

a) M.C.Q: 40 MARKS

Q1. An immune response depends on:

- Sex
- Race
- Altitude
- Immunogenecity
- Dose of antigen

Q2. Nucleated cells involved in fighting infections and making antibodies are called?

- a) lymphocytes
- b) Thrombocytes
- c) Histiocytes
- d) Mast cells
- e) Erythrocytes

Q3. The force at the boundary of shear due to differences in electrostatic potential is called:

- Ionic cloud
- Slipping plane
- Dielectric constant
- Zeta potential
- Isoelectric point

Q4. An antibody with unknown antigenic stimulus is called?

- a) Heterophile antibody
- b) Natural antibody
- c) Monoclonal antibody
- d) Irregular antibody
- e) Anti-complement

Q5. Low ionic strength saline (LISS) is preferred more than isotonic saline because:

- a) Cells suspended in it rarely lyse compared with isotonic saline
- b) It decreases the chances of abnormal antigen-antibody interactions
- c) It is cheaper than isotonic saline
- d) It increases rapid uptake of antibodies on to red cells
- e) It requires shorter incubation time

Q6. Antibodies that do not cause agglutination of cells are:

- (a) Unblocking
- (b) Complete antibodies
- (c) Sensitizing antibodies
- (d) Incomplete antibodies
- (e) Saliva agglutinins

Q7. Which of these components are synthesized in the liver:

- C9
- C4
- C2
- C6
- C1

Q8. The following has the capacity to activate the C1 _q, _r, _s assembly:

- (a) Ig A
- (b) Ig E
- (c) Ig M
- (d) Ig D
- (e) C₄

Q9. "H" and "A" genes, code for the addition of:

- a) D - galactose
- b) N- acetylgalactosamine
- c) Fructose
- d) L - fucose
- e) N- acetylglucosamine

Q10. Candidates for Rhogam must satisfy the following conditions:

- (a) The mother must be Rh Positive
- (b) The newborn must be Rh Positive and jaundiced
- (c) The mother must be Rh Negative
- (d) The mother must be Rh Negative and antibody screening positive
- (e) The mother must be Rhesus Positive with high titre of anti-D

Q11. Given the phenotype as D^cE. The following are possible genotype:

- a) R₂ r''
- b) R₀R₂
- c) R₂ r'
- d) R₂ R₂
- e) R₂ R_Z

Q12. Incidence of rouleaux formation is higher in patients suffering from:

- (a) Malaria
- (b) Kala-azar
- (c) Trachoma
- (d) Dysentery
- (e) Multiple myeloma

Q13. Avidity refers to:

- (a) Strength of an antibody
- (b) Type of an antibody
- (c) Concentration of the antigen
- (d) False positive
- (e) Time taken for the reaction to occur

Q14. Which of the following is correct about O^h phenotype:

- a) A,B genes are always absent
- b) The 'H' gene is absent
- c) The 'h' gene is absent
- d) RBC's carry only 'H' antigens
- e) The serum contains anti-A,anti-B,anti-H

Q15. The source of lectin anti-A₁ is:

- (a) *Dolichos biflorus*
- (b) *Iberis amara*
- (c) *Lotus tetragonolobus*
- (d) *Vicia graminea*
- (e) *Ulex europeaus*

Q16. Serum from group B agglutinates

- a) A₂ cells
- b) O cells
- b) B cells
- c) O^h cells
- d) A₁ cells

Q17. The albumin - 37°C phase of cross-match will detect the following

antibodies:

- (a) Regular anti-A and anti-B
- (b) Immune anti-A and anti-B
- (c) Rhesus antibodies
- (d) Anti-P.
- (e) Anti-M.

Q18. Low grade D^u:

- (a) Can be considered as Rh-negative donor.
- (b) Can be falsely typed as Rh Negative
- (c) Is easily detected using saline anti-D
- (d) Is considered as an Rh Positive donor
- (e) Is not easily detected using Anti-human Globulin

Q19. When natural antibody A is mixed and incubated with its corresponding blood group specific substance, the following takes place.

- a) Agglutination
- b) Inhibition of Anti-A
- c) Haemolysis
- d) Precipitation
- e) Neutralization of Anti-A

Q20. Which of these blood group systems can cause haemolytic disease of the

Newborn:

- (a) Kell
- (b) MN
- (c) Kidd
- (d) P
- (e) Xg

Q21. Washed red cells are indicated in:

- a) Severe anaemia
- b) Platelet deficiency
- c) Bleeding disorders
- d) Patient with leukocyte antibodies
- e) Protozoal injections

Q22. The Anti-human Globulin phase in antibody screening test detects:

- (a) Incomplete antibodies
- (b) Cold antibodies
- (c) Natural antibodies
- (d) Antibodies that react at 4°C
- (e) Iso-antibodies

Q23. Which of these is included in the CPDA, solution:

- (a) Sodium chloride
- (b) Adenine
- (c) Glycerol
- (d) Arabinose
- (e) Fructose

Q24. Which of these blood group systems exhibits dosage effect:

- (a) ABO
- (b) Lewis
- (c) Rhesus
- (d) MNSs
- (e) P system

Q25. Mulberry-like agglutination is characteristic of:

- (a) Lewis system
- (b) Kell system
- (c) MNSs system
- (d) Lutheran system
- (e) P system

Q26. Which of these may bar a volunteer donor:

- (a) Recent history of vaccination
- (b) Age 18-65
- (c) Good physique
- (d) Hb concentration of 13 g/dl
- (e) The last donation was four months ago

Q27. Which of these changes occur in refrigerated blood:

- (a) Red cells become more viable
- (b) The plasma becomes xanthochromic
- (c) Red cells lose viability
- (d) The effect of anticoagulant improves
- (e) The dextrose level becomes elevated

- Q28. Synthetic plasma expanders in serum may cause:
- (a) Haemolysis
 - (b) Elution
 - (c) Sensitization
 - (d) Agglutination
 - (e) Rouleaux formation

ESSAY QUESTIONS: 60 MARKS

- Q1. Write in detail on laboratory investigations of a suspected transfusion reaction.
(20 marks)
- Q2. Describe the factors that will influence an antigen-antibody reaction in vitro:
(20 marks)
- Q3. Write short notes on the following:
Rhesus null
Universal donor
Kidd blood group system
Exchange transfusion (20 marks)
1. The cellular immunity is associated with: -
 - (a) transfusion reaction
 - (b) Dysuria
 - (c) Hypersensitivity
 - (d) Homograft rejection
 - (e) Production of antibodies
 2. The characteristics of a natural antibody are/is: -
 - Incomplete antibodies
 - Complete antibodies
 - Are about 11,000 Å length
 - Length usually 250 Å
 - Can cross the placental barrier
 3. Blood group specific substance of secretors: -
 - (a) Are found in saliva
 - (b) Occur on the surface of RBCs
 - (c) Are controlled by Se - gene
 - (d) Are common causes of transfusion reaction
 - (e) Are found only in adults

4. The individuals have phenotype A_2 which of the following are the possible genotypes: -
- a) A_2B
 - b) A_3O
 - c) A_2A_2
 - d) A_1O
 - e) A_1A_1
5. Haptens: -
- (a) Are antigens with high antigenicity
 - (b) Will cause production of antibodies in individual lacking it
 - (c) Are antigens with little antigenicity
 - (d) Have no specificity
 - (e) Are mainly non-red cell antigens found in body fluids
6. The conversion of CI to its active form requires not only the presence of antigen-antibody complex but also the availability of: -
- a) Mg^{++}
 - b) Na^+
 - c) K^+
 - d) Ca^{++}
 - e) Cl^- ions
7. The complement components are synthesised in the: -
- (a) Bone marrow
 - (b) Liver
 - (c) Spleen
 - (d) Lymph nodes
 - (e) Kidneys
8. Heating human serum at $56^\circ C$ for 30 min is
- a) Meant to coagulate immunoglobulins
 - b) To inactivate complement
 - c) To enhance the antibody activity
 - d) To inactivate proteases
 - e) To inhibit bacterial growth

9. Given the phenotype as DC^ce. The following are possible genotypes: -
 - (a) R₁r
 - (b) Rr''
 - (c) R⁰R⁰
 - (d) R²R²
 - (e) R¹R⁰

10. If a woman is Rh-Negative and her husband is Heterozygous for D antigen then the probability that one of their children will inherit D is: -
 - a) 75%
 - b) 60%
 - c) 50%
 - d) 80%
 - e) 90%

11. The anti E will react with which of the following red blood cells
 - (a) R^zr^y cells
 - (b) R¹r cells
 - (c) R¹R¹ cells
 - (d) R¹r cells
 - (e) R^zR² cells

12. Anti rh'' will agglutinate the following cells.
 - a) r'r'
 - b) R⁰r
 - c) R¹r
 - d) R^zR¹
 - e) r''r¹

13. The following features are found in Haemolytic disease of the Newborn due to anti D.
 - (a) Low bilirubin levels
 - (b) High Haemoglobin levels
 - (c) Low reticulocyte count
 - (d) Increased osmotic fragility
 - (e) Decreased osmotic fragility

14. The risk of kernicterus is greatest infants with serum bilirubin level in excess of:-
 - a) 340 mol/l
 - b) 342 mol/l
 - c) 240 mol/l

- d) 684 mol/l
 - e) 245 mol/l
15. The blood for exchange transfusion in cases of haemolytic disease of the Newborn should:-
- (a) Use maternal blood for cross-match
 - (b) Use maternal serum for cross-match
 - (c) Use donor's serum for cross-match
 - (d) Not be more than 5 days old
16. A suspected case of haemolytic transfusion reaction would be confirmed with the presence of:-
- a) elevated levels of alkaline phosphates
 - b) elevated levels of plasma haemoglobin
 - c) an increase of platelets
 - d) free phosphates in urine
 - e) free haemoglobin in urine
17. In acute transfusion reaction.
- (a) some antibodies may be bound on patient's RBC's
 - (b) IGA antibodies will be detected as the cause
 - (c) Leucocytosis occurs
 - (d) The haptoglobin level is decreased
 - (e) The recipient dies of transfusion overload
18. In extra vascular transfusion reaction, cell destruction occurs in the:-
- a) Liver
 - b) Spleen
 - c) Brain
 - d) Bone marrow
 - e) Heart
19. Which of the following antibodies can cause extravascular transfusion reactions.
- (a) Lewis
 - (b) Lutheran
 - (c) ABO
 - (d) Kell
 - (e) Rhesus
20. If the father is Xg positive, and the mother is Xg Negative:-
- a) All children will be Xg positive

- b) All sons will be Xg Negative
 - c) Half of his daughters will be Xg positive
 - d) Half of his sons will be Xg Negative
 - e) All daughters will be Xg positive
- 21. The following blood group antigens may be found in the body fluids:-
 - (a) Rhesus
 - (b) Kell
 - (c) Duffy
 - (d) Lewis
 - (e) Lutheran
- 22. The Dosage effect is particularly demonstrated on red cells from blood groups.
 - ABO blood group system
 - MN blood group system
 - Duffy blood group system
 - Rhesus blood group system
 - Lewis blood group system
- 23. The following techniques are used for the screening of hepatitis B surface antigen in blood bank
 - (a) Radio immunoassay
 - (b) Counter-immunoelectrophoresis
 - (c) Elution-absorption method
 - (d) Absorption-inhibition method
 - (e) Sandwich method

ESSAY

Q1. Differentiate between the Ig G and Ig M Immuno-globulins

(
**20
pt
s)**

Q2. Discuss on the factors that will affect the anti-Human globulin test.

(20 pts)

- Q3. Write short notes on the following
- (a) Pseudoagglutination
 - (b) Reasons for washing donor red blood cell prior to performing a cross-match
 - (c) Cryoprecipitate

MARKING KEY

1. D, C
2. B
3. A, C
4. C
5. C, E
6. D
7. B, C
8. B, C
9. A, E
10. C
11. A, E
12. D, E
13. C, E
14. B
15. B, D
16. B, E
17. A, D
18. A, B
19. D, E
20. A, E
21. D
22. B, C
23. A, B

ESSAY

Q1. Differentiate between the IgG & IgM Immunoglobulins:

Tabulate the differences and correct difference

1 pt = total 20 marks

Q2. Factors that will affect the anti-human globulin test.

