammonium thiocynate

Q24. The major extra cellular anion of the body is/are:
(a) Chloride
(b) Potassium
(c) Sodium
(d) Bicarbonates
(e) Calcium

Q25. Clinical condition caused by Hyperventilation is:
(a) Metabolic acidosis
(b) Metabolic alkalosis
(c) Respiratory acidosis
(d) Respiratory alkalosis
(e) Hyperglycaemia

Q26. Serum/plasma bicarbonate may be estimated by:
(a) Titrimetric method
(b) Turbidimetric method
(c) Colorimetric method
(d) Enzymatic method
(e) Photometric method

Q27. Amylase estimation may be used in diagnosis of:
(a) Acute pancreatitis
(b) Nephritic syndrome
(c) Salivary gland disorders
(d) Gastric disorders
(e) Hepatitis

Q28. The two diagnostically useful transaminases are:
(a) Glutamate Oxaloacetate transaminase
(b) Glutamate Pyruvate transaminase
(c) Oxoglutarate Pyruvate
(d) Aspartate aminotransferase
(e) Alanine amino-Oxaloacetate

Q29. When glucose and copper II solution react in an alkaline medium:
(a) The glucose is oxidized
(b) The copper II ions are reduced
(c) The glucose is reduced
(d) The glucose becomes an alkali
(e) A black/blue colour develops

Q30. Uric acid is the end product of:
(a) Nucleic acid metabolism
(b) Rbcs metabolism
(c) Protein metabolism
(d) Purine metabolism
(e) Wbc metabolism

Q31. Heller's test utilizes:
(a) Conc. HCl
(b) Conc. H_2SO_4
(c) Conc. HNO_3
(d) Conc. CH_3COOH
(e) Conc. Ammonia

Q32. Reduction of biliverdin yields:
(a) Indirect Bilirubin
(b) Direct Bilirubin
(c) Urobilinogen
(d) Stercobilinogen
(e) Glucoronic acid

SECTION B: ESSAY (60 marks)

1. Describe in detail the formation of Bilirubin and its derivatives (20 marks)

2. Briefly describe the following:
(a) Bence-Jones proteins (5 marks)
(b) Peptide Bonds (5 marks)
(c) Functions of CSF (List five) (5 marks)
(d) Why sucrose is non-reducing (5 marks)

3. State the principles of the following estimation methods
(i) Diacetyl monoxime for urea
(ii) Schales and Schales for chlorides
(iii) Jaffe's reaction for creatinine
(iv) Maulemann's test for CSF protein
(v) Urinary Amylase
(20 marks)

MODEL PAPER 5

SECTION A: M.C.Q. (40 marks)

Q.1. Parenteral stimulants include:
- a) Alcohol
- b) Insulin
- c) Milk less tea
- d) Gruel
- e) Pentagastrin

Q.2. Which of the following substances indicate physiological disorder if found in gastric juice
- a) Hydrogen ions
- b) Hydroxyl ions
- c) Mucus
- d) Bilirubin
- e) Trypsinogen

Q.3. The process of urea hydrolysis can be effected by:
- a) Alcohol
- b) Bicarbonates
- c) Phosphates
- d) Urease enzyme
- e) Metallic halides

Q.4. Biuret reaction involves co-ordination complex of copper ions with:
- a) 2 – CaOH
- b) 2 – OH
- c) 2 – C = O
- d) 2 – CONH
- e) 2 – NH_2

Q.5. The pH of 0.001 HCl is:
- a) 2
- b) 3
- c) 0.1
- d) 0.3
- e) More than 2

Q.6. Ion-free pure water may be prepared by:
a) Refrigeration
b) Distillation
c) De-ionisation
d) Decantation
e) Electrolysis

Q.7. The filters below were used to determine the optical densities of a coloured solution. The respective OD values were recorded accordingly. The best filter for that solution is:
a) Blue filter which gave O.D. = 0.3
b) Green filter which gave O.D. = 0.4
c) Red filter which gave O.D. = 0.5
d) Blue/green filter which gave O.D. = 0.6
e) Yellow filter which gave O.D. = 0.7

Q.8. The incomplete metabolism of fatty acids yields:
a) Acetoacetic acid
b) Urea
c) Oxaloacetate
d) Salicylates
e) Uric acid

Q.9. None-functional plasma enzymes include:
a) Amylase
b) Prothrombin
c) Coagulation factor V
d) Coagulation factor VII
e) Prostatic acid phosphatase

Q.10. The following is/are true about disaccharides:
a) Do not form crystalline solids
b) Are soluble in water
c) Are insoluble in water
d) Are hydrolysed by acids to form monosaccharide
e) Are not hydrolysed by acids

