

## AZC

### PROVISIONAL ANSWER KEY (CBRT)

Name of the post	Associate Professor, Immuno Haematology and Blood Transfusion, GSS, Class-1
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THE LINK FOR ONLINE OBJECTION SYSTEM WILL START FROM 11-09-2021; 04:00 PM ONWARDS

### Instructions / સૂચન

**Candidate must ensure compliance to the instructions mentioned below, else objections shall not be considered: -**

- (1) All the suggestion should be submitted through **ONLINE OBJECTION SUBMISSION SYSTEM** only. Physical submission of suggestions will not be considered.
- (2) Question wise suggestion to be submitted in the prescribed format (proforma) published on the website / online objection submission system.
- (3) All suggestions are to be submitted with reference to the Master Question Paper with provisional answer key (Master Question Paper), published herewith on the website / online objection submission system. Objections should be sent referring to the Question, Question No. & options of the Master Question Paper.
- (4) Suggestions regarding question nos. and options other than provisional answer key (Master Question Paper) shall not be considered.
- (5) Objections and answers suggested by the candidate should be in compliance with the responses given by him in his answer sheet. Objections shall not be considered, in case, if responses given in the answer sheet /response sheet and submitted suggestions are differed.
- (6) Objection for each question should be made on separate sheet. Objection for more than one question in single sheet shall not be considered.

**ઉમેદવારે નીચેની સૂચનાઓનું પાલન કરવાની તકેદારી રાખવી, અન્યથા વાંધા-સૂચન અંગે કરેલ રજૂઆતો ધ્યાને લેવાશે નહીં**

- (1) ઉમેદવારે વાંધા-સૂચનો ફક્ત ઓનલાઇન ઓબ્જેક્શન સબમીશન સીસ્ટમ દ્વારા જ સબમીટ કરવાના રહેશે. રૂબરૂ અથવા ટપાલ દ્વારા આયોગની કચેરીએ મોકલવા આવેલ વાંધા-સૂચનો ધ્યાને લેવામા આવશે નહીં જેની ખાસ નોંધ લેવી.
- (2) ઉમેદવારે વાંધા-સૂચનો રજૂ કરવા વેબસાઇટ / ઓનલાઇન ઓબ્જેક્શન સબમીશન સીસ્ટમ પર પ્રસિધ્ધ થયેલ નિયત નમૂનાનો જ ઉપયોગ કરવો.
- (3) ઉમેદવારે પોતાને પરીક્ષામાં મળેલ પ્રશ્નપુસ્તિકામાં છપાયેલ પ્રશ્નક્રમાંક મુજબ વાંધા-સૂચનો રજૂ કરતા તમામ વાંધા-સૂચનો વેબસાઇટ પર પ્રસિધ્ધ થયેલ પ્રોવિઝનલ આન્સર કી (માસ્ટર પ્રશ્નપત્ર)ના પ્રશ્ન ક્રમાંક મુજબ અને તે સંદર્ભમાં રજૂ કરવા.
- (4) માસ્ટર પ્રશ્નપત્રમાં નિર્દિષ્ટ પ્રશ્ન અને વિકલ્પ સિવાયના વાંધા-સૂચનો ધ્યાને લેવામાં આવશે નહીં.
- (5) ઉમેદવારે પ્રશ્નના વિકલ્પ પર વાંધો રજૂ કરેલ છે અને વિકલ્પ રૂપે જે જવાબ સૂચવેલ છે એ જવાબ ઉમેદવારે પોતાની ઉત્તરવહીમાં આપેલ હોવો જોઈએ. ઉમેદવારે સૂચવેલ જવાબ અને ઉત્તરવહીનો જવાબ ભિન્ન હશે તો ઉમેદવારે રજૂ કરેલ વાંધા-સૂચનો ધ્યાનમા લેવાશે નહીં.
- (6) એક પ્રશ્ન માટે એક જ વાંધા-સૂચન પત્રક વાપરવું. એક જ વાંધા-સૂચનો પત્રકમાં એકથી વધારે પ્રશ્નોની રજૂઆત કરેલ હશે તો તે અંગેના વાંધા-સૂચનો ધ્યાને લેવાશે નહીં.