False positive:

- Bacterial contamination of AHG (1 pt)
- Bacterially contaminated erythrocyte (1 pt)
- Presence of cold antibodies (1 pt)
- Patients with pernicious anaemia & multiple (1 pt)
- Myeloma - causing pan agglutination (1 pt)
- High reticulocytes count (1 pt)
- Scratched glass-ware leading to presence of silica acid (1 pt)
- Using incorrectly prepared saline (1 pt)

Each 1 mark = (10pt)

False Negatives:

- Coombs serum has lost potency (1 pt)
- Coombs serum not added to test (1 pt)
- Failure to wash cells adequately (1 pt)
- Using dirty glassware (1 pt)
- Prozone phenomenon (1 pt)
- Bacterially contaminated comb's serum (1 pt)
 - Insufficient fiver between washing the erythrocytes and addition of AHG (1 pt)
- Incubation temperature not optimum (1 pt)
- Failure to incubate test (1 pt)

Each 1 pt total = 10 pts

Total for the Question 2. 20 marks

Q3. (a) Pseudo Agglutination:

- Definition (1 pt)
- Causes of pseudo (1 pt)
- Methods of resolving of pseudo (1 pt)
- Practical importance of (1 pt)

Total (5pts)

Reasons for washing donor red blood cells:

- Remove free Hb (1 pt)

- Remove red cell stroma (1 pt)
- Expose antigenic sites (1 pt)
- Remove the anticoagulant (1 pt)
- Total (5pts)

(c) Cryoprecipitate:

- Definition (1 pt)
- Preparation – fresh blood (1 pt)
 - Methods of preparation (2 pt)
 - Storage (1 pt)
 - Use of cryoprecipitate (1 pt)
- Total (5pts)

(d) Indirect coombs test:

- Definition of ICT (1 pt)
- Types of test or Application of ICT (2pts)
- Procedure – (General procedure) (2pts)
- (Total 5 pts)

(d) Indirect coomb's test

(20 pts)

SECTION 1

1. A person who possess an Se gene but are of genotype on.
 - (a) Secretes only H substance
 - (b) Secretes A and B substances
 - (c) Secretes B and H substances
 - (d) Secretes A, B and H substances
 - (e) Do not secrete A, B and H substances.
2. The following is a/are light chain(s) of an immunoglobulin:
 - a) Gamma
 - b) Kappa
 - c) Delta
 - d) Lambda
 - e) Mu

3. The following blood group(s) is/are referred to as “minus – minus” phenotype:
- a) Bombay blood group
 - b) Group O rhesus positive
 - c) Rhesus negative
 - d) Rhesus null phenotype
 - e) Lewis blood group
4. Preservation of blood by freezing is accomplished by:
- a) Addition of adenine
 - b) Using liquid nitrogen
 - c) Using liquid hydrogen
 - d) Using absolute alcohol
 - e) Using glycerol
5. Given the mother’s genotype as OO and the father’s as AB what are the possible phenotypes of their offspring
- a) AB
 - b) A
 - c) O
 - d) AO
 - e) B
6. Which of the following are remedial measures for rouleaux formation.
- a) Use of potent antisera
 - b) Correct incubation time
 - c) Proper washing of cells
 - d) Diluting with physiological saline
 - e) Correct centrifugation.
7. Bacteria commonly isolated from blood stored at 40 c is/are:
- a) *Streptococcus pyogenes*
 - b) *Staphylococcus aureus*
 - c) *Pseudomonas flourescens*
 - d) *Escherichia coli*
 - e) *Klebsiella pneumonial*
8. When serum is treated with 2 – Mercapto ethanol:
- a) IgG antibodies are split
 - b) IgM antibodies are split
 - c) FC region of the antibodies is strengthened
 - d) Makes all immunoglobulins weak
 - e) Increase agglutination ability of 1gG antibodies

9. Which of the following blood group(s) is/are associated with blood group specific substances:
- a) Kell
 - b) Lewis
 - c) Lutheran
 - d) Duffy
 - e) Kidd
10. Cord cells will react weakly or not at all with:
- a) anti - K
 - b) anti - P
 - c) anti - I
 - d) anti - S
 - e) anti - N
11. The best positive control cells in Rh - D grouping are:
- a) R_0R_z
 - b) R_0R_2
 - c) rr
 - d) R_0r
 - e) R_1R_2
12. Paroxysmal cold haemoglobinuria is associated with:-
- a) Anti - P
 - b) Donath landstrainer antibody
 - c) Anti P_1
 - d) Anti Lu^a
 - e) Anti luke
13. The following antigens are destroyed by enzymes:
- a) Kidd
 - b) Rhesus
 - c) li
 - d) Duffy
 - e) Diego
14. Cells committed by Thymus develop into:
- a) Plasma cells
 - b) Monocytes
 - c) Committed effector lymphoid cells
 - d) Activated B cells
 - e) Activated T cells

15. The following blood system are of little or no use in disputed paternity:

- a) ABO
- b) Rhesus
- c) Lewis
- d) MNSs
- e) Duffy

16. A false negative indirect coombs test can occur

- a) If O positive cells are used in the test
- b) By improper washing of cells after incubation
- c) If important AHG is used
- d) If incubated at 37° c
- e) If cells are suspended in saline

17. Weak agglutination with anti A serum is to be expected with blood group:

- a) A₁
- b) A₂
- c) A₂B
- d) A₁B
- e) O

18. Leukocyte poor blood is transfused to:

- a) Patients with platelets reaction
- b) Patients with leukocyte antibodies
- c) Patients with Renal dialysis
- d) Leukemia patients
- e) Von-willibrand's disease

19. The colouring reagents used for anti B blood grouping sera includes:-

- a) Trypan blue
- b) Acriflavine
- c) Tertrazine
- d) Azure
- e) Methylene blue

20. In erythroblastosis foetalis:

- a) Mother's cells sensitize foetal serum
- b) Foetal antibodies sensitize maternal serum
- c) Maternal cells sensitize foetal cells
- d) Paternal antibodies sensitize foetal cells
- e) Maternal antibodies sensitize foetal red blood cells.

21. The chemical(s) added to neutralize the acidity of blood for exchange transfusion is/are:
- a) 10% calcium gluconate
 - b) Sodium chloride
 - c) 10% calcium chloride
 - d) Trihydroxymethylaminomethane
 - e) Magnesium chloride
22. Complement pathway activated by antigen-antibody complex is:
- a) Classical pathway
 - b) Alternate pathway
 - c) Common pathway
 - d) Embden-Meyerhof pathway
 - e) Ca^{++} and Mg^{++} dependent pathway.
23. Cryoprecipitate:
- a) Is a factor VIII concentrate
 - b) Platelet concentrate
 - c) Is used for treatment of haemophiliacs
 - d) Is a factor VIII concentrate
 - e) Will not precipitate in cold temperatures
24. Decreased transferrase levels in red blood cells may be due to:
- a) HDNB
 - b) Universal recipient
 - c) Universal donor
 - d) Leukaemia
 - e) Haemolytic transfusion reaction
25. The purpose of O cells in antibody screening test is to:-
- a) Obtain the correct blood group
 - b) Increase the number of antigens
 - c) Identify the antibody
 - d) Avoid interference of ABO antibodies
 - e) Avoid lysis of cells
26. Sex-linked blood is:
- a) Lutheran
 - b) MNSs
 - c) Lewis
 - d) Duffy
 - e) Xg

27. Anti - E will react with following red blood cells:

- a) $R'r^y$
- b) R^2R''
- c) rr'
- d) R^0r
- e) R^0R^0

SECTION 11

1. Tabulate the differences between Haemolytic disease of the newborn due to Rhesus and ABO in compatibility.

(20 marks)

2. Discuss characteristics of IgM

(20 marks)

3. Write short notes on the following:

- (a) Platelet concentrate (5 marks)
- (b) Recruitment of a blood donor (5 marks)
- (c) Kidd blood group (5 marks)
- (d) Rhogam (5 marks)

SECTION 1
05 MARKING GUIDE

E
B, D
D
B, E
B, E
C, D
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A, B
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A, B

SECTION 11
05 MARKING GUIDE

Differences between HDNB DUE to Rh + ABO lcomp.

Differences	Rhesus	ABO
Anaemia	Moderate to severe	Mild to moderate
Infant factor	D ag	A or B
Maternal ab	Anti D	Immune anti A or Anti B
Familial	Yes	B
1 st borns	Rarely affected	Rarely
Irregular abs in mother	Present and significant	Frequently affected.
Maternal antibody during pregnancy	Usually diagnostic	Immune anti A,B often present and not significant.
Haemolysin in maternal serum	Not present	Not diagnostic
Splenomegally	Marked enlarged	
Jaundice	Severe	Frequent.
Direct coombs test	Invariably positive	Absent to mild
Osmotic fragility	Normal	Mild to moderate
Polychromasia	Moderate to marked	Weak or negative.
Reticulocytosis	Mild to moderate	Increased.
Normoblast	Moderate to marked	Mild
Spherocytosis	Negative	Marked.
Exchange transfusion.	Indicated.	Marked.
Etc, Etc,		Microspherocytes present.
		Depend on severity.
	Each 1 pt Total = (20 pts)	

Q2. Discuss characteristics of IgM:

Molecular weight

Molecular size

Passage across the placenta

Sedimentation

Fixation on complement

Avidity

Stimulus - Natural

Components - Heavy & light.

Half life - 5 days

Temperature - cold.

Each correct response 2pt, total =20pt

Q3. Short notes on:

Platelet concentrate

- Used for the treatment of platelet disorders **(0.5 pt)**
- Fresh blood should be used < 4 hrs old = **(0.5 pt)**
- Whole blood centrifuge (double bag system) = **(1 pt)**
- Transfer platelet - rich plasma to satellite bag = **(1 pt)**

- Platelet - rich plasma centrifuged hard
- Remove supernatant (ppp) **(1 pt)**
- Leaving a minimum of 5.5 ml platelets **(1 pt)**
 - Before use - it is suspended in 50 mls of plasma

(b) Recruitment of blood donor.

- Visiting institutions e.g colleges, schools, industries etc **(1 pt)**
- Appealing through the media **(1 pt)**
- Appealing through the community leaders **(1 pt)**
- Voluntary donors **(1 pt)**
- Appealing to the patients relatives etc **(1 pt)**
- Donor Education: **(1 pt)**

Total 5 points.

(c) Kidd blood group:

- Antigens - Jk^a and Jk^b = **0.5pt**
- Antibodies - anti Jk^a and anti - Jk^b = **0.5pt**

Phenotypes - Genotypes

JK (a+b+)	=	0.5pt
JK (a + b -)	=	0.5pt
JK (a- + b +)	=	0.5pt

Anti - JK^a

- Discovered from a mother who had a newborn with HDNB.	=	0.5pt
- Detected by enzyme and AHG	=	0.5pt
- Bind complement	=	0.5pt
- Rarely causes HDNB and HTRX	=	0.5pt
- Extremely labile antibody	=	0.5pt

Anti - JK^b

- Bind complement	0.5pt
- Detected by AHG and Enzyme	0.5pt
Implicated on causing HDNB and HTR	0.5pt

(Give a maximum of 5 pts)

Or any other correct response.

(d) Rhogam:

Definition - purified concentrated anti - D Immunoglobulin	1.0
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pt

- Given to Rh-ve/D ^u -ve mother	1.0 pt
- Mother not immunized by D factor	1.0 pt
- Baby must be Rho D+ve/or D ^u +ve	1.0

pt

- Baby must be DCT Neg	1.0 pt
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or any correct information (relevant)

Q.1. Write in details on Blood Donor Screening/recruitment.
(20 marks)

Q.2. Discuss in details on investigation of transfusion reactions
(20 marks)

Q.3. Write short notes on:

Selection of blood for emergency cross match

Rhogam

Xg blood group system

Cryoprecipitate

(20 marks)

Q.4. Write short notes:

- a) Bombay phenotype
- b) Preparation of Platelet concentrate
- c) Blood Bank refrigerator
- d) Coomb's reagent

(20 marks)

Q.5. a) Write short notes on Anti-coagulants used in Blood Bank.
(10 marks)

Briefly describe local preparation of Anti-A and Anti-B
grouping antisera

(10 marks)

Q.1. You are provided with O reagent red cell master list, ten (10) panel cells labelled 1 - 10, patient's serum whose antibody screening test AST reacted best at Albumin phase. Carry out tests to identify the antibody (ies) responsible for the patient's Transfusion reactions. Show your workings.

(50 marks)

Q.2. Sample K is from antenatal mother who is pregnant with a 3rd child and has been referred from a sub-district hospital. Carry out tests necessary for the antenatal screening and comment on your findings.
(30 marks)

Q.3. You are provided with samples X, Y and Z. Carry out forward and reverse grouping.
Comment on your results.
(30 marks)

Q.4. You are provided with spots labelled Spot 1, Spot 2 and Spot 3. Answer the questions appropriately for each spot.

SPOT 1

a) Name the spot (2 marks)

b) Describe the procedure of its preparation (7 marks)

c) List three (3) conditions where it is used therapeutically (5 marks)

SPOT 2

a) Describe the use of Spot 2 in blood transfusion (8 marks)

Name one (1) advantage and one (1) limitation of its application in Blood Transfusion Science (4 marks)

SPOT 3

a) Name Spot 3 (2 marks)

b) Write in details its preparation procedures. (7 marks)

c) Name three (3) conditions where its use is positive (3 marks)

M.C.Q. (40 MARKS)

1)The cells responsible for graft rejection are:

- a) Big lymphocytes
- b) Plasma cells
- c) Thymus dependent cells
- d) B- lymphocytes
- e) T- lymphocytes

2)Activation of complement C₁, C₄ and C₂ requires:

- a) K^+ ions
- b) Na^+ ions
- c) Ca^{++} ions
- d) Mg^{++} ions
- e) Fe^{++} ions

3) Inhibitory effects of blood specific substances affects:

- a) I gG anti A
- b) I gG anti B
- c) I gM anti A
- d) I gG anti D
- e) I gM anti B

4) Failure to wash red cells when performing Coomb's test will:

- a) Cause lysis of red cells
- b) Cause false negative results
- c) Cause false positive results
- d) Neutralise Coombs reagents
- e) Cause agglutination of RBCs

5) When the allelic genes are not alike the individual is said to be:

- a) Homozygous
- b) Heterozygous
- c) Dominant
- d) Hemizygous
- e) Recessive

6) Amorphs are:

- a) Genes which have a detectable effect
- b) Chromosomes which produce detectable effect
- c) Genes in mitosis
- d) Genes which produce no detectable effect
- e) Genes produced as a result of crossover.

7) The sum total of blood group genes inherited from both parents constitute an individual's:

- a) Phenotype
- b) Genotype
- c) Homozygosity
- d) Heterozygosity

e) Blood group.

Volunteers for ABO grouping sera preparation should have:

- a) Serum with low titre
- b) Serum with low specificity
- c) Serum with high titre
- d) Serum with good avidity
- e) Serum that would react after 10 minutes.

1M calcium chloride added to plasma:

- Transforms it to serum
- Inhibits bacterial growth
- Coagulates proteins
- Colours the antisera
- Delays deterioration of the serum

Proteolytic enzymes used in serological work:

- Digest RBCs membranes exposing hidden antigens
- Includes *Dolichos biflorus*
- Includes bromelain
- Includes *Vicia graminea*
- Inhibits antibody activity

Agglutinins A and B are absent in the following conditions:

- Cord blood
- Agammaglobulinaemia
- Aged serum
- Serum from patients with leukaemia
- Bombay phenotype.