Q.11. The following is/are apparatus used in specific gravity determination:
a) Refractometer
b) Weighing balance
c) Colorimeter
d) Spectrophotometer
e) Absorptometer

Q.12. The main natural pathways of gastric juice stimulation involve:
- a) Dilute alcohol
- b) Tea without milk
- c) Gastrin
- d) Oat meal
- e) Vagus nerve

Q.13. The following substances may be tested for in urine in a suspected case of obstructive jaundice:
- a) Urea
- b) Sodium ions
- c) Chloride ions
- d) Bile salts
- e) Bilirubin

Q.14. Chemical reduction process involves:
- a) Electron gain
- b) Loss of electrons
- c) Loss of water molecule (H_2O)
- d) Loss of hydrogen molecules
- e) Gain of water molecules

Q.15. Simple lipids are derived from the following classes of organic compounds:
- a) Acetone
- b) Alcohol
- c) Carboxylic acids
- d) Esters
- e) Amines

Q.16. Reduced glucose tolerance results to:
- a) Hyperglycaemia
- b) Hypoglycaemia
- c) Diabetes mellitus
- d) Renal glycosuria
- e) Reduced renal threshold

Q.17. In Serum electrophoresis, Bence Jones proteins is found between:
- a) Alpha 1 globulin and albumin
- b) Alpha 2 globulin and Beta globulin
- c) Beta globulin and gamma globulin
- d) Cathode and gamma globulin
- e) Anode and alpha globulin

Q.18. In the presence of alkaline and heat, some sugars undergo re-arrangement reaction, this is the basis of:

a) Methyl amine test
b) Benedict's test
c) Seliwanoff's test
d) Bial's test
e) Osazone

Q.19. Ammonia gas couples with phenol-hypochlorite in the presence of sodium Nitroprusside forming blue colour; this is useful for the determination of:

a) Haemoglobin
b) Complex protein
c) Urea
d) Peptide bonds
e) Glycerol

Q.20. Which of the following instruments use a photo cell?

a) Ph meter
b) Colorimeter
c) Urinometer
d) Flame photometer
e) Refractometer

Q.21. In pre-hepatic jaundice, indirect bilirubin in plasma is:

a) Low
b) Normal
c) High
d) Nil
e) Below normal

Q.22. Urine pH measurement is externally influenced by:

a) Humidity
b) Pressure
c) Uncontrolled diabetes mellitus
d) Loss of CO_2
e) Temperature

Q.23. The following methods can be used in detection of heamoglobinuria:

a) Microscopy
b) Spectroscopy
c) Ph meter reading
d) Refractometry
e) Haemastin

Q.24. The renal threshold for urea is:
a) 1 mmol/L
b) 2 mmol/L
c) 0 mmol/L
d) 3 mmol/L
e) 4 mmol/L

Q.25. The relationship between transmitted light and thickness of curette is described by:
a) Lamberts law
b) Beers law
c) Beer – lamberts law
d) Law of mess action
e) Law of definite proportion

Q.26. Which of the following tests can be used to quantitative protein in urine?
a) Gerhardt's
b) 3% S.S.A.
c) Esbach's tube
d) Phenistix
e) Occultest

SECTION B: ESSAY (60 marks)

Q.1. Describe in detail the formation and degradation of Bilirubin (20 marks)

Q.2. Precisely state the principle of the following:
a) Hay's test
b) 3% Trichloroacetic test for C.S.F. proteins
c) Uricase method for plasma uric acid
d) Biuret for protein estimation
e) Glucose determination by glucose oxidase
(20 marks)

Q.3. a) Illustrate the formation of peptide bond

b) Explain the significance of Ketone bodies in urine

c) Calculate the % transmittance whose absorbance is 0.1.

d) Convert 110 mg% urea standard to mmol/L.
Show your calculations clearly
(5 marks each)

MODEL PAPER 6

SECTION A: MCQS (40 marks)

1. Van dar Waals forces are applicable in:
   (a) Chromatography
   (b) Electrophoresis
   (c) Flame photometry
   (d) Atomic absorptiometry
   (e) Get titration

2. In indirect pregnancy test, Agglutination is:
   (a) Positive test
   (b) Negative test
   (c) False negative test
   (d) False positive
   (e) Non- confirmatory

3. Bial's reagent for pentoses consists of the following:
   (a) Conc. sulphuric Acid
   (b) Conc. Nitric Acid
   (c) Orcinol
   (d) Conc. hydrochloric Acid
   (e) 10% Ferric chloride

4. Osazones reagent consists of the following chemicals:
   (a) Sodium acetate
   (b) Phenyl hydrazine hydrochloride
   (c) Zinc acetate
   (d) Sodium chloride
   (e) Mercuric chloride