**Website link for online objection submission system : [www.safevaults.in/login](http://www.safevaults.in/login)**

001. Which of following is not correct about autologous donation:  
 (A) Prescription from patient's physician is must  
 (B) Minimum hemoglobin concentration of 11 gm /dl or Hct  $\geq$  33%  
 (C) Use only for donor-patient if labeled "autologous use only"  
 (D) Voluntary donation can be accepted
002. Which is NOT Probability sampling technique?  
 (A) Simple random Sampling (B) Stratified random sampling  
 (C) Cluster Random Sampling (D) Quota Sampling
003. Which of the following is the component of choice for a low-birth-weight infant with a hemoglobin of 8 g/dL if the mother is anti-CMV negative?  
 (A) Whole blood from a donor with anti-CMV  
 (B) RBCs from a donor who is anti-CMV negative  
 (C) Leukoreduced platelets  
 (D) Solvent detergent-treated plasma
004. Individuals exposed to EBV maintain an asymptomatic latent infection in:  
 (A) B cells. (B) T cells.  
 (C) All lymphocytes. (D) Monocytes.
005. Nucleic acid amplification testing for HIV was instituted in donor testing protocols to:  
 (A) Identify donors with late-stage HIV who lack antibodies.  
 (B) Confirm the presence of anti-HIV in asymptomatic HIV-infected donors.  
 (C) Reduce the window period by detecting the virus earlier than other available tests.  
 (D) Detect antibodies to specific HIV viral proteins, including anti-p24, anti-gp41, and anti-gp120.
006. The square of standard deviation is called \_\_\_\_\_  
 (A) Quartile deviation (B) Mean absolute deviation  
 (C) Range  (D) Variance
007. Cryoprecipitate contains large amounts of which of the following  
 (A) Factor V (B) Platelets  
 (C) Factor IX  (D) Fibrinogen
008. Washed red blood cells are sometimes used for transfusion in the following conditions except  
 (A) Necrotizing enterocolitis with positive lectin screen  
 (B) Paroxysmal nocturnal hemoglobinuria  
 (C) IgA deficiency  
 (D) Jehovah's witness
009. Deferral period for blood donor with history of endoscopy procedure  
 (A) 15 days (B) 1 month  
 (C) 3 month  (D) 1 year
010. Plasma fractionation unit comes under  
 (A) Part XI A (B) XII B  
 (C) XIIC (D) XIIB

011. Gaussian distribution is known as \_\_\_\_\_
- (A) Normal distribution (B) Binomial distribution  
(C) Poisson distribution (D) Random distribution
012. Spouse of PLHA (Person living with HIV AIDS) should be deferred for blood donation for
- (A) 1 year (B) 1 month  
(C) Permanent defer (D) Till disease subside
013. Incubation period of transfusion related syphilis is
- (A) 9-15 days (B) 3-6 wks  
(C) 9-10 wks (D) 6-8 wks
014. Deferral period for blood donation after swine flu vaccine
- (A) 15 d (B) 28d  
(C) 1 year (D) 7 days
015. Which of the following tests is positive during the window period of infection with hepatitis B?
- (A) Hepatitis B surface antigen (B) Hepatitis B surface antibody  
(C) Hepatitis B core antibody (D) Hepatitis C antibody
016. Which of the following tests are used to supplement a reactive enzyme-linked immunosorbent assay test for HIV?
- (A) Western blot (B) Immunofluorescent assay  
(C) Rapid plasma reagin (D) Both (A) and (B)
017. "CLAA" is an abbreviation for the \_\_\_\_\_ in blood banking
- (A) Central Licensing Approving Authority  
(B) Council of Licensing Approving Authority  
(C) Component Licensing Authority of Approval  
(D) Central Licensing Authority of Approval
018. HVPI (HAEMOVIGILANCE PROGRAMME OF INDIA) includes:
- (A) Set of surveillance procedures covering whole transfusion chain  
(B) Includes Transfusion Reaction reporting (TRR)  
(C) Includes Donor reaction reporting  
(D) All of the above
019. PBM (Patient Blood Management) includes all, except
- (A) Evidence based strategies include multidisciplinary approach to improve patient outcome  
(B) Helps in maintaining sustainability of blood supply  
(C) Does not include physician education and monitoring  
(D) Involves intra and postoperative autologous salvage
020. Advantage of Autologous blood transfusion includes all; except
- (A) Elimination of transfusion associated risk  
(B) Elimination of alloimmunization  
(C) Provide blood in remote areas where blood supply is unpredictable  
(D) Increase risk of hemolytic, febrile, allergic reactions

021. PBM for surgical interventions include all except  
 (A) Anemia should be investigated and treated according to cause before elective surgery  
 (B) INR should <2 before surgery  
 (C) NSAIDS should stop 5-6 days before surgery to increase platelet function  
 (D) Blood transfusion is used preoperatively to facilitate elective surgery
022. In TEG, k time is increased in  
 (A) Hypercoagulable state (B) Hypofibrinogenemia  
 (C) Thrombocytopenia (D) Factor deficiency
023. Priorities in Massive blood loss are  
 (A) Restore and maintain adequate blood volume  
 (B) Maintain sufficient oxygen carrying capacity  
 (C) Secure haemostasis  
 (D) All of the above
024. Multiple Transfusion is not indicated in:-  
 (A) Hypoproliferative anaemia (B) Haemolytic anaemia  
 (C) Anaemia of chronic diseases (D) GI surgeries
025. In HIT (Heparin Induced Thrombocytopenia) management all are contraindicated, except  
 (A) Warfarin monotherapy (B) LMWH  
 (C) Prophylactic platelet therapy (D) Danaparoid sodium
026. True about Hemophilia is  
 (A) Inherited disorder of coagulation  
 (B) X linked recessive disorder  
 (C) Characterized by deficiency of factor VII and IX  
 (D) All of the above
027. True about Inhibitors in Haemophilia are all, except  
 (A) Antibodies against Factor VIII and IX causing neutralization  
 (B) > 5BU/ml is high responding inhibitor concentration  
 (C) Treated with FEIBA  
 (D) Staphylococcal protein induces inhibitor concentration
028. Ideal blood substitute is one which have  
 (A) O2 carrying capacity and volume expansion  
 (B) Long shelf life , cost efficient  
 (C) Universal compatible and