The ability of an antigen to stimulate the production of corresponding antibodies is known as:

- Specificity
- Avidity
- Agglutination
- Immunogenicity
- Haemolysis

When human cells are reacted with anti H, strong reaction is observed with:

- A cells
- B cells
- O cells
- A₁ cells
- A₁ B cells

Anti - e will react with the red cells of the following genotypes:

R_2R_z
 R_1r
 $R''r^y$
 R_0R_2
 R_zr_y

“Dosage effect” is particularly demonstrated in red cells from the following blood group system(s):

ABO
Lewis
Rhesus
MNSs
P

To improve tissue oxygenation without overloading the circulation:

Exchange transfusion is done
Plasma is transfused
Packed cells are transfused
Whole blood is transfused
Buffy coat is transfused

The force expressed at the boundary of shear and results from the difference in electrostatic potential is called:

Ionic cloud
Slipping plane
Di-electric constant
Zeta potential
Iso electric point

Which of the following antibodies, that gives a characteristics of mixed field agglutination of large agglutination in a sea of free cells:

Anti P
Anti Fy^a
Anti Xg^a
Anti Lu^a
Anti Jk^a

Direct Coombs test is used for:

Diagnosis of Haemophilia
Diagnosis of incompatible crossmatch
Diagnosis of auto-immune haemolytic anaemias AIHA
Diagnosis of Aplastic anaemia
Diagnosis of leukaemias

The pan-agglutination due to the bacterial alteration of red blood cells is also known as:

- Raynaud's phenomenon
- Robinson phenomenon
- Matunasi – agata phenomenon
- A prozone phenomenon
- Habener – Thomson – Freidenreich phenomenon

The following preservatives prevent bacterial contaminations in antisera:

- Heating the serum at 70°C for one hour
- Sodium fluoride
- Acriflavin
- Phenothiazide
- Sodium azide

The blood bank fridge should have:

- Electricity ran alarm
- Battery ran alarm
- Thermostatically controlled temperature recorder
- Freezing compartment
- Minimum and maximum thermometer

23. Cryoprecipitate:

- (a) Is used for the treatment of multiple clotting factor deficiencies
- (b) Is given to haemophilic patients
- (c) Is used for the treatment of patients with low white cell count
- (d) Required for the treatment of anaemic patients
- (e) May be obtained from stored blood

24. The purpose of using controls while performing ABO blood grouping is to:

- Check the labelling of the specimen
- Check the speed of the reaction
- Check the potency of the reagents
- Check the suitability of the technique used
- Check the avidity of the reaction

25. Bombay phenotype individuals:

- Have agglutinins AB & H
- Have antigens H only
- Lack gene A and B only
- Have agglutinogens A, B and H
- Cannot receive blood from group O individuals

26. Which of the following can be transmitted through blood transfusion:

- (a) Hepatitis B surface antigen
- (b) Neisseria meningitides
- (c) Gonorrhoea
- (d) Typhoid fever
- (e) Diabetes

ESSAY QUESTIONS (60 MARKS)

- Q1. Discuss the changes that takes place in donor blood stored in blood bank for 28 days at 4°C
- Q2. With an aid of a well labelled diagram discuss the characteristics of IgG molecule
- Q3. Write short notes on following:
- (a) Acid citrate dextrose as anticoagulant
 - (b) Agglutination
 - (c) Bombay phenotype
 - (d) Fresh frozen plasma (FFP)
- Q.1. To improve tissue oxygenation without over-loading the circulation:
- a) Exchange transfusion is done
 - b) Whole blood is transfused
 - c) Plasma is transfused
 - d) Packed cells are transfused
 - e) Surgery is necessary
- Q.2. A patient must be transfused with his own blood group unless in cases of:
- a) Laparatomy
 - b) Open heart surgery
 - c) Haemolytic disease of the newborn
 - d) Burns
 - e) Aged patients
- Q.3. IgG and IgM immunoglobulin can be differentiated by:
- a) Serum treatment with enzymes
 - b) AHG technique
 - c) Treating serum with 2 - mercaptoethanol
 - d) Electrophoresis

- e) Enzyme technique
- Q.4. A record that should be kept indefinitely is a record of:
- a) Compatibility testing
 - b) Refrigerator temperature
 - c) Blood inspection prior to issue
 - d) Donor medical history and physical
- Q.5. The management of the testing process that documents accuracy and reproducibility of a test is called:
- a) Quality control
 - b) Quality assessment
 - c) Quality assurance
 - d) Quality audit
 - e) Quality improvement
- Q.6. Blood group specific substances that are controlled by Se gene are:
- a) Water soluble
 - b) Glycoprotein
 - c) Glycolipids
 - d) Amino acids
 - e) Alcohol soluble
- Q.7. Variants of D antigen (Low grade D^u)
- a) Reacts strongly with commercially prepared anti D
 - b) Can only be detected using Coomb's reagent
 - c) Cannot stimulate production of anti D
 - d) Can stimulate production of anti D
 - e) Reacts only in saline RT
- Q.8. The most important consideration in the selection and administration of blood and blood components is:
- a) Clinical condition of the patient
 - b) The results of laboratory testing
 - c) The cost of the treatment
 - d) The component inventory
 - e) The HIV status of the patient
- Q.9. The best blood product that can be given to a patient deficient in IgA is:
- a) Whole blood
 - b) Red blood cells concentrate
 - c) Leucocyte poor blood

- d) Cryoprecipitate
- e) None of the above

Q.10. Fresh Frozen Plasma is the component of choice for the management of:

- a) Multiple factor deficiency
- b) Factor VIII deficiency
- c) Factor IX deficiency
- d) Hypovolemia
- e) Factor X deficiency

Q.11. Cryoprecipitate is indicated:

- a) For the management of Factor VII deficiency
- b) As a source of viable granulocytes
- c) For patients with factor VIII inhibitors
- d) For treatment of factor VIII deficiency
- e) For the treatment of severe anaemia

Q.12. Inhibition of the serological reactivity of an antibody by reacting it with soluble antigen is known as:

- a) Coomb's testing
- b) Albumin addition method
- c) Titration test
- d) Inhibition test
- e) Neutralization test

Q.13. Plants agglutinins are also referred to as:

- a) Lectins
- b) Phytagglutinins
- c) Pseudo agglutinins
- d) Antigens
- e) Poly agglutinins

Q.14. A pre-transfusion test that utilizes the patient red cells and the plasma from the donor unit is known as:

- a) A major crossmatch
- b) A minor crossmatch
- c) Antibody screening test
- d) Direct Coomb's test
- e) Auto control test

Q.15. Fy^a, M and N red blood cells are destroyed by:

- a) 22% bovine albumin
- b) Enzymes
- c) Low ionic strength saline (LISS)
- d) Low ionic polycations
- e) Papain

Q.16. Anticoagulant/preservative solutions are designed to perform which of the following functions?

- a) Prevent product contamination with microorganisms
- b) Inactivate viruses

- c) Ensure 90% red cell viability at expiry date
- d) Prevent blood from clotting
- e) Increase life span of transfused cells

Q.17. The addition of adenine to anticoagulant/preservative solution provides:

- a) A substrate for glycolysis
- b) Improves O₂ delivery by transfused cell
- c) Enhances red blood cells viability
- d) Reduces the toxicity of the anticoagulant
- e) Maintains 2 - 3 DPG levels better

Q.18. Levels of red cell ATP are associated with:

- a) Red cell viability
- b) Increases of blood shelf life
- c) Reduction of intravascular levels of Na⁺ and K⁺
- d) The survival of white cells before transfusion
- e) Maintenance of pH level

Q.19. Which of the following is an accurate standard of blood storage?

- a) Monitoring of internal temperatures every 8 hours
- b) Audible and visible signals that function throughout the day
- c) An original alarm check upon receipt of the instrument
- d) A 24 hours emergency back-up system
- e) Monitoring cold room temperature after every two days

Q.20. Which of the following anticoagulant is not used in Blood Transfusion Centres?

- | | |
|---------------------------------------|-------------------------------|
| a) Acid citrate Dextrose | b) Citrate-phosphate Dextrose |
| c) Citrate-phosphate Dextrose-Adenine | d) Heparin |
| e) Alserver | |

Q.21. Graft-vs-host disease can be prevented by:

- a) The use of fresh whole blood
- b) The use of washed red blood cell
- c) Using blood products donated by close relatives
- d) Irradiating red blood cells prior to infusion
- e) Using fresh frozen plasma always

Q.22. Hypertensive donors who are taking medication and who have controlled their blood pressure are:

- | | |
|--|--------------------------|
| a) Acceptable to donate | b) Deferred for 6 months |
| c) Deferred for a year | d) Permanently deferred |
| e) Asked to take medicine before being allowed to donate | |

- Q.23. Which of the following blood components may carry a risk of CMV infection?
- a) Fresh frozen plasma
 - b) Cryoprecipitate
 - c) Platelets
 - d) Packed cells
 - e) All of the above
- Q.24. Which of the following is an absolute contra-indication to autologous donations?
- a) Weight less than 110 pounds
 - b) Bacteraemia
 - c) Systolic blood pressure of 200 mmHg
 - d) Pulse of 43 beats per minute
- Q.25. The specificity of the antibody described by Landsteiner and Wiener that was produced in rabbits injected with Rhesus monkey red cells was later found to be:
- a) Anti D
 - b) Anti C
 - c) Anti Lw
 - d) Anti Rh29
 - e) Anti V
- Q.26. Anti D is a clinically significant antibody because:
- a) It is capable of activating complement
 - b) It is naturally occurring in all D-negative healthy adults
 - c) It can cause haemolytic transfusion reaction
 - d) It does not cross the placental barrier
 - e) It is more potent than all other Rhesus antibodies
- Q.27. A patient has the following Rhesus antigen typing results:
- | | | | | |
|--------|--------|--------|--------|--------|
| Anti D | anti D | anti E | anti c | anti e |
| + | + | - | + | |
- Which of the following is/are the probable genotype?
- a) $R_1 R_1$
 - b) $R_1 r$
 - c) rr
 - d) $R_z r y$
 - e) $R_z R_1$
- Q.28. The common cause of false-positive anti D testing:
- a) The deterioration of reagents
 - b) Failure to follow manufacturers' directions
 - c) Spontaneous agglutination of red cells due to a positive DCT
 - d) Rouleaux formation

Q.29. A blood group 'A' man marries a group 'AB' woman. The father of the man is group 'O'. What are the possible blood groups of their offspring?

- a) A, B, AB and O
- b) A and B only
- c) A, B and O
- d) A, B and AB
- e) AB only

Q.30. The immunodominant sugar that confers blood group A and B specificity is:

- | | |
|----------------------------|------------------|
| a) L - fucose | b) D - galactose |
| c) N - acetylgalactosamine | d) L - Glucose |
| e) D - Glucose | |

Q.31. The O gene has no detectable product and is therefore termed:

- | | |
|----------------|-------------|
| a) Recessive | b) Dominant |
| c) Co-dominant | d) Amorphic |
| e) Alleles | |

Q.32. Fischer-Race gene complex DCe is equivalent to Wiener:

- | | |
|-------------------|-------------------|
| a) r | b) R ₁ |
| c) R ₂ | d) ry |
| e) R ₀ | |

Q.33. IgM and IgG immunoglobulins can be differentiated by:

- a) Serum treatment with enzymes
- b) AHG technique
- c) Treating serum with 2 - mercapto-ethanol
- d) Electrophoresis
- e) Enzyme technique

Q.34. Direct Combs test is essential in diagnosis of:

- a) Hepatitis
- b) Haemolytic disease of the newborn
- c) Diabetes
- d) Auto-immune haemolytic Anaemia
- e) Acquired immune deficiency syndrome

Q.35. The best storage temperature for platelet concentrate is:

- | | |
|--------------|--------|
| a) -20°C | b) 8°C |
| c) 0°C | d) RT |
| e) 18 - 25°C | |

Q.36. It is now known that the MHC complex is inherited on the:

- a) Short arm of chromosome 6
- b) Short arm of chromosome 8
- c) Long arm of chromosome 9
- d) Long arm of chromosome 12
- e) Long arm of chromosome 6

Q.37. For solid organ transplant, recipients and donors are often tested for:

- a) HLA-A, -B and -DR antigen
- b) HLA - A and -B antigens
- c) HLA - DR antigens only
- d) HTLA antigen
- e) HLA-A and -DR antigen only

Q.38. When a child inherits a trait that neither of the parents has it, is regarded as:

- a) A direct exclusion
- b) An indirect exclusion
- c) In conclusive
- d) Unlikely
- e) First order of exclusion

Q.39. A disease association exists between

- (a) HLA-B5 and Idiopathic haemochromatosis
- (b) HLA- B27 and ankylosing spondylitis
- (c) HLA- DR2 and narcolepsy
- (d) HLA - DR5 and insulin dependent diabetes
- (e) HLA - BR7 and insulin independent diabetes

Q.40. The most common cause of morbidity and mortality associated with haemolytic transfusion reaction is:

- a) Hypoxia
- b) Respiratory failure
- c) Acute renal failure
- d) Cardiac failure
- e) Oedema

Q.41. Acute intra-vascular hemolysis is most commonly associated with antibodies of the following blood group system:

- a) ABO
- b) Rhesus blood group system
- c) Kidd blood group
- d) Duffy blood group system
- e) MNSS blood group system

Q.42. Transfusion reactions may occur due to bacterial contamination of the following unit(s):

- a) Fresh Frozen plasma
- b) Red blood cells conc.
- c) Granulocytes pheresis
- d) Platelet concentrate

e) Cryoprecipitate

Q.43. If no data regarding critical titre are available, which of the following titre values is frequently used as cut off?

- | | |
|--------|-------|
| a) 8 | b) 16 |
| c) 32 | d) 64 |
| e) 128 | |

Q.44. Anti C will react with:

- | | |
|--------------------------|--------------|
| a) Rh2 cells | b) Rh1 cells |
| c) rh ¹ cells | d) Rh2 cells |
| e) Rho cells | |

Q.45. Anti - I is:

- a) Found in patients with pneumonia
- b) Is a warm antibody
- c) Encountered in patients with infectious mononucleosis
- d) Found in the serum of patient with reticulosis
- e) Reacts strongly with infants' red blood cells

Q.46. The genes responsible for Lutheran blood group systems is/are:

- a) Le^a
- b) La^e
- c) Lu^a
- d) Lu^b
- e) La^e

Q.47. The autoantibody associated with paroxysmal cold haemoglobinemia shows specificity with the following antigens:

- | | |
|------|------|
| a) 1 | b) D |
| c) P | d) K |
| e) A | |

Q.48. If the father is Xg^{a+} and the mother is Xg^{ci-} their children will be:

- a) All sons Xg^{a+}
- b) All daughters Xg^{a+}
- c) All sons Xg^{a-}
- d) All daughters Xg^{a-}
- e) Fifty fifty chances

Q.49. Cord cells will react weakly or not at all with:

- | | |
|-----------|-----------|
| a) Anti-K | b) Anti P |
| c) Anti S | d) Anti I |
| e) Anti i | |

Q.50. The following enzymes are used to treat red cells in blood transfusion:

- a) Alkaline phosphatase
- b) Trypsin
- c) Bromalin
- d) Renin
- e) Glucose 6 - phosphate dehydrogenase

Q.51. Which of the following are cold antibodies?