5. The suitable method for detecting urinary urea is:
   (a) Urastrat method
   (b) Berthelot's method
   (c) Azostix
   (d) Diacetyl monoxime
   (e) Hypobromite method

6. Bradshaw's test detects:
   (a) Pentoses
   (b) Proteins
   (c) Reducing substances
   (d) Bence Jones proteins
   (e) Gamma globulins

7. Conversion of acetoacetate to beta-hydroxy butyric acid is a:
   (a) Reduction process
   (b) Oxidation process
   (c) Decarboxylation process
   (d) Redox process
   (e) De- acylation process

8. Which of the following is/are confirmatory test(s) for Bence Jones proteins?
   (a) Bradshaw's test
   (b) Layering method
   (c) Boiling method
   (d) Electrophoresis
   (e) Sulphosalicyclic Acid

9. Which of the following is/are associated with Ketonuria?
   (a) Diabetes Ketosis
   (b) Fasting
   (c) Strict protein diet intake
   (d) High carbohydrate
   (e) Prolonged dehydration

10. 10.0 ml of 0.4 M HCl will react with how many ml of 0.I M NAOH?
   (a) 4 litres
   (b) 400 ml
   (c) 40 ml
   (d) 4 ml
   (e) 0.04 litres

11. The optimum PH for acid phosphate estimation is:
   (a) 4.9
   (b) 6.0
   (c) 10.0
   (d) 9.8
   (e) 1

12. Which of the following substance will be reduced in plasma in liver failure?
   (a) Albumin
   (b) Urea
   (c) Creatinine
   (d) Uric acid
   (e) Transaminase

13. Which of the following substance/s can be used as a measure of Glomerular filtration rate?
   (a) Insulin
   (b) Creatinine
   (c) Glucose
   (d) Uric acid
   (e) Ammonia

14. Seliwanoff's test detects
    (a) Frutosuria
    (b) Pentosuria
    (c) Ketonuria
    (d) Glucosuria
    (e) Proteinuria

15. The indicator used in chloride estimation by Schales and Schales method is:
    (a) Diphenyl Carbazone
    (b) Potassium dichromate
    (c) Phenol red
    (d) Methyl red
    (e) Methyl orange

16. Dubosq is associated with:
    (a) Filtration
    (b) Distillation
    (c) Flame photometry
    (d) Atomic absorption
    (e) Colorimetry

17. Which of the following urea estimation method does not utilise urease enzyme?
    (a) Nesslerization method
    (b) Berthelot's method
    (c) Azostix method
    (d) Diacetyl monoxime method
    (e) Urastrat method

18. The importance of Methanol in Bilirubin estimation is to:
    (a) Convert indirect bilirubin to direct bilirubin
    (b) Provide an acid medium
    (c) Provide a suitable pH
    (d) Combines with the diazo reagent
    (e) Promote colour development

19. Which of the following vitamins is/are fat-soluble?
    (a) K
    (b) Thiamine
    (c) A
    (d) C
    (e) B12

20. Achlorhydria is associated with:
    (a) Pernicious anaemia
    (b) Lack of vitamin B_{12}
    (c) Vitamin C
    (d) Lack intrinsic factor
    (e) Lack of vitamin C

21. Which of the following is/are parenteral stimulants?
    (a) Dilute alcohol
    (b) Gruel
    (c) Pentagastrin
    (d) Tea without milk
    (e) Insulin

22. Colorimetry is associated with?
    (a) Thickness of coloured solution
    (b) Intensity of coloured solutions
    (c) Flame absorptiometry
    (d) Bear – Lambert's law
    (e) Flame photometry

23. Glucosuria could be due to:
    (a) Diabetes mellitus
    (b) Diabetes inspidus
    (c) Low renal threshold
    (d) High carbohydrate diet
    (e) High renal threshold

24. Which of the following are causes of false occult positive test?
    (a) Parasitic infection
    (b) Ulcers
    (c) Cancers
    (d) Presence of iron on glassware
    (e) Not abstaining from meat prior to testing

25. Which of the following is /are a cause of high specific gravity of urine?
    (a) Diabetes inspidus
    (b) Proteinuria
    (c) Ketonuria
    (d) Polyuria
    (e) Oliguria

26. Which of the following can be a cause of acid urine excretion?
    (a) Alkalosis
    (b) Diabetes inspidus
    (c) Fever
    (d) Hyperventilation
    (e) Asthma

SECTION B: ESSAY (60 marks)

Q1. Write briefly on:

(a) Functions of proteins in the body
(b) Fluoride anticoagulant
(c) Ketone bodies
(d) Principle of glucose estimation by glucose oxidation method

(20 marks)

Q2. (a) Outline the urea cycle (flow diagram) (10 marks)

(b) Calculate the creatinine clearance given the following

- Serum creatinine = 1.4 mg/dl
- Urine " = 8.4 "
- Urine volume = 40 ml in 20 minutes

(10 marks)

Q3. (a) Briefly write on buffers

(5 marks)

(b) Outline the indirect method of pregnancy testing

(5 marks)

(c) Calculate the concentration in Mol/L and in g/L of 20 ml sodium hydroxide which will neutralize 30 ml of 0.4M sulphuric acid?