- a) Anti Le^a
- b) Anti Fy^a
- c) Anti JK^a
- d) Anti Kg^a
- e) Anti I

Q.52. Which of the following statements is/are true of anti-Le^a?

- a) It is produced by Le^{a-b-} secretors
- b) It usually clinically significant
- c) It sometimes activates the complement
- d) It causes severe Haemolytic disease of the newborn
- e) It is a warm antibody

Q.53. The following are antibodies from NNSs system, which one is insignificant?

- a) Anti S
- b) Anti U
- c) Anti s
- d) Anti N
- e) Anti M

Q.54. Anti-Fy^a is detected by:

- a) Heat-treatment of red cells at 56°C
- b) Ficin pre-treatment of red cells
- c) Coomb's technique
- d) Incubation at room temperature and below
- e) Inhibition technique

Q.55. Cells are washed in serological tests because:

- a) Leukocytes inhibit antigen/antibody reactions
- b) Unwashed cells do not react with anti sere
- c) To expose the antigenic sites
- d) Serum and other protein fragments may interfere with test
- e) To increase the Zeta potential

Q.56. The Paul-Bunnell test is useful in the diagnosis of:

- a) Rheumatoid arthritis
- b) Rheumatoid heart disease
- c) Infectious mononucleosis
- d) Glandular fever
- e) PNH

- Q.57. C₂, C₄ and factor B are inactive precursor molecules inherited in which region of the MHC complex
- (a) Class I (b) Class II (c) Class III
(d) Class IV (e) Class V
- Q.58. Which of the following can phyta-agglutinin be prepared from:
- (a) Saliva (b) *Ulex europeaus*
(c) *Dolichous biflorus* (d) Hogs (e) Pigs
- Q.59. The most abundant immunoglobulin in plasma is:
- (a) IgM (b) IgA (c) IgE
(d) IgD (e) IgG
- Q.60. Circle the blood group system that is/are of little or no use in disputed paternity:
- a) ABO blood group system (b) Rhesus blood group system
c) Lewis blood group system (d) Li blood group system
e) Duffy
- Q.61. The blood group specific substances that depend on Se gene are:
- a) Glycolipids
b) Glycoproteins
c) Water soluble blood group specific substances
d) Alcohol soluble blood group specific substances
e) Those found in the body tissues
- Q.62. Blood can be stored indefinitely in:
- a) ACD (b) Thymol (c) Glycerin
(d) Liquid nitrogen (e) Kaolin
- Q.63. Cells from an individual whose genotype is rr reacts with:
- (a) Anti - D (b) Anti - C (c) Anti - E
(d) Anti - c (e) Anti - e
- Q.64. Rhesus antibodies:
- a) Are immune antibodies (b) Can be extracted from Lectins
c) Are always IgM (d) Are always IgG
e) Occur naturally at birth

SECTION A: 40 MARKS

- Q.1. The cells from the following blood group will not react with Anti-A, Anti-B and Anti-H:
- O cells
 - A cells
 - B cells
 - O^h cells
 - Bombay phenotype
- Q.2. If the mother is A₂ A₂ and the father is A₁ A₂ which of the following is/are the probable genotypes of the offspring:
- A₂ A₂
 - A₁ A₁
 - A₂ B
 - A₁ A₂
 - A₁ O
- Q.3. The following are indirect antiglobulin techniques **except**:
- Major cross-match
 - Reverse grouping
 - D^u test
 - Antibody screening
 - Minor cross match
- Q.4. Anti - H will react strongly with the following cells:
- O^h
 - O
 - A₂ B
 - A₁ B
 - B
- Q.5. Lectin Anti - A can be prepared from:
- Iberis amara*
 - Vicia graminea*
 - Ulex eruopeus*
 - Dolichous biflorous*
 - Lotus tetragonolobus*
- Q.6. Rh-null phenotype occurs as a result of:
- Genetic mutation
 - Suppressor gene X^o r
 - Normal gene X¹r
 - Recessive gene d
 - Silent gene h
- Q.7. The Panagglutination due to the bacterial alteration of red blood cells is also known as:

- a) Raynaud's phenomenon
 - b) Robinson phenomenon
 - c) Thomsen phenomenon
 - d) Prozone phenomenon
 - e) Mutahasi-Ogata phenomenon
- Q.8. The Weiner antigens Rh⁰ and Rh¹ are equivalent to which Fisher-Race Complex:
- a) DCE
 - b) DCe
 - c) D^ce
 - d) D^cE
 - e) dCE
- Q.9. Low ionic strength saline is used to:
- a) Digest off the sialic residues
 - b) Increase the surface of shear
 - c) Decrease the rate of association between the antigen and antibody
 - d) Remove water molecules from the cell surface
 - e) Increase the rate of association between the antigen and the antibody
- Q.10. The minor cross-match:
- a) Tests for antibodies in patient's serum
 - b) Tests for antibodies in donor's serum
 - c) Is the commonest compatibility test done
 - d) Uses 1% patient's cells
 - e) Tests for autoantibodies
- Q.11. Rhogam is:
- a) Given within 6 days of delivery
 - b) Given to all D^u positive mothers
 - c) Given to all D-positive mothers
 - d) Purified incomplete Anti - D
 - e) Given to the affected baby
- Q.12. IgA occurs in the two different forms in the mucous secretions as:
- a) Pentamers
 - b) Polymers
 - c) Dimers
 - d) Trimers
 - e) Monomers

Q.13. The alternative pathway of complement is activated by:

- a) Immune complex of IgG and IgM
- b) Streptokinase
- c) Endotoxins
- d) IgE
- e) IgD

Q.14. "Neck-lace" pattern type of reaction is characteristic of:

- a) Kell typing
- b) MNS typing
- c) P-system
- d) Lewis typing
- e) Kidd typing

Q.15. Examples of adjuvants used in the preparation of Coombs serum are:

- a) Sodium chloride
- b) Sulphuric acids
- c) Ammonium nitrate
- d) Freud's adjuvant
- e) Ammonium sulphate 4%

Q.16. The placenta plays very important role such as:

- a) Determining the foetal blood group
- b) A barrier to certain class of antibodies
- c) Controlling the foetal weight
- d) Determining the sex of the baby
- e) Nutrients pass through it to the foetus

Q.17. Blood group specific substances are:

- a) Glycoproteins
- b) Lipopolysaccharide
- c) Lipid soluble
- d) Water soluble
- e) Found on red blood cells

Q.18. 22% Albumin is prepared from:

- a) Guinea pigs
- b) Cows
- c) Pigs
- d) Goats
- e) Horses

Q.19. A Secretor must have:

- a) h gene
- b) H^{se} gene
- c) H gene
- d) Secretor gene
- e) An unaltered precursor substance I

Q.20. The antibody causing precipitation is:

- a) Present on the red cells
- b) Soluble
- c) Particulate
- d) Precipitinogen
- e) Precipitin

Q.21. Sera from patients with paroxysmal cold Haemoglobinuria is associated with:

- a) Anti - P
- b) Anti - Tj^a
- c) Luke antibody
- d) Donath-Landsteiner antibody
- e) Anti - Le

Q.22. The following diseases can be transmitted through blood transfusion:

- a) Gonorrhoea
- b) Viral hepatitis
- c) Diabetes
- d) Pneumonia
- e) HIV

Q.23. Damages to red blood cells during freezing may be prevented by:

- a) Rapid freezing
- b) Addition of Adenine
- c) Rapid thawing
- d) Addition of glycerol
- e) Removal of plasma

Q.24. The source of enzyme bromelain is:

- a) Apple
- b) Paw paw
- c) Hog
- d) Horse
- e) Pineapple

Q.25. The purpose of Exchange transfusion is:

- a) To change the baby's blood group

- b) To remove paternal antibody
- c) To prevent formation of Calcium deposits in the brain
- d) To lower the bilirubin levels
- e) To remove maternal antibody

Q.26. Antibody absorption:

- a) Is the same as antibody adsorption
- b) Is dislodging attached antibody to the cells back to the solution
- c) Is applied in cases of preparation of suitable typing sera
- d) Is the same as inhibition test
- e) Is the removal of unwanted antibody from serum by use of specific cells

SECTION B: 60 MARKS

Q.1. Discuss in detail on the investigations of a suspected haemolytic transfusion

Reaction (20 marks)

Q.2. Explain the factors that lead to candidates being disqualified as suitable donors.

(20 marks)

Q.3. Write short notes on the following:

- a) Cryoprecipitate
- b) Anti - Lu^a
- c) Indirect Coombs test
- d) C.P.D.A. Anti-coagulant

(20 marks)

Q1. Write in detail on type of blood donors. Explain how safe and adequate blood supply can be achieved.

(20 marks)

Q2. Write in detail on Rhesus haemolytic disease of the newborn.

(20 marks)

Q3. Discuss in details on local on local production of antibodies A and B.
(20 marks)

Q4. Write short notes on:
(a) Fresh frozen plasma
(b) Direct coomb test
(c) Xg blood group system
(d) Rhesus null phenotype
(20 marks)

Q5. Write short notes on:
(a) Advantages of DNA applications in forensic investigations
(b) Autologous blood donors
(c) Blood bank refrigerators
(d) Panagglutination
(20 marks)

Q1. Sample X is from O^{-ve} mother who has delivered a baby suspected to be suffering from HDNB. Using the apparatus and reagents provided establish the cause of the disease.

(30 marks)

Q2. Carry out forward and reverse grouping on samples P Q R comments on your results.

(30 marks)

Q3. Sample D is from a donor who is O^{-ve} using reagents and apparatus provided find out whether his anti- A and B are natural or immune.

(30 marks)

Q4. "L" is a patient who requires blood transfusion "N" is the only available donor of her blood group. Find out whether "N" is compatible with "L". Comment on your finds.

(30

marks)

Q5. **SPOTS**

Spot 1:

What is the name of spot 1 ? -(2 marks)

What does it contain and how much? -(2 marks)

Give two advantages of spot over others of it type -(4 marks)

Name two other types of reagent can be used in spot one

-(2 marks)

Spot 2:

- Name the strip - (2 marks)
- Give the principle behind it - (4 marks)
- Give two advantages and disadvantages of the strip - (4 marks)

Spot 3:

- What is the purpose of spot C in blood transfusion science laboratory? - (2 marks)
- Name two other methods that could be applicable in case Spot C is not available - (2 marks)

Spot 4:

- What is the purpose of spot E? - (2 marks)
- Give the procedure used to prepare it - (2 marks)
- Where is it stored and why? - (2 marks)

Q1. Anti-M:

- (a) Shows dosage phenomenon
- (b) Reacts at 56°C
- (c) Reacts in acidic Medium
- (d) Does not react in 22% bovine albumin medium
- (e) Does not react with enzyme treated cells

Q2. The offspring of parents who are both heterozygous A will be blood group:

- (a) AO
- (b) A
- (c) O
- (d) AB
- (e) O^h

Q3. Anti A₂ reacts with the following **except:**

- (a) O A₁ cells
- (b) A₂ B Cells
- (c) A₂ Cells
- (d) A₁ Cells
- (f) A₃ Cells

Q4. Linkage between secretor gene and the following blood group exists:

- Duffy
- Lewis

Lutheran
Kell
MNSs

Q5. Cord cell reacts weakly or not at all with:-

- (a) anti-Le^a
- (b) anti-I
- (c) anti-K
- (d) anti-D
- (e) anti-S

Q6. The genes responsible for Lutheran Blood group system: -

- (a) Le^a
- (b) Le^b
- (c) Lu^a
- (d) Lu^b
- (e) Fy^a

Q7. Anti-P₁ is inhibited by:-

- (a) 22% bovine albumin
- (b) Milk
- (c) Normal saline
- (d) Hydatid cyst fluid
- (e) Acidic pH

Q8. The following are cold auto-antibodies:-

- (a) anti-Fy^a
- (b) anti-Xg^a
- (c) anti-Le^a
- (d) anti-JK^a
- (e) anti-I

Q9. Anti-I

- (a) Is associated with mycoplasma pneumonia infection
- (b) Is not a common auto-antibody
- (c) Reacts best at 4°C
- (d) Is not associated with cold agglutinin disease
- (e) Is the same as anti-i

Q10. Anti-e reacts with the following cells: -

- (a) Rh_o
- (b) rh^{''}
- (c) rh_y
- (d) hr^{''}
- (e) Rh_z

- Q11. Mixed field agglutination is a characteristic of reactions with antibodies from the following systems:
- (a) MNSs system
 - (b) Kidd system
 - (c) Lutheran system
 - (d) ABO system
 - (e) Rhesus system
- Q12. Lack of detectable ABO antigens can occur in patients suffering from:-
- (a) Alcoholism
 - (b) Carcinoma of stomach
 - (c) Carcinoma of the pancreas
 - (d) Blood pressure
 - (e) Diabetes
- Q13. ABO antigens can first be detected:
- (a) 6(six) months of foetal life
 - (b) six weeks of foetal life
 - (c) 6 months after birth
 - (d) six weeks after birth
 - (e) six months after birth
- Q14. The gene R_o is equivalent to fisher-race genes:
- (a) $D\hat{c}\bar{e}$
 - (b) $dC\bar{e}$
 - (c) $D\hat{c}E$
 - (d) DCE
 - (e) $DC\bar{e}$
- Q15. The possible offspring's phenotype of a father Rhesus $DC\bar{e} / D\hat{c}E$ and mother Rhesus $DC\bar{e} / DC\bar{e}$ are/is:
- (a) $DC\bar{e} / DC\bar{e}$
 - (b) $D\hat{c}\bar{e} / D\hat{c}\bar{e}$
 - (c) $D\hat{c}E / DC\bar{e}$
 - (d) $DC\bar{e} / d\hat{c}\bar{e}$
 - (e) $d\hat{c}\bar{e} / dCE$
- Q16. Which of the following adjuvants are used in the preparation of Coomb's Reagent:
- (a) Freund's adjuvant
 - (b) 4% Sodium alginate
 - (c) Sodium bisulphate
 - (d) Field's adjuvant
 - (e) Almoninium phosphate