(10 marks)

MODEL PAPER 7

SECTION A: MCQ (40 marks)

1. Reference range of K^+ in serum is
(a) 136 – 148MEq/L
(b) 3.8 – 5.0 MEq/L
(c) 4.2 – 7.3 MEq/L
(d) 3.8 – 5.0 mmol/L
(e) 136 – 148 mmol/L

2. Reference range of Na^+ in serum is
(a) 136 – 148MEq/L
(b) 3.8 – 5.0 MEq/L
(c) 4.2 – 7.3 MEq/L
(d) 3.8 – 5.0 mmol/L
(e) 136 – 148 mmol/L

3. A Polysaccharide made up of glucose units only is
(a) Oligosaccharide
(b) Inulin
(c) Starch
(d) Sucrose
(e) Maltose

4. Reduction of Bilirubin yield
(a) Urobilinogen
(b) Uric acid
(c) Stercobilinogen
(d) Biliverdin
(e) Urobilin

5. Bial's reagent is composed of
(a) Sulphuric acid
(b) Citric acid
(c) Ferric Chloride
(d) Orcinol
(e) Resorcinol

6. 10mg% Urea can also be reported as
(a) 2.76mmol/L
(b) 1.70mmol/L
(c) 2.66mmol/L
(d) 10mmol/L
(e) 1.63mmol/L

7. Pentose/s include
(a) Fucose
(b) Mannose
(c) Galactose
(d) Arabinose
(e) Trihexose

8. Chief cation in ICF is
(a) Bicarbonate
(b) Sodium
(c) Potassium
(d) Manganese
(e) Chloride

9. Characteristic/s of enzymes include
(a) Specificity
(b) Reaction at 37oC
(c) Resisting UV denaturation
(d) Sensitivity to PH
(e) Inhibition by fluorine

10. Flame- photometry can be used in the estimation of the following electrolyte/s
(a) Manganese
(b) Sodium
(c) Potassium
(d) Magnesium
(e) Calcium

11. Uric acid is normally oxidized by
(a) Peroxidase
(b) Allantoin
(c) Glucoronyl
(d) Uricase
(e) Esterase

12. Uric acid estimation is indicated in
(a) Leukaemia
(b) Certain anaemia
(c) Muscle wasting diseases
(d) Diabetes mellitus
(e) Gouty arthritis

13. Blood glucose is directly regulated by
(a) T3 and T4
(b) Cortisol
(c) Epinephrine
(d) Insulin
(e) Glucagon

14. A positive Hays' test on a Urine specimen usually indicate
    (a) Glucose is present
    (b) No bile salts
    (c) Anuria
    (d) Surface tension is very low
    (e) Salts of cholic acid could be present

15. Ketosis is usually associated with
    (a) Diabetes mellitus
    (b) Leukaemia
    (c) Carbohydrate starvation
    (d) Anuria
    (e) Nephritis
16. Benzoic acid and its salts is normally used to
    (a) Add colour to solution
    (b) Act as preservative
    (c) Acidify solution
    (d) Reduce precipitation
    (e) Stop glycolysis

17. The enzyme amylase is elevated in diseases of
    (a) Heart
    (b) Pancreas
    (c) Liver
    (d) Brain
    (e) Salivary glands

18. Fluoride cannot be used in the assay of
    (a) Glucose
    (b) Acid Phosphatase
    (c) Urea
    (d) Uric acid
    (e) Amylase

19. Bone metabolism is associated with
    (a) Phosphorus
    (b) Urea
    (c) Cholesterol
    (d) Calcium
    (e) Amines

20. There is practically no glucose in urine because
    (a) It is not filtered through the glomerulus
    (b) It is retained in the bladder
    (c) It oxidized in the medulla
    (d) It is used in the loop of Henle
    (e) It is absorbed in the convoluted tubules

21. Separation and identification of different sugars in a Urine sample is best achieved by
    (a) Electrophoresis
    (b) Fermentation
    (c) Ion-exchange
    (d) Western blot
    (e) Chromatography

22. Oxidative deamination in Protein metabolism yield
    (a) Uric acid
    (b) Urea
    (c) Ammonia
    (d) Carbamide
    (e) Ketogenic amino acids

23. Wallace diamond test give a red colour with
    (a) Urobilin
    (b) Urobilinogen
    (c) Bilirubin
    (d) Porphobilinogen
    (e) Biliverdin

24. A pale coloured Urine probably indicate
    (a) Glucose is present
    (b) Protein is present
    (c) Urine is dilute
    (d) Urine is concentrated
    (e) Urine is contaminated

25. The concentrating power of the Kidney can be routinely evaluated by analyzing the level of
    (a) Uric acid
    (b) Glomerular filtrate
    (c) Creatinine
    (d) Potassium
    (e) Bilirubin

SECTION B: ESSAY (60 marks)

1. (a) Explain how 400mls of each of the following mixtures of standards can be prepared from 1 mole/L of NaCL and 0.1mole/L KCl solutions.

Na+ mmol/L	120	140	160
K+ mmol/L	3	5	6

(10 marks)

(b) Define the 'IU unit of enzyme activity' and list at least seven (7) assay conditions considered during the assay.

(10 marks)

2. With the aid of a well labelled diagram, describe how a Colorimeter works

(20 marks)

3. Discuss the following principles: -

(a) Cholesterol estimation.
(b) Creatinine estimation
(c) Uric acid estimation
(d) Bilirubin estimation using diazo reagent
(e) Blood glucose estimation using Alkaline Copper reduction method

(20 marks)

MODEL PAPER 8

SECTION A: MCQ (40 marks)

1. The following are functions of the Kidney**:-**
- (a) Removal of excess proteins
- (b) Maintain acid-base equilibrium
- (c) To rid the body of excess glucose
- (d) Removes waste products of metabolism
- (e) Detoxification of bilirubin

2. The final colour of urine is due to
- (a) Ammonia
- (b) Creatinine
- (c) Creatine
- (d) Urochrome
- (e) Urea

3. The following are Rothera's reagents
- (a) Benedict's reagent
- (b) Sodium Sulphate
- (c) Hydrochloric acid
- (d) Sodium nitroprusside
- (e) Ammonium Sulphate

4. Increase in blood glucose is known as
- (a) Hypoglycaemia
- (b) Diabetes Inspidus
- (c) Hyperglycaemia
- (d) Acidaemia
- (e) Diabetes mellitus

5. The following are serum protein fraction/s
- (a) Amylase
- (b) Albumin
- (c) Globulin
- (d) Lipid
- (e) Fibrinogen

6. Urine is formed using the following principles
- (a) Absorption
- (b) Adsorption
- (c) Simple filtration
- (d) Krebs's cycle
- (e) Selective reabsorption

7. 50% transmittance of a solution give an OD of
   (a) 0.5
   (b) 0.4
   (c) 0.3
   (d) 0.2
   (e) 0.1

8. The PH of a 0.0001M HCL is
   (a) 1.0
   (b) 2.0
   (c) 3.0
   (d) 4.0
   (e) 5.0

9. The Lieberman-Burchard reaction is associated with
   (a) Cholesterol estimation
   (b) Bilirubin determination
   (c) Uric acid estimation
   (d) Protein estimation
   (e) Acid Phosphatase

10. Bloor's reagent is used in the estimation of
   (a) Blood sugar
   (b) Cholesterol
   (c) Uric acid
   (d) Bilirubin
   (e) Lipids
11. Surface tension of urine is lowered by
   (a) Amino acids
   (b) Bile salts
   (c) Thymol
   (d) Glucose
   (e) Chloride

12. Optical Density is calculated by the formulae
   (a) 2 + log %T
   (b) 2 – log %T
   (c) Log T – 2
   (d) Log T
   (e) Log 1 – 00 – Log%T
13. The common principles in Chromatography includes:
   (a) Adsorption
   (b) Partition
   (c) Absorption
   (d) Malabsorption

(e) Saponification

14. In pre-hepatic jaundice, indirect bilirubin is
    (a) Low
    (b) Normal
    (c) High
    (d) Nil
    (e) Above normal

15. Uric acid may increase abnormally in plasma due to
    (a) Renal fructose
    (b) Gout
    (c) Ulcers
    (d) Diarrhoea
    (e) Intake of purine

16. Acid/Base titrations are based on
    (a) Reduction
    (b) Neutralization
    (c) Oxidation
    (d) Redox
    (e) Precipitation

17. Lamberts law relates transmitted light of a coloured solution to
    (a) Thickness of the solution
    (b) Concentration of the solution
    (c) Extinction
    (d) Blank
    (e) Specific gravity

18. Which of the following is true about the indirect bilirubin
    (a) Water soluble
    (b) Conjugated
    (c) Non-toxic
    (d) Protein bound
    (e) Alcohol soluble