Q17. Which of the following blood components may carry a risk of CMV infection:

- (a) Fresh frozen plasma
- (b) Cryoprecipitate
- (c) Platelet
- (d) White blood cells
- (e) Red blood cells

Q18. Inadequate washing in Coomb's test: -

- (a) Causes haemolysis
- (b) Inhibits Coomb's reaction
- (c) Results in false negative reaction
- (d) Results in false positive reaction
- (e) Increases sensitivity

Q19. Anti-N can be prepared from: -

- (a) *Vicia graminea*
- (b) *Ulex europeaus*
- (c) *Dolichous biflorus*
- (d) *Bauhinea purpurea*
- (e) *Iberis amara*

Q20. The auto-antibody associated with Paroxysmal Cold Haemoglobulinemia is:

- (a) anti V
- (b) anti C
- (c) anti K
- (d) anti P
- (e) anti A

Q21. The following antigen are found in P₁ phenotype:

- (a) P^k
- (b) P₁
- (c) P₂
- (d) P₃
- (e) P

Q22. The antigens of the following blood group system are not well developed

at birth:

- (a) ABO
- (b) Rhesus

- (c) Kell
- (d) Lutheran
- (e) Lewis

Q23. It is known that the MHC complex is inherited on the:

- (a) Short arm of chromosome 8
- (b) Long arm of chromosome 9
- (c) Long arm of chromosome 12
- (d) Short arm of chromosome 7
- (e) Short arm of chromosome 6

Q24. HLA -E, HLA-F, HLA-G and HLA-H are newly recognized molecules in:-

- (a) Class V
- (b) Class IV
- (c) Class III
- (d) Class II
- (e) Class I

Q25. Recipient and donor of a solid organ should be tested for: -

- (a) MLC
- (b) HLA-A and HLA-B antigens
- (c) HLA-DR antigens
- (d) HLA-A, HLA-B, HLA-DR antigens
- (e) HTLA antigens

Q26. Rhesus immune globulin is effective in the prevention of H.D.N.B. due to which of the following antibodies: -

- (a) Anti E
- (b) Anti-e
- (c) Anti C
- (d) Anti D
- (e) Anti CD

Q27. IgM and IgG antibodies are differentiated in the serum using: -

- (a) Enzyme techniques
- (b) Polybrene
- (c) Neutralization technique
- (d) Direct coomb's test
- (e) 2-mercaptoethanol (2-ME)

Q28. Antibody produced to T-independent antigens is:

- (a) IgA
- (b) IgD
- (c) IgM
- (d) IgG
- (e) IgE

- Q29. The change in production of IgM to IgG is an example of: -
- (a) Epitope switching
 - (b) Isotype switching
 - (c) Immune surveillance
 - (d) Antibody specificity
 - (e) Antigen specificity
- Q30. In humans, B Cells mature in the: -
- (a) Bursa of fabricus
 - (b) Liver
 - (c) Stomach
 - (d) Bone-marrow
 - (e) Thymus
- Q31. The practice of physicians monitoring the appropriateness of other physician's transfusion practices are called: -
- (a) Quality control
 - (b) Quality improvement
 - (c) Utilization review
 - (d) Asset management
 - (e) Quantity assurance
- Q32. An essential component of quality monitoring is: -
- (a) Exceeding regulatory requirement
 - (b) Defining physicians services
 - (c) Documentation
 - (d) Defining laboratory personnel services
 - (e) Monitoring a list of specific patient care activities.
- Q33. The minimum frequency of documenting the temperature of refrigerators freezers and water bath is:-
- (a) Monthly
 - (b) Each day of use
 - (c) Quarterly
 - (d) Weekly
 - (e) Daily
- Q34. The recommended disposal method for a unit of blood that is positive for infectious diseases is:-
- (a) Draining the bag in a laboratory sink
 - (b) Give your colleague to prepare media
 - (c) Bury in a pit outside the laboratory
 - (d) Mix with 10% jik solution
 - (e) Incinerate

- Q35. Transfusion of incompatible blood is sometimes followed by: -
- (a) Cancer
 - (b) Epilepsy
 - (c) Brain damage
 - (d) Renal failure
 - (e) Heart disease
- Q36. Extravascular red cell destruction can be avoided by:-
- (a) Carrying out minor crossmatch
 - (b) Carrying out antibody screening test in all recipient serum
 - (c) Always giving blood group O^{-ve}
 - (d) Carrying out antibody screening test in all donors serum
 - (e) Monitoring the flow of blood during transfusion
- Q37. Transfusion of Red cell concentrate is indicated in-patient suffering from
- the following condition(s):-
- (a) Iron deficiency anaemia
 - (b) Leukemia or aplastic anaemia
 - (c) Chronic renal failure
 - (d) Megaloblastic anaemia
 - (e) Haemolytic anaemia
- Q38. The following blood group system cannot be used in disputed paternity:
-
- (a) P blood group system
 - (b) ABO blood group system
 - (c) Lu blood group system
 - (d) Rhesus blood group system
 - (e) MNSs blood group system
- Q39. An alarm system of a blood bank refrigerator: -
- (a) Should be connected to the main supply with the refrigerator
 - (b) Should be connected to a separate circuit system
 - (c) Should give audible and visible signals
 - (d) Should be operated manually
 - (e) Should be build inside the refrigerator
- Q40. Blood stored in a dark refrigerator develop: -
- (a) Yellow colour
 - (b) Red colour
 - (c) Golden colour
 - (d) Green colour
 - (e) Purplish colour

Q41. The refrigerator sensor must be placed in to: -

- (a) Methylated spirit
- (b) 10% glycerol
- (c) Freezing compartment
- (d) Air
- (e) Water

Q42. In Rhesus haemolytic disease of the newborn

- (a) Anaemic is severe
- (b) Osmotic fragility test is increased
- (c) Direct Coomb's test is usually positive for the baby's cells
- (d) Haemoglobin is normal
- (e) Spherocytes are presence.

Q43. The IgA deficiency is associated with

- (a) Febrile transfusion reaction
- (b) Urticaria transfusion reaction
- (c) Allergic reaction
- (d) Anaphylactic reaction
- (e) Circulation overload

Q44. Which of the following maintain the viability of the red blood cells:-

- (a) Plasma
- (b) Electrolytes
- (c) Adenosine Triphosphate (ATP)
- (d) Glucose
- (e) Fibrinogens

Q45. The following blood group system gene(s) are not carried on autosomes;

MNSs
Xg System
Duffy system
ABO system
Rhesus system

Q46. Which antibody is identified in the given antibody identification chart?

Antigen	Rh ₀	Rh'	Rh''	Rhz	rh	rh'	rh''	rhy
X	+	-	+	-	+	-	+	-

Anti D
Anti C
Anti E

Anti c
Anti e

- Q47. The main function of a placenta is/are: -
(a) Antibody production
(b) Assist in child growth
(c) Exchange of substances between the mother and the foetus
(d) Prevent kernicterus
(e) Protect the foetus
- Q48. The following is/are associated with exchange transfusion
(a) It is indicated in case of accidents
(b) It is recommended in anaemic patients
(c) It corrects anaemia
(d) It reduces toxic bilirubin
(e) It recommends use of old blood
- Q49. The best storage temperature for platelets concentrate is: -
(a) 4°C
(b) 8°C
(c) ROOM temperature
(d) 20°C
(e) 37°C
- Q50. Delayed haemolytic transfusion reaction can be caused by: -
(a) Anti Fy^a
(b) Anti K
(c) Anti M
(d) Anti D
(e) Anti P
- Q51. Washed red blood cells are transfused to patient suffering from:-
(a) Diabetes
(b) Paroxysmal Nocturnal Haemoglobinuria
(c) Thalassaemia
(d) HDNB
(e) Transfusion reaction
- Q52. 22% bovine albumin is composed of; -
(a) Calcium chloride
(b) Normal saline
(c) 4% sodium azide
(d) Caprylate

(e) Sodium sulphate

Q53. Estimation of transfused red cell survival is recommended when: -

- (a) Compatible blood is transfused
- (b) Incompatibility is reported
- (c) Homozygous blood is transfused
- (d) Patient develop haemolytic anaemia
- (e) Old blood is transfused

Q54. The following are donor recruitment tools **Except:**

- (a) Donor education
- (b) Giving sodas to blood donor after donating
- (c) Exhibitions during national activities
- (d) Advertising in media
- (e) Giving money to donors to encourage them

Q55. In HLA system: -

- (a) Majority of the antibodies are IgG
- (b) Majority of the antibodies are IgM
- (c) Cytotoxicity test is useful
- (d) Fluorescent antibody test is done
- (e) Majority of the antibodies are IgE

Q56. Bombay phenotype: -

- (a) Has high amount of H antigen
- (b) Has high amount of H antibodies
- (c) It lacks both A and B antibodies
- (d) Reacts strongly with A B and O cells
- (e) It has H-gene

Q57. Cadaver can donate the following organs; _

- (a) Liver
- (b) Spleen
- (c) Kidney
- (d) Pancreas
- (e) Heart

Q58. In intravascular haemolytic reaction: -

- There is free haemoglobin in urine
- Complement component are involved
- Complement system mechanism is not involved
- There is rapid increase of unconjugated bilirubin
- There is very slow destruction of red blood cells

Q59. Which of the following cells are found in peripheral blood film of patient suffering from haemolytic transfusion reactions: -

- (a) Sick cells
- (b) Megaloblastic cells
- (c) Heinz bodies
- (d) Crenated cells
- (e) Microcytic cells

Q60. Transfused red blood cells survival can be investigated by: -

- (a) Reticulocyte count method
- (b) Differential agglutination method
- (c) Radio-isotope method
- (d) Estimating blood volume
- (e) 2-mercaptoethanol technique

Q61. The following are considered risk behaviour in donors **EXCEPT**: -

- (a) Bisexuality
- (b) Homosexuality
- (c) Intravenous drug abuse
- (d) Skin scarification
- (e) Heterosexuality

Q62. In Kenyan public hospital, tests are done to detect the following disease in donated blood **EXCEPT**: -

- (a) Hepatitis A
- (b) Hepatitis B
- (c) Hepatitis C
- (d) Malarial parasites
- (e) HIV 1 and 2

Q63. Platelets can be separated from whole blood by: -

- A heavy spin followed by a light spin
- A light spin followed by a heavy spin
- A single light spin
- A single heavy spin
- A heavy spin followed by another heavy spin

Q64. Hydatid cyst fluid: -

- (a) Reacts with anti-Lu^a
- (b) Is found in echinococcus granulosus
- (c) Reacts with anti M
- (d) Inhibits anti P₁
- (e) Inhibits anti-A and anti B

Q65. The criteria for choosing a good grouping sera includes: -

- (a) Antigencity
- (b) Titre

- (c) Specificity
- (d) Viscosity
- (e) Avidity

Q66. Lectins with B antigen specificity is/are

- (a) *Crotalaria mucronata*
- (b) *Phaseolus lunatus*
- (c) *Vicia graminea*
- (d) *Lotus tetragonolobus*
- (e) *Dolichous biflorus*

B.T.S

Q.1. Samples to be collected:

- | | | |
|---|---|---|
| . Donor's unit | - | 1 |
| . Patient's pre-transfusion sample | - | 1 |
| . Patient's post-transfusion clotted sample | | |
| - E.D.T.A. sample | - | |
| - Heparinized blood sample | | |
| . Urine sample | - | 1 |

Q.2. Regroup donor's unit post and pre-transfusion samples
Of the patient

- 3

Q.3. Repeat X-match using the donor's unit and the
patient's pre and post transfusion samples

- 3

Q.4. Antibody screening test on post and pre-transfusion
samples

- 2

Q.5. Do antibody identification if positive

- 1

Q.6. Do haemogram and blood film examination on the
Post transfusion E.D.T.A. sample

- 1

Q.7. Do osmotic fragility using heparinized sample

- 1

Q.8. Check the colour of donor's unit, labelling, expiry date

- 1

Q.9. Do blood culture on the donor's unit

- 1

Q.10. Do the direct Coomb's on the post transfusion sample

-

1

- Q.11. Do the estimation bilirubin levels - 1
- Q.12. Detection of Hb in urine or Iron using the Prussian
Blux technique RBC's casts etc - 1

Q.2. Factors

- . Age
- . Physical appearance
- . Lactating mothers
- . Intervals of donating should be a minimum of 8 weeks
- . Suffering from hepatitis
- . Alcoholism and drug addicts
- . Bleeding disorders
- . Hemoglobin levels males 13.5 to 18.6 gms
females 11.5 to 16.5 gms
- . People suffering from syphilis and A.I.D.S.
- . Diabetic people
- . Abnormal blood pressure
- . People with kidney problems etc

Total = 20 marks

Q.3. Cryoprecipitate

- a)
- Definition - 1
 - Preparation - 1
 - Storage - 1
 - Uses - 1

Total = 5 marks

b) Anti Lua

- It binds complement - 1
- It shows Meberly Agglutination - 1
- Shows dosage effect - 1
- Detected by indirect antiglobin test - 1
- It reacts in saline medium - 1

Total = 5 marks

c) Indirect Coombs test

- | | | | | |
|---|------------------------------------|---|---|---------|
| - | Definition | - | 1 | |
| - | Principle | - | 2 | |
| - | Types of indirect Coombs test e.g. | | | |
| | - Antibody screening | } | | |
| | - Antibody identification | } | | |
| | - X-match | } | - | 2 |
| | - Du tests | } | | |
| | Total | = | | 5 marks |

d) C.P.D.A. antincoagulant

- | | | | | |
|---|-----------------------------|---|---|---------|
| - | Definition | - | 1 | |
| - | Composition | - | 2 | |
| - | life | - | 1 | |
| - | Advantage and disadvantages | - | | 1 |
| | Total | = | | 5 marks |

Q.1. D, E

Q.2. A, D

Q.3. B

Q.4. B

Q.5.