19. Bial's test will be negative with the following
    (a) Sucrose
    (b) Pentose
    (c) Xylose
    (d) Fucose
    (e) Glucose

20. A fasting blood glucose level of 14.0 mmol/L is
    (a) Above normal
    (b) 140mg/dl
    (c) Suggestive of diabetes mellitus
    (d) Below normal

(e) Considered normal

21. Proteins can be semi-quantitated in urine using
    (a) Esbach's tube
    (b) Gerhardt's reagent
    (c) Albustix
    (d) Hay's test
    (e) Acetic acid reagent

22. Indicators are either …… or ….
    (a) Buffers
    (b) Strong acids
    (c) Weak bases
    (d) Weak acids
    (e) Strong bases

23. The normal concentration of blood glucose by oxidase method under fasting condition is
    (a) 50 – 150 mg%
    (b) 50 – 90mg%
    (c) 80-120mg%
    (d) 80-180mg%
    (e) 2.8-5.0mmols/L

24. Some of the common urine preservatives includes
    (a) Hypochlorite
    (b) Dichromate
    (c) Ammonia
    (d) HCl
    (e) Thymol

25. In paper Chromatography, the stationary phase is
    (a) Paper
    (b) Solvent molecules
    (c) Urate molecules
    (d) Elutanant
    (e) Non-polar

26. A carcinogenic chromogen system is
    (a) O – tolidine
    (b) Arsenomolybdic acid
    (c) Phosphomocybdic acid
    (d) Gluconic acid
    (e) Guaiacum

27. Bence Jones proteins can be detected by
    (a) Concentrated hydrochloric acid
    (b) 33% Diacetic acid
    (c) Urastrat strip
    (d) Hay's test
    (e) 3% TCA

SECTION B: ESSAY (60 marks)

1. State the principle behind the estimation of activity for the following enzymes in a serum sample

    (a) Alkaline Phosphatase (by King Armstrong)
    (b) SGPT
    (c) SGOT
    (d) Amylase

(20 marks)

2. Write briefly on Na+, K+ and HCo3 electrolytes (to include the normal values)
(20 marks)

3.
    (a) State all the parameters to be included when reporting Lipid Profile.
(5 marks)
    (b) Convert a cholesterol value of 200mg% to the current reporting units. And state the Reference range (in the same reporting unit) (4 marks)
    (Molecular wt = 386.64)
    (c) An adult female produced 1.6L of Urine in 24 hr. Urine Urea value was 80 mmol/L while blood Urea was 5.5 mmol/L.

        i. Calculate the Urea clearance and
        ii. Comment on the results

(8 marks)

    (d) Given the PH of HCl is 1.6988, calculate its molar concentration
(3 marks)

CLINICAL CHEMISTRY PAPER 9

SECTION A: M.C.Q. (40 MARKS)

Q.1. Bilirubin in the body originates from:
- (a) Red Blood cells
- (b) White Blood cells
- (c) Platelets
- (d) Plasma cells
- (e) Haemoglobin

Q.2. Caffeine benzoate reagent in Jendrassik and Grof method is used to:
- (a) Convert bilirubin to azobilirubin
- (b) Provide the alkaline medium
- (c) Provide the acidic medium
- (d) Accelerate the conversion of bilirubin to azobilirubin
- (e) Remove turbidity

Q.3. A green filter has a wavelength of:
- (a) 540 nm
- (b) 600 nm
- (c) 470 nm
- (d) 700 nm
- (e) 630 nm

Q.4. The main serum protein fractions are:
- (a) Albumin
- (b) Fibrinogen
- (c) Globulin
- (d) Haemoglobin
- (e) Globin

Q.5. Serum urea value of 60 mg/dl is considered:
- (a) Normal
- (b) Increased
- (c) Decreased
- (d) 10 mmol/L
- (e) 60 mmol/L

Q.6. The role of peroxidase enzyme in the glucose oxidase method is to:
- (a) Oxidise glucose
- (b) Develop the colour
- (c) Oxidise hydrogen peroxide
- (d) Liberate oxygen
- (e) Combine with oxygen

Q.7. C.S.F. Chloride levels are high compared to blood because:
- a) They balance ionic charges
- b) Protein levels are low
- c) Sodium levels are high
- d) Sodium levels are low
- e) They have no function in the C.S.F.

Q.8. A C.S.F. glucose level of 4.0 mmol/l by alkaline copper reduction method is:
- a) Normal
- b) Above normal
- c) Below normal
- d) 40 mg/dl
- e) 72 mg/dl

Q.9. Glucose oxidase test is:
- a) Colour reaction
- b) Enzyme test
- c) Osazone test
- d) Fermentation test
- e) Copper test

Q.10. Excess globulins in C.S.F.may not be detected by:
- a) Mac lagan method
- b) Maulemann's reagent
- c) Pandy's test
- d) Nonne – Apelt's test
- e) 3% Trichloroacetic acid

Q.11. Seliwanoff's reagent is composed of:
- a) NaOH
- b) HCl
- c) Orcinol
- d) $H_2 SO_4$
- e) Resorcinol

Q.12. Excess acetyl COA during the breakdown of fate forms:
- a) Glucose
- b) Carbon monoxide
- c) Acetoacetic acid

d) Cholesterol
e) Oxygen

Q.13. Rothera's reagent is composed of:
a) Dilute Ammonia
b) Ammonium Sulphate
c) Ammonium Carbonate
d) Ferric Chloride
e) Sodium Salicylate

Q.14. Large amounts of sodium urates in urine may be suggestive of:
a) Hepatitis
b) Renal failure
c) Muscle damage
d) Diabetes mellitus
e) Gout

Q.15. Creatinine is formed in the body as a result of:
a) Loss of methyl group
b) Loss of Phosphoric acid
c) Loss of Carbon dioxide
d) Loss of water
e) Loss of Ammonia

Q.16. The clinician assesses the degree of renal failure by the results of:
a) Urea
b) Cholesterol
c) Creatinine
d) Uric acid
e) Ammonia

Q.17. The electrolyte most useful in acid – base balance is:
a) Na^+
b) K^+
c) HCO^-_3
d) Cl^-
e) Mg^{2+}

Q.18. The diluent of choice in serum electrolyte determination is/are:
a) Distilled water
b) Deionised water
c) Isotonic saline
d) Tap water
e) Normal saline

Q.19. In which class of enzymes does amylase belong?
a) Transferase
b) Isomerase
c) Hydrolase

d) Dehydrogenase
e) Lyase

Q.20. Which of the following method may estimate Uric acid:
a) Somogyi
b) Asatoor and King
c) Uricase
d) Brown's
e) Armstrong

Q.21. Hay's test is used to detect:
a) Bile salts
b) Fructose
c) Glucose
d) Sodium deoxycholate
e) Acetoacetic acid

Q.22. Clinistix contain the following enzymes:
a) Hydrogen peroxide
b) Peroxidase
c) Glucose oxidase
d) Transaminase
e) Catalase

Q.23. Complete breakdown of fats yields:
a) Ketones
b) Energy
c) Phosphoric acid
d) Cholesterol
e) A.T.P.

Q.24. Polycythaemia is associated with elevation of:
a) Glucose
b) Creatinine
c) Uric acid
d) Cholesterol
e) Urea

Q.25. Which of the following is absent in serum?
a) Albumin
b) Fibrinogen
c) Globulin
d) Urea
e) Creatinine

SECTION B: ESSAY (60 MARKS)

Q.1. Convert systematically the following C.S.F. values and comment.

a) 9 mg/dl urea to mmol/l
b) 150 mg/dl glucose to mmol/l
c) 800 mg/dl CL^- (as NaCl) to mmol/l
d) 355 mg/dl CL^- (as CLl^-) to mmol/l (20 marks)

Q.2. Describe the formation and excretion of ketones. (20 marks)

Q.3.

(a) Write down the principles underlying each of the following determinations:
i) Uric acid
ii) Creatinine
iii) Serum electrolytes (10 marks)

b) Discuss reducing substances. (10 marks)

CLINICAL CHEMISTRY PAPER 10

SECTION A: MCQ (40marks)

Q.1 Isotopes of an element have:

a) Same number of neutrons
b) Different number of neutrons
c) Same number of protons
d) Same atomic weight
e) Same atomic mass

Q.2. 0.1 N NaOH is made by dissolving:

a) 40 g in 1 litre
b) 0.5 g in 125 ml
c) 0.1 g in 100 ml
d) 2 g in 500 ml
e) 1g in 1 litre

Q.3. A control in Clinical Chemistry is:

a) A solution of known concentration
b) A solution of known reference range
c) A solution without a known concentration
d) A solution used to calibrate a machine
e) Same as a standard solution

Q.4. Glucose Tolerance Test is done:

a) To confirm if one is medically fit
b) To assess liver efficiency
c) To assess pancreatic efficiency
d) To confirm kidney dysfunction
e) To confirm Diabetes Inspidus

Q.5. Bile salts are important in:

a) Digestion of proteins
b) Digestion of carbohydrates
c) Absorption of fat-soluble vitamins
d) Absorption of water-soluble vitamins
e) Absorption of fats

Q.6. The presence of amylase in urine is due to:

a) Nephrotic syndrome
b) Liver problem
c) Impaired digestion
d) Mumps
e) Pancreatitis