Q.6. D

Q.7. B

Q.8. C

Q.9. B, C

Q.10. E

Q.11. B

Q.12. D

Q.13. D, E

Q.14. B & C

Q.15. D

Q.16. D, E

Q.17. B, E

Q.18. A, D

Q.19. B, D

Q.20. C, D

Q.21. A, E

Q.22. D

Q.23. B, E

Q.24. D

Q.25. E

Q.26. D, E

Q.27. C, E

- Q.1. You are provided with O reagent red cell master list, ten (10) panel cells labeled 1 – 10, patient's serum whose antibody screening test AST reacted best at Albumin phase. Carry out tests to identify the antibody (ies) responsible for the patient's Transfusion reactions. Show your workings.

(30 marks)

- Q.2. Sample K is from antenatal mother who is pregnant with a 3rd child and has been referred from a sub-district hospital. Carry out tests necessary for the antenatal screening and comment on your findings.

(30 marks)

- Q.3. You are provided with Sample "X" "Y" and "Z". Carry out forward and reverse grouping. Comment on your results.

(30 marks)

- Q.4. Given samples labelled "A" and "B" from Haematology clinic patient suspected to have haemolytic anaemia. Carry out necessary tests and comment on your findings.

(30 marks)

- Q.5. You are provided with samples labelled D₁ and D₂ of possible donors for a patient who requires to be transfused with 1 pint of blood (patient's blood group is A positive and labelled "P"). Perform the necessary tests to provide the patient with safe blood. Comment on your findings.

(30 marks)

- Q.1. The terminal sugars of the antigen:
a) Are responsible for specificity of the antigen

- b) Are responsible for antigenicity of the antigen
 - c) Are proteinous in nature
 - d) Will not be found in infants cells
 - e) Are polysaccharides
- Q.2. The following are used to reduce the Zeta potential:
- a) De-ionized water
 - b) A-serum
 - c) 22% bovine albumin
 - d) Enzyme
 - e) Normal saline
- Q.3. Factors affecting immunogenicity are:
- a) The chemical structure of the antigen
 - b) The race of the host
 - c) Route of introduction
 - d) The diet of the host
 - e) The occupation of the host
- Q.4. Neutralization test:
- a) Is used to detect leucocytes antibodies
 - b) Cannot detect immune antibodies
 - c) Confirm if an individual is a secretor or non-secretor
 - d) Is used in Rhesus grouping
 - e) Can be applied in disputed parentage cases
- Q.5. The following are some of the risks of blood transfusion on the recipient:
- a) Loss of appetite
 - b) Viral hepatitis
 - c) HIV infection
 - d) Blood group alteration
 - e) Loss of weight
- Q.6. Red Blood cells antigens are made up of:
- a) Polysaccharides portion
 - b) Amino Acids portion
 - c) Enzymes
 - d) Globulins
 - e) Mineral salts
- Q.7. Blood Transfusion reaction may occur due to:
- a) Incompatible blood transfusion

- b) Malaria
 - c) Nervous syndrome
 - d) Allergy
 - e) AIDS
- Q.8. If a father is homozygous A and the mother heterozygous B their offspring will have the following blood group:
- a) A
 - b) AB
 - c) B
 - d) O
 - e) A, B AB and O
- Q.9. Antigen synthesis and insertion onto the cell membrane occurs during red blood maturation in the:
- a) Spleen
 - b) Bone marrow
 - c) Liver
 - d) Heart
 - e) Kidneys
- Q.10. Plasma is not preferred in Blood Transfusion for serological tests because:
- a) Plasma contains complement components
 - b) Calcium and magnesium ions have been removed
 - c) Fibrinogen is present
 - d) Plasma forms fibrin clot
 - e) It gives a positive reaction in hemolysis
- Q.11. Indirect coomb's test differs from direct coomb's test in that:
- a) It requires incubation at 37 C
 - b) It requires patient cells
 - c) It requires patient serum
 - d) It does not require incubation
 - e) It detects sensitized cells in VIVO
- Q.12. The following enzymes can be extracted from fruits:
- a) Trypsin
 - b) Bromelin
 - c) Papain
 - d) Trypsinogen
 - e) Enterokinase
- Q.13. Individual who lack Se gene and of the phenotype Oh.

- a) Secrete A blood group specific substance only
- b) Secrete H blood group specific substance only
- c) Secrete A and H blood group specific substances
- d) Secrete A and O substances
- e) Is a non-secretor

Q.14. Most of the Rhesus antibodies are:

- a) IgM
- b) Natural antibodies
- c) IgA
- d) Immune antibodies
- e) IgG

Q.15. Terminal sugar N-acetylgalactosamine and D-galactose determines the specificity of blood group:

- a) AB
- b) A only
- c) B only
- d) D only
- e) M.N. only

Q.16. Rhesus null phenotype cells will only react with:

- a) Anti D
- b) Anti E
- c) Anti C
- d) Anti e
- e) None of the above antibodies

Q.17. Pooled blood is used in:

- a) Cross matching
- b) Antibody screening test
- c) Indirect coomb's test
- d) Antibody identification test
- e) D^u testing

Q.18. If genes are co-dominant this means that:

- a) All genes will be suppressed
- b) Is a congenital abnormality
- c) Any gene present will be expressed
- d) Only O-gene will be expressed on RBCs
- e) Inhibition of genes does not occur

Q.19. The surface charge of Red Blood Cells is maintained by:

- a) A antigens
- b) B antigens
- c) AB antibodies
- d) O antigens
- e) Sialic acid resides on the surface RBC

Q.20. Anti human serum specific for IgG antibodies is produced by injecting rabbits with purified human:

- a) Alpha globulin
- b) Gamma globulin
- c) Beta globulin
- d) Delta globulin
- e) Mu globulin

Q.21. Sese gene is responsible for:

- a) Rhesus blood group system
- b) Bombay phenotype
- c) Hemolysin
- d) ABH secretion
- e) Cellular antigen

Q.22. The following anticoagulants are used for Blood Transfusion:

- a) CPDA
- b) ACD
- c) EDTA
- d) Ammonium oxalate
- e) Flouride

Q.23. The most abundant immunoglobulin is:

- a) IgM
- b) IgG
- c) IgA
- d) IgD
- e) IgE

Q.24. In the ABO blood group system there are:

- a) 4 genotypes
- b) 4 phenotypes
- c) 6 genotypes
- d) 3 phenotypes
- e) 3 genotypes

Q.25. Anti C will react with the following red blood cells:

- a) Rh₁ cells
- b) rhy cells
- c) Rh₂ cells
- d) Rh_o cells
- e) rh^u cells

Q.26. Extravascular transfusion reaction occurs in the:-

- a) Brain
- b) Oesophagus
- c) Stomach
- d) Liver
- e) Kidney

ESSAY

Q.1. Discuss in details the differences between Natural and Immune antibodies (20 marks)

Q.2. Write short notes on:

- a) Hemolysis
- b) Bombay phenotypes
- c) D^u
- d) Rhesus null phenotype

(20 marks)

Q.3. Discuss the ABH blood group system in details (20 marks)

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

Q.1. The biological functions of the FC fragment is/are:

- a) Antigen binding
- b) Complement fixation
- c) Antibody binding
- d) Placental transfer
- e) Production of antibodies

Q.2. Blood group specific substances are:

- a) Alcohol soluble

- b) Water soluble
- c) Haptens
- d) Amino acid with muco-polysaccharide fraction
- e) Antibodies of high specificity

Q.3. An offspring of genotype rr will give positive reaction with the following antibodies:

- a) Anti Rh₀
- b) Anti rh¹
- c) Anti hr¹
- d) Anti hr¹¹
- e) Anti rh¹

Q.4. The following are some of the ABO grouping panel cells:

- a) A cells
- b) O cells
- c) Dcê cells
- d) DCE cells
- e) Rh. Cells

Q.5. The following reagents must be added to 22% to prevent over polymerization:

- a) Calcium chloride
- b) Caprylate
- c) Sodium alginate
- d) 1% Sodium azide
- e) Ammonium Sulphate

Q.6. Zeta potential is reduced by:

- a) De-ionized water
- b) Centrifugation
- c) 22% bovine albumin
- d) Enzymes
- e) Sodium Sulphate

Q.7. Which of the following fixes complement?

- a) IgG
- b) IgA
- c) IgM
- d) IgD
- e) IgE

- Q.8. Anti-Human serum specific for complement component is produced by injecting rabbits with purified human:
- a) Beta globulin
 - b) Alpha globulin
 - c) Gamma globulin
 - d) Delta
 - e) Mu
- Q.9. The following are some of the characteristics of a natural antibody:
- a) Incomplete antibodies
 - b) Complete antibodies
 - c) 1gM
 - d) Are usually 250A° in length
 - e) Crosses the placental barrier
- Q.10. Which of the following is/are adjuvants?
- a) 10% formaline
 - b) 4% Sodium alginate
 - c) Freund's adjuvant
 - d) Liss
 - e) Caprylate
- Q.11. The low grade D^u red cells:
- a) Can be detected using 1gM anti D
 - b) Can falsely be typed as Rhesus negative
 - c) Can be detected using anti human globulin (AHG) technique
 - d) Can be transfused to Rhesus negative individuals safely
 - e) Is considered as Rhesus negative
- Q.12. A major X-match will not:
- a) Raise the Hb-level of the patient
 - b) Prevent immunization
 - c) Detect ABO errors
 - d) Detect errors of documentation
 - e) Be done during emergency
- Q.13. If the phenotype is DCC^{EE} what are the probable genotype?
- a) D^C^E/d^C^E
 - b) DCE/Dce
 - c) DCE/DCE
 - d) D^C^E/d^C^E

e) D^cE/Dce

Q.14. If a parent is homozygous AA and the other is OO, their offspring will be blood group:

- a) A
- b) B
- c) O
- d) AB
- e) AO

Q.15. Red blood cells antigens are made up of:

- a) Polysaccharide
- b) Amino acid
- c) Peptides
- d) Enzymes
- e) Mineral salts

Q.16. In ABO blood group system there are:

- a) 4 genotypes
- b) 4 phenotypes
- c) 6 genotypes
- d) 6 phenotypes
- e) 8 genotypes

Q.17. The following are Rhesus grouping techniques:

- a) ABO Forward grouping
- b) ABO Reverse grouping
- c) Antibody Screening Test
- d) Direct Coomb's test
- e) Stration Sandwich method

Q.18. The fisher-race gene complex D^cE is equivalent to:

- a) R_y
- b) R_o
- c) R₁
- d) R
- e) R_z

Q.19. Rhesus antibodies:

- a) Occur naturally
- b) Are IgM
- c) Are complete antibodies
- d) Belong to IgA class
- e) Belong to IgG class

Q.20. Plasma is not preferred in blood transfusion for serological tests because:

- a) Plasma contains complement components
- b) Calcium and Magnesium ions have been removed
- c) Fibrinogen is present
- d) Plasma forms fibrin clots
- e) It gives a positive reaction in haemolysis

Q.21. Complement component can be obtained from:

- a) Guinea pig fresh serum
- b) Birds fresh serum
- c) Reptiles fresh serum
- d) Plant
- e) Rabbits fresh serum

Q.22. If Beta and gamma anti human serum is sourced from one colony it is said to be:

- a) Monoclonal
- b) Polyspecific
- c) Polyclonal
- d) Monologous
- e) Monospecific

Q.23. The immunoglobulins that are capable of crossing the placental barrier are:

- a) IgM
- b) IgG
- c) React optimally at 37°C
- d) React optimally at R.T
- e) IgD

SECTION B: ESSAY (60 MARKS)

Q.1. Draw a well labelled diagram of IgG molecule and give ten (10) characteristics (20 marks)

Q.2. Write short notes on:

- a) Bombay phenotype
- b) Coomb's reagent
- c) 22% bovine albumin
- d) Rhesus null phenotype
- e) D^u

(20 marks)

Q.3. List down ten (10) differences between natural and immune antibodies (20 marks)

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

Q.1. The biological functions of the FC fragment is/are:

- a) Antigen binding
- b) Complement fixation
- c) Antibody binding
- d) Placental transfer
- e) Production of antibodies

Q.2. Blood group specific substances are:

- a) Alcohol soluble
- b) Water soluble
- c) Haptens
- d) Amino acid with muco-polysaccharide fraction
- e) Antibodies of high specificity

Q.3. An offspring of genotype rr will give positive reaction with the following antibodies:

- a) Anti Rh₀
- b) Anti rh¹
- c) Anti hr¹
- d) Anti hr¹¹
- e) Anti rh¹

Q.4. The following are some of the ABO grouping panel cells:

- a) A cells
- b) O cells
- c) D^c cells
- d) DCE cells
- e) Rh. Cells

Q.5. The following reagents must be added to 22% to prevent over polymerization:

- a) Calcium chloride
- b) Caprylate
- c) Sodium alginate
- d) 1% Sodium azide
- e) Ammonium Sulphate

Q.6. Zeta potential is reduced by:

- a) De-ionized water
- b) Centrifugation
- c) 22% bovine albumin

- d) Enzymes
- e) Sodium Sulphate

Q.7. Which of the following fixes complement?

- a) 1gG
- b) 1gA
- c) 1gM
- d) 1gD
- e) 1gE

Q.8. Anti-Human serum specific for complement component is produced by injecting rabbits with purified human:

- a) Beta globulin
- b) Alpha globulin
- c) Gamma globulin
- d) Delta
- e) Mu

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SECTION B: ESSAY (60 MARKS)

- Q.1. Draw a well labelled diagram of 1gG molecule and give ten (10) characteristics (20 marks)
- Q.2. Write short notes on:
a) Bombay phenotype
b) Coomb's reagent
c) 22% bovine albumin
d) Rhesus null phenotype
f) D^u (20 marks)
- Q.3. List down ten (10) differences between natural and immune antibodies (20 marks)

M.C.Q: 40 MARKS

- Q1. An immune response depends on:
Sex
Race
Altitude
Immunogenecity
Dose of antigen
- Q2. Nucleated cells involved in fighting infections and making antibodies are called?
(a) Lymphocytes
(b) Thrombocytes
(c) Histiocytes
(d) Mast cells
(e) Erythrocytes
- Q3. The force at the boundary of shear due to differences in electrostatic potential is called:
Ionic cloud
Slipping plane
Dielectric constant
Zeta potential
Isoelectric point
- Q4. An antibody with unknown antigenic stimulus is called?
(a) Heterophile antibody
(b) Natural antibody
(c) Monoclonal antibody
(d) Irregular antibody

(e) Anti-complement

Q5. Low ionic strength saline (LISS) is preferred more than isotonic saline because:

- a) Cells suspended in it rarely lyse compared with isotonic saline
- b) It decreases the chances of abnormal antigen-antibody interactions
- c) It is cheaper than isotonic saline
- d) It increases rapid uptake of antibodies on to red cells
- e) It requires shorter incubation time

Q6. Antibodies that do not cause agglutination of cells are:

- (f) Unblocking
- (g) Complete antibodies
- (h) Sensitizing antibodies
- (i) Incomplete antibodies
- (j) Saliva agglutinins

Q7. Which of these components are synthesized in the liver:

- C9
- C4
- C2
- C6
- C1

Q8. The following has the capacity to activate the C1_{q,r,s} assembly:

- (f) Ig A
- (g) Ig E
- (h) Ig M
- (i) Ig D
- (j) C₄

Q9. "H" and "A" genes, code for the addition of:

- (a) D - galactose
- N- acetylgalactosamine
- Fructose
- L - fucose
- N- acetylglucosamine

Q10. Candidates for Rhogam must satisfy the following conditions:

- (a) The mother must be Rh Positive
- (f) The newborn must be Rh Positive and jaundiced
- (g) The mother must be Rh Negative

- (h) The mother must be Rh Negative and antibody screening positive
- (i) The mother must be Rhesus Positive with high titre of anti-D

Q11. Given the phenotype as D^cE. The following are possible genotype:

- (a) R₂ r''
- R₀R₂
- R₂ r'
- R₂ R₂
- R₂ R_Z

Q12. Incidence of rouleaux formation is higher in patients suffering from:

- (a) Malaria
- (b) Kala-azar
- (c) Trachoma
- (d) Dysentery
- (e) Multiple myeloma

Q13. Avidity refers to:

- (f) Strength of an antibody
- (g) Type of an antibody
- (h) Concentration of the antigen
- (i) False positive
- (j) Time taken for the reaction to occur

Q14. Which of the following is correct about O^h phenotype:

- a) A,B genes are always absent
- b) The 'H' gene is absent
- c) The 'h' gene is absent
- d) RBC's carry only 'H' antigens
- e) The serum contains anti-A,anti-B,anti-H

Q15. The source of lectin anti-A₁ is:

- a) *Dolichos biflorus*
- b) *Iberis amara*
- c) *Lotus tetragonolobus*
- d) *Vicia graminea*
- e) *Ulex europeaus*

Q16. Serum from group B agglutinates

- a) A₂ cells
- b) O cells
- c) B cells
- d) O^h cells
- e) A₁ cells

- Q17. The albumin - 37°C phase of cross-match will detect the following antibodies:
- (a) Regular anti-A and anti-B
 - (b) Immune anti-A and anti-B
 - (c) Rhesus antibodies
 - (d) Anti-P.
 - (e) Anti-M.
- Q18. Low grade D^u:
- (a) Can be considered as Rh-negative donor.
 - (f) Can be falsely typed as Rh Negative
 - (g) Is easily detected using saline anti-D
 - (h) Is considered as an Rh Positive donor
 - (i) Is not easily detected using Anti-human Globulin
- Q19. When natural antibody A is mixed and incubated with its corresponding blood group specific substance, the following takes place.
- Agglutination
 - Inhibition of Anti-A
 - Haemolysis
 - Precipitation
 - Neutralization of Anti-A
- Q20. Which of these blood group systems can cause haemolytic disease of the newborn:
- (f) Kell
 - (g) MN
 - (h) Kidd
 - (i) P
 - (j) Xg
- Q21. Washed red cells are indicated in:
- Severe anaemia
 - Platelet deficiency
 - Bleeding disorders
 - Patient with leukocyte antibodies
 - Protozoal injections
- Q22. The Anti-human Globulin phase in antibody screening test detects:
- (f) Incomplete antibodies
 - (g) Cold antibodies

- (h) Natural antibodies
 - (i) Antibodies that react at 4°C
 - (j) Iso-antibodies
- Q23. Which of these is included in the CPDA, solution:
- (a) Sodium chloride
 - Adenine
 - Glycerol
 - Arabinose
 - Fructose
- Q24. Which of these blood group systems exhibits dosage:
- (a) ABO
 - (f) Lewis
 - (g) Rhesus
 - (h) MNSs
 - (i) P system
- Q25. Mulberry-like agglutination is characteristic of:
- Lewis system
 - Kell system
 - MNSs system
 - Lutheran system
 - P system
- Q26. Which of these may bar a volunteer donor:
- (f) Recent history of vaccination
 - (g) Age 18-65
 - (h) Good physique
 - (i) Hb concentration of 13 g/dl
 - (j) The last donation was four months ago
- Q27. Which of these changes occur in refrigerated blood:
- (a) Red cells become more viable
 - The plasma becomes xanthochromic
 - (c) Red cells lose viability
 - (d) The effect of anticoagulant improves
 - (e) The dextrose level becomes elevated
- Q28. Synthetic plasma expanders in serum may cause:
- (f) Haemolysis
 - (g) Elution
 - (h) Sensitization
 - (i) Agglutination
 - (j) Rouleaux formation

ESSAY QUESTIONS: 60 MARKS

- Q1. Write in detail on laboratory investigations of a suspected transfusion reaction. (20 marks)
- Q2. Describe the factors that will influence an antigen- antibody reaction in vitro: (20 marks)
- Q3. Write short notes on the following:
Rhesus null
Universal donor
Kidd blood group system
Exchange transfusion (20 marks)
1. The following are treatment of a baby suffering from Haemolytic disease of the new born (HDNB) EXCEPT
(a) Phototherapy
(b) Inter-uterine transfusion
(c) Induction of early labour
(d) Estimation of bilirubin
 2. The following are adjuvants used together with globulins to inject rabbit when preparing AHG EXCEPT
(a) Sodium chloride
(b) 4% sodium alginate
(c) Freund's adjuvants
(d) Ammonium sulphate
(e) 40% saturated ammonium sulphate
 3. The antibodies which react best at 4°C is/are
(a) Anti M
(b) Anti P
(c) Anti I
(d) Anti A1
(e) Anti C
 4. Normal cold auto-agglutinins react at the temperatures of:-
(a) -1°C to 1°C
(b) 0°C to 2°C
(c) 10°C to 18°C
(d) 15°C to 22°C
(e) 2°C to 8°C
 5. Donath Landsteiner antibody has the following characteristics:-
(a) Provides haemolysis both in vivo and vitro

- (b) Reacts at 37°C only
 - (c) Does not bind compliments
 - (d) Beats only at room temperature (R.T)
 - (e) Associated with paroxysmal cold haemoglobinuria (PCH)
6. The ABO antigens can first be detected at
 - (a) 6 weeks of foetal life
 - (b) 6 months of foetal life
 - (c) at birth
 - (d) 6 weeks after birth
 - (e) 3 months after birth
 7. G6PD enzyme is needed so that the red blood cells can
 - (a) Preserve its membrane
 - (b) Maintain its shape and flexibility
 - (c) Can be susceptible to auto-haemolysis
 - (d) Electrolytes can move easily
 - (e) Control production of antibodies
 8. Ulex europeas is
 - (a) lectin with Anti A₁ specificity
 - (b) lectin with Anti H specificity
 - (c) lectin with Anti M specificity
 - (d) lectin with Anti N specificity
 - (e) lectin with Anti I specificity
 9. The blood group which is more at risk when receiving universal blood group O is:-
 - (a) A
 - (b) B
 - (c) AB
 - (d) O
 - (e) B and A
 10. The avidity of Anti A with A₂ cells is:-
 - (a) 10 seconds
 - (b) 15 seconds
 - (c) 20 seconds
 - (d) 25 seconds
 - (e) 30 seconds
 11. The following is/are referred to as second order of exclusion:-
 - (a) Man b/Group O, child is A while mother is O
 - (b) Man homozygous CC child Cc child Cc while mother Cc
 - (c) Man heterozygous Cc child cc while mother Cc
 - (d) Man homozygous Cc child cc while mother Cc

- (e) Man b/Group A child O while mother is B
12. Breast milk is a rich source of which of the following blood groups
- (a) Lewis
 - (b) Xg
 - (c) Kidd
 - (d) Kell
 - (e) MNSS
13. The offspring of parents who are both heterozygous B will be blood groups
- (a) BO
 - (b) B
 - (c) O
 - (d) AB
 - (e) Oh
14. The gene Rh^1 is equivalent to fisher-race genes
- (a) $Dc\bar{e}$
 - (b) $dC\bar{e}$
 - (c) $DC\bar{e}$
 - (d) DcE
 - (e) dcE
15. Anti-T can be prepared from
- (a) *Arachis graminea*
 - (b) *Vicia graminea*
 - (c) *lbens amara*
 - (d) *Anguilla Anguilla*
 - (e) *Ulex Europeans*
16. Blood stored in dark refrigerator develops
- (a) Purple colour
 - (b) Yellow colour
 - (c) Green colour
 - (d) Cloudy colour
 - (e) Golden colour
17. The recommended temperature when transporting all liquid red blood cell products during shipment is/are:-
- (a) -1°C to -10°C
 - (b) 2°C to 8°C
 - (c) 1°C to 10°C
 - (d) 0°C to 4°C
 - (e) 12°C to 25°C

18. Investigations of a haemolytic transfusion reactions falls conveniently into:-
- (a) Obtaining evidence of increased red cell destruction
 - (b) Transfusing plasma only
 - (c) Identifying the cause of increased cell destruction
 - (d) Identifying the donor
 - (e) Type of transfusion reaction
19. Transfusion of red cells concentrate is indicated in patient suffering from the following:-
- (a) Megaloblastic anaemia
 - (b) Chronic renal failure
 - (c) Leukaemia
 - (d) Iron deficiency anaemia
 - (e) Pernicious anaemia
20. The fresh frozen plasma when in frozen state has a life span of:-
- (a) 24 hours
 - (b) 24 months
 - (c) six months
 - (d) one year
 - (e) 18 months
21. The dye added to anti A and Anti B is:-
- (a) Trypan blue
 - (b) Acriflavine
 - (c) Methylene blue
 - (d) Copper sulphate
 - (e) Crystal violet
22. ABH whitebky substance is important when you want to:-
- (a) Screen for immune Anti A and Anti B
 - (b) Neutralize natural occurring antibodies
 - (c) Screen for HIV infection
 - (d) Screen for immune Le a and anti P1
 - (e) Screen for haemolysin M and N
23. Which of the following anticoagulants are used in blood transfusion
- (a) Potassium oxalate
 - (b) Sodium citrate
 - (c) Heparin
 - (d) Ethylylene diamim fetra-acetic acid (EDTA)
 - (e) Citrate phosphate dextrose
24. The main cause of haemolytic disease of the newborn is/are
- (a) Warm immune antibodies

- (b) Paternal antibodies
 - (c) Cold antibodies
 - (d) Maternal antibodies
 - (e) Foetal antibodies
25. The Intra-uterine transfusion is usually given at:-
- (a) 28 weeks of pregnancy
 - (b) 30 weeks of pregnancy
 - (c) 34 weeks of pregnancy
 - (d) 38 weeks of pregnancy
 - (e) any time when anaemia is noted
26. The enzyme coded by B gene
- (a) N-acetyl galactose-aminyl transferase
 - (b) N - acetyl galactose amine
 - (c) D - galactosyl transferase
 - (d) D - galactose
 - (e) Fucose
27. The term Iso - haemagglutinins refers to:-
- (a) Immune antibodies
 - (b) Natural antibodies
 - (c) Cold antibodies
 - (d) Warm antibodies
 - (e) Auto-immune antibodies
28. In weiner theory the factors Rho, rh^1 and hr^{11} will be equivalent to which agglutinin
- (a) DCE
 - (b) DcE
 - (c) DCe
 - (d) dce
 - (e) dcE
29. In Rhesus null the x^1r/x^0r will result to
- (a) Normal
 - (b) Heterozygous (partial suppression)
 - (c) Homozygous (complete suppression)
 - (d) 50% normal and 50% heterozygous
 - (e) 50% complete suppression
30. In Rhesus missing the following antigen (s) is missing EXCEPT
- (a) D
 - (b) C
 - (c) E
 - (d) c

- (e) ē
31. The production of an antibody stimulation from a member of same species is referred to as:-
(a) Hetero-immunization
(b) ISO - immunization
(c) Immune response
(d) Auto - immunization
(e) Anamnestic response
32. Which of the following is an example of cryoprotectant substance
(a) Glycerol
(b) Plasma
(c) Dimethyl sulfoxide (DMSO)
(d) 10% calcium gluconate
(e) factor XIII
33. The following blood groups can be used in disputed paternity EXCEPT
(a) ABO blood group system
(b) Rhesus blood group system
(c) Lutheran blood group system
(d) P blood group system
(e) MNSS blood group system
34. Anaphylactic reaction is associated with
(a) Ig G
(b) Ig A
(c) Ig E
(d) Ig M
(e) Ig D
35. The best plasma for testing HLA - Antigen should be preserved with:-
(a) EDTA
(b) Acid citrate dextrose
(c) Sodium citrate
(d) Phenol-free heparin
(e) Citrate phosphate
36. In blood transfusion negligence is based on which elements
(a) Duty, breach, causation and damages
(b) Duty, standards and damages
(c) Duty, battery, contracts and fault
(d) Violence of common law and civil ordinances
(e) Statutes, regulations, and representation