Q.7. Seliwanoff's test is positive with:

a) Maltose
b) Galactose
c) Sucrose
d) Lactose
e) Fructose

Q.8. The presence of Bence Jones proteins in urine is due to:

a) Nephrotic syndrome
b) Low molecular weight
c) Multiple myeloma
d) Liver failure
e) Liver cirrhosis

Q.9. A technique for separating sugars is:

a) Electrophoresis
b) Chromatography
c) Ultracentrifugation
d) Decanting
e) Fermentation

Q.10. Diabetes mellitus is associated with:

a) Impaired glucose metabolism
b) Poor appetite
c) Glucosuria
d) Anuria
e) Low renal threshold

Q.11. Achlorhydria is associated with:

a) Pernicious anaemia
b) Poor absorption of Vitamin B_{12}
c) Indigestion
d) Poor night vision
e) Beri- Beri

Q.12. Hydrochloric acid in gastric juice is important in:

a) Converting pepsin to pepsinogen
b) Providing an acid medium for protein digestion
c) Converting pepsinogen to pepsin
d) Buffering of the gastric contents
e) Overcoming alkalinity provided by mucus

Q.13. Occult blood test detects:

a) Invisible blood
b) The amount of blood host in urine
c) Malignancies of Gastro-Intestinal tract
d) Peroxidase activity
e) Presence of dyes in stool

Q.14. Which of the following compounds are carcinogenic?

a) Phenolphthalein
b) Benzidine
c) Ortho-tolidine
d) Guaiacum
e) Hydrogen peroxide

Q.15. High Cerebral Spinal Fluid sugar may be due to:

a) Diabetes mellitus
b) Diabetes inspidus
c) Bacterial infection
d) High blood sugar
e) High glucose synthesis

Q.16. The pH of Hydrochloric acid whose concentration is 0.0002 M is:

a) 2.0.
b) 4.0
c) 3.699
d) 2.699
e) 4.8

Q.17. One of the urea estimation techniques does not employ urease:

a) Berthelot's method
b) Nesslerization method
c) Urastrat method
d) Enzymatic kinetic method
e) Diacetyl monoxime method

Q.18. Methanol, in bilirubin determination:

a) Coverts direct bilirubin to total bilirubin
b) Coverts indirect bilirubin to direct bilirubin
c) Couples with bilirubin to form a purple colour
d) Stops the reaction between bilirubin and diazo reagent
e) Stabilizes the purple colour

Q.19. Peptide bonds in protein:

a) React with Biuret reagent in protein determination
b) Link up Amino Acids to form peptides
c) Are charged and cause proteins to move in electrophoresis

d) Cause coagulation when proteins are heated
e) Cause separation of proteins in Electrophoresis

Q.20. False low bilirubin levels could be due to:
a) Liver failure
b) Use of ethanol
c) Exposure of samples to light
d) Poor separation of samples
e) Use of clotted samples

Q.21. Pandy's test detects:
a) Excess globulins
b) Excess albumin
c) Serum proteins
d) α - Amylase
e) Lipoproteins

Q.22. Conversion of Biliverdin to bilirubin is a:
a) Oxidation process
b) Reduction process
c) Hydrolysing process
d) Polymerization process
e) Cleavage process

Q.23. Amino acids at their isoelectric pH are:
a) Negatively charged
b) Positively charged
c) Have both a negative and a positive charge
d) Termed as zwitterions
e) Move towards the cathode

Q.24. Keto- acidosis is often associated with:
a) Diabetes mellitus
b) Diabetes inspidus
c) Diarrhoea and vomiting
d) Haemorrhage
e) Incompatible blood reactions

Q.25. Titrimetric analysis can be used in the estimation:
a) Chlorides
b) Proteins
c) Glucose
d) Creatine
e) Urea

SECTION B: ESSAY 60 MARKS

Q.1. Give the principle of the following tests:

a) Glucose oxidase method (5 marks)

b) Protein estimation by Biuret method (5 marks)

c) Creatinine estimation by Jaffe method (5 marks)

d) Determination of occult blood by phenolphthalein method (5 marks)

Q.2. Covert the following values into mmoles/L and comment on the results

a) 80 mg/dl of urea (5 marks)

b) 400 mg/dl glucose (5 marks)

c) 0.85 g/dl NaCL solution (5 marks)

d) 4 mEq/L Calcium (5 marks)

(Molecular mass H=1; C=12; N=14; O=16; Na=23; Cl=35.5; Ca 40)

Q.3. With the aid of a well labelled diagram of a Colorimeter:

a) Describe the function of each part

b) State Beer's Law and Lambert's Law

(20 marks)