37. Advantages of monoclonal antibodies over polyclonal antibodies includes the following EXCEPT
 - (a) Can be produced in unlimited quantities
 - (b) Consistent specificity
 - (c) Easy to elute
 - (d) Consistent reproducibility
 - (e) Not contaminated with non-immunoglobulin proteins
38. Which of the following blood group can not be detected by the use of enzyme technique
 - (a) Kell
 - (b) Lewis
 - (c) Duffy
 - (d) MNSS
 - (e) Lutheran
39. ryr'' is equivalent to the fisher-race nomenclature:-
 - (a) DCE/dcE
 - (b) dc E/DC $\bar{e}$
 - (c) DcE/DcE
 - (d) DcE/dce
 - (e) dce/dcE
40. Anti A₁ is produced by:-
 - (a) 2% group A₂
 - (b) 25% group A₂B
 - (c) 2% group A₂B
 - (d) 25% group A₁B
 - (e) 25% group A^w
41. Donors with the following conditions should be deferred
 - (a) Obesity
 - (b) Sickle cell diseases
 - (c) Women of age bearing
 - (d) Sexually active healthy men
 - (e) Glucose - 6 - phosphate dehydrogenase
42. The following test(s) are used when screening for universal donors:-
 - (a) Direct coombs test
 - (b) Indirect coombs test
 - (c) Test for haemolysis
 - (d) Auto-agglutination test
 - (e) Neutralization test
43. The term "dominant" recessive refer to
 - (a) Genes themselves

- (b) Antigens
 - (c) Antibodies
 - (d) Haptens
 - (e) Genes expression
44. Terminal sugars of the antigens
- (a) Are proteins in nature
 - (b) Are responsible for specificity
 - (c) Occurs only in adult red cells
 - (d) Will only be found in infants
 - (e) Are responsible for avidity
45. The minimum interval allowed between apheresis component collection procedure is
- (a) 24 hrs
 - (b) 48 hrs
 - (c) 7 days
 - (d) 8 weeks
 - (e) 3 months
46. The modifier gene X^{or}
- (a) Results into Bombay phenotype
 - (b) Encountered in infants only
 - (c) Responsible for Rhesus null
 - (d) Encountered in secretor gene only
 - (e) Suppress genes of ABO system
47. The most significance sub-groups of are is/are
- (a) A₁
 - (b) A₂
 - (c) A_x
 - (d) A_m
 - (e) A end
48. The main function of a placenta is:-
- (a) Prevent foreign antibodies from entering to foetus
 - (b) To increase immunity of the mother
 - (c) Manufacture antibodies
 - (d) Exchange of substances between the mother and the foetus
 - (e) To allow Ig M antibodies to cross to the foetus
49. The following are hazards of exchange transfusion EXCEPT
- (a) Air embolism
 - (b) Citrate toxicity
 - (c) Use of ice cold blood
 - (d) Potassium toxicity

- (e) Anaemia
50. The protein containing A, B and H gene specific antigenicity corresponding to their ABO blood group is referred to as:-
(a) Bilipids
(b) Oligoprotein
(c) Glycoprotein
(d) Glycolipids
(e) Saccharide
51. The following is/are donor recruitment tools EXCEPT
(a) giving cash to donor everytime he/she donates
(b) advertising in media and audios
(c) giving caps and T-shirts
(d) good public relationship
(e) forcing a donor to donate if she/he is health
52. In tissue typing the following tests are used
(a) Immunodiffusion
(b) Mancin
(c) Electrophoresis
(d) Serologically defined (SD) antigens
(e) Mixed lymphocyte reactions (MLR)
53. The term agammaglobulinaemia refers to the following conditions
(a) Lack of Tcell response
(b) Defective phagocytic system
(c) Lack of humoral immune response
(d) Lack of immunoglobulins in the serum of the affected individuals
(e) Deficiency affecting the compliment system
54. Which of the following is true about the ELISA test
(a) It is a highly sensitive test
(b) The enzyme substrate combination is crucial
(c) Positive is often associated with colour change
(d) It can not give quantitative results
(e) Radioactive isotopes are used as indicators
55. The preferred route for exchange transfusion is:-
(a) Umbilical arteries
(b) Hand vein
(c) Umbilical vein
(d) Hand arteries
(e) I.M – route

56. Pre-deposit donation and intra-operative transfusion is associated with:-
(a) Volunteer donor
(b) Relative donor
(c) Autologous donor
(d) Commercial donor
(e) Replacement donor
57. When doing donor recruitment the most related problem is/are:-
(a) Lack of vehicle
(b) Lack of well trained personnel
(c) Fear of knowing HIV status
(d) Lack of stationary
(e) Little knowledge and various myths/misconception about blood donation
58. Blood stored in heparin anticoagulant for transfusion purposes has a life span of:-
(a) 24 hours
(b) 48 hours
(c) 72 hours
(d) 3 days
(e) one week
59. The recommended temperatures for storage of blood is:-
0°C to 10°C
-1°C to 10°C
2°C to 6°C
0°C to 4°C
1°C to 12°C
60. The parents of AO and OO will have the offsprings of:-
(a) A
(b) B
(c) AB
(d) O
(e) Oh
61. The blood group genes not carried on autosome belong to
(a) ABO system
(b) Rh system
(c) Duffy system
(d) Xg system
(e) MNSS system

62. Weak antigens may be found as acquired characteristics in the following conditions
Haemolytic disease of the new born
Hereditary spherocytosis
Transfusion reactions
Leukaemia
Carcinomatosis
63. Copper sulphate method for screening donors have the following disadvantages
Time consuming
It is very expensive
Must be prepared fresh always (stocks)
Anaemia donors with high plasma proteins concentration may be accepted as normal donors
Under estimates haemoglobin concentration so that donors are rejected unnecessarily
64. The following reagents is/are used to give colour to grouping sera's
Sky blue
Tartrazine
Amino acid
Sodium azide
Methylene blue
65. 22% bovine albumin is composed of
Sodium sulphate
Caprylate
4% sodium azide
con. Sodium azide
calcium chloride
66. The antigens of the following blood groups system are not well developed at birth
(a) Lewis
(b) Lutheran
(c) Kell
(d) Xg
(e) Bombay
67. Blood group specific substances are:-
(a) Soluble in alcohol
(b) Found in body fluids
(c) Muco-proteins
(d) Lipo proteins
(e) Found in red blood cells

68. The main use of Anti human globulin (AHG) is to
(a) Sensitize cells
(b) Lyse the red blood cells
(c) Cause red blood cell haemolysis
(d) Form bridges for agglutination
(e) Cause agglutination when mixed with the RBC
69. Transfused red blood cell survival can be investigated by
(a) 2 - Mercapto ethanol technique
(b) estimating blood volume
(c) reticulocyte count
(d) radio-isotope method
(e) differential agglutination method

PAPER III

MCQs

(40 marks)

- Q.1. Serum from blood group B agglutinates:
a) B cells
b) A cells
c) AB cells
d) O cells
e) O^h cells
- Q.2. Rh antigens are:
a) Lipoprotein
b) Glycoprotein
c) Mucosaccharides
d) Glycolipid
e) Found on Rbc surface membrane only
- Q.3. During the 2nd stage of hemolysis the following happens:
a) Haemoglobin is released into solution
b) Haemolysis occurs
c) Haemolysin attaches onto the haemolysinogen
d) Complement fixation takes place
e) Agglutination occurs
- Q.4. Compatibility testing:
a) Prevent isoimmunization
b) Does not detect all errors in Rh-typing
c) Detects most errors in ABO typing

- d) Includes direct Coomb's test
 - e) Can be performed using plasma
- Q.5. The enzyme commonly used in transfusion science is:
- a) Trypsin
 - b) Papain
 - c) Pepsin
 - d) Resin
 - e) Amylase
- Q.6. The recommended temperature for storage of packed cells is:
- a) 37° C
 - b) Room Temperature
 - c) 25° C
 - d) -4° C
 - e) 4 - 6° C
- Q.7. Saline for washing Rbc's has a pH of:
- a) 7.6 - 8.0
 - b) 7.4 - 7.6
 - c) 7.2 - 7.4
 - d) 6.6 - 7.0
 - e) 6.0 - 6.5
- Q.8. Water soluble blood group specific substances are:
- a) Found in Rbcs
 - b) Present in lymphocytes
 - c) Controlled by secretor gene
 - d) Present in saliva
 - e) Common cause of incompatibility
- Q.9. The Lectin anti-H is prepared from the seeds of:
- a) Rose flowers
 - b) *Vicia graminea*
 - c) *Ulex europaeus*
 - d) *Dolichos biflorous*
 - e) Litmus
- Q.10. What are the possible genotypes, if the phenotype is?
- a) $r^I r$
 - b) $r^I r^y$
 - c) $r^{II} r^{11}$
 - d) rr
 - e) rr^y

Q.11. The following are some of the risks of blood transfusions in the recipient:

- a) Loss of appetite
- b) Blood group alteration
- c) Viral hepatitis
- d) Loss of weight
- e) HIV infection

Q.12. Dosage effect is exhibited by the following blood groups:

- a) Ii
- b) Rhesus
- c) Kell
- d) Ss
- e) MN

Q.13. Neonatal Jaundice can occur due to:

- a) Mother's delivery when too young
- b) Maternal diabetes
- c) Premature labour
- e) G - 6 - PD deficiency
- f) Marriage of related relatives

Q.14. The immunological functions in our body are manifested by:

- a) M - cells
- b) D - cells
- c) T - cells
- d) O - cells
- e) B - cells

Q.15. In the alternate pathway of complement activation, snake venous is equated to:

- a) C_3
- b) C_{15}
- c) $C1_{qrs}$
- d) C_{89}
- e) C_{142}

Q.16. Which of the following is/are associated with 1gm molecule?

- a) J - chain
- b) Biological half life of 5 days
- c) Is made up of 10 monomers
- d) Has a carbohydrate content of 28%
- e) Is a typical agglutinin

Q.17. Which of the following anticoagulants are used in Blood Transfusion Sciences?

- a) Sodium citrate
- b) Edglugate
- c) Potassium oxalate
- d) Ethylene diamine tetra acetic acid
- e) Citrate phosphate dextrose adenine

Q.18. Which of the following are plasma substitutes?

- a) Sodium chloride
- b) Dextran 40
- c) Hydroxethyl starch
- d) Sodium citrate
- e) Dextrose

Q.19. The portion of immunoglobulin which plays the role of complement fixation is the:

- a) Disulphide bond portion
- b) Fab fragment
- c) Light chain
- d) F.C. Portion
- e) Heavy chain

Q.20. Auto-control can be set by using a:

- a) Donor's cells and patient's cells
- b) Patients cells and donor's serum
- c) Patient's cells and O-positive cells
- d) Patient's cells and patient's serum
- e) Donor's cells and patient's serum

Q.21. The purpose of exchange transfusion is:

- a) Correct the infant's anaemia
- b) Correct the mother's anaemia
- c) Cure the infants from all congenital disease
- d) Improve tissue oxygenation without overloading the circulation
- e) To help in safe delivery

Q.22. Which of the following ions are necessary in complement activation?

- a) Calcium
- b) Phosphorus
- c) Ferric ions

- d) Magnesium
- e) Potassium ions

Q.23. An immune response depends on:

- a) Sex of the host
- b) Race
- c) Altitude
- d) Immunogenicity of the antigen
- e) Dose of the antigen

Q.24. Heparin prevents coagulation of blood by:

- a) Inhibiting calcium ions
- b) Binding calcium ions
- c) Inactivating Fibrinogen
- d) Chelating Magnesium ion
- e) Inhibiting the action of thrombin

Q.25. Given the disputed child as blood group AB and the mother is blood group A. The father is not likely to be of Phenotype:

- a) B
- b) A
- c) AB
- d) O
- e) A₂ B

ESSAY

Q.1. Discuss in detail on antibody screening. (20 marks)

Q.2. Explain the changes that take place in blood stored at 4° C (20 marks)

Q.3. Write short notes on:

- | | | |
|----|-------------------------|-----------|
| a) | D ^u variants | (5 marks) |
| b) | Secretor status | (5 marks) |
| c) | MNSs system | (5 marks) |
| d) | Rouleaux formation | (5 marks) |

TRANSFUSION SCIENCES

1. B C
2. A
3. D
4. B C
5. A B
6. C
7. C
8. C D
9. C
10. E
11. C E
12. D E
13. B D
14. C E
15. E
16. A B
17. B E
18. B C
19. D
20. D
21. A D
22. A D
23. D E
24. E
25. B D

TRANSFUSION SCIENCES

Q1. CHANGES THAT TAKES PLACE IN BLOOD STORED AT 4°C:

Loss of shape from disc to spherical.
 Loss of oxygen binding ability
 Loss of Rbcs viability
 Potassium in Rbc – decreases
 potassium in plasma – increases
 Sodium in plasma – decreases
 Sodium in RBC – Increases
 Sodium in plasma-decreases
 Plasma PH becomes acidic due to increase in lactic acid.
 Plasma haemoglobin increases due rupture of some RBCs:

Osmotic fragility increases:
 Plasma ammonia increased;
 Labile factors e.g VIII and V decreases:
 Anticoagulant changes in leukocytes:
 Loss of leukocytes:
 Reaction in heatelets
 Depletion of Red blood cells organic phosphatase i.e ATP and 2, 3 DPG.
 Depletion of ATP lead to distortion of Red cells shape from disc like to spheres loss of membrane lipids, Decrease in critical volume.
 Depletion of glucose levels.
 Others - = (1 pt each. Total 20 pts)

Q2. A well labelled Diagram: - 5 pts
 Each correct characteristics (to maximum of 15 pts) 1pt = 15 pts
 Total points = 20 pt.

Q3. Acid citrate Dextrose:
 (i) - Definition of anticoagulant - (1 pt)
 -Composition of ACD & functions
 - Trisodium citrate
 - Citric acid
 - Dextrose
 -Distilled water
 (1pt)
 - Mode of Action - binding calcium - (1 pt)
 - Advantages and disadvantage - (1pt)
 - Shelf life of blood collected in ACD - (1pt)

(ii) Agglutination -
 - definition - (1pt)
 - Stages of Agglutination: Explanation - (2 pts)
 - Abs involved - (1pt)
 - Ags - Involved - (1pt)
 - Application (1pt)
 Total - (5 pts)

(iii) Bombay phenotype
 (c)Bombay Phenotype:
 - Defination of Bombay - 1
 - Each correct characteristics - 1 pt (each)
 Total 5 points.

(d) Fresh frozen Plasma:
 - Defination: - 1
 - Preparation - 2
 - Storage - 1
 - Uses of FFP - 1

Total Points (5 pts)

1. C E
2. C D
3. C E
4. B E
5. B
6. D
7. B
8. C D
9. A
10. A C
11. A B
12. D
13. C
14. B D
15. D
16. A C
17. D
18. D
19. B C
20. E
21. D E
22. B C
23. B
24. C D
25. A E
26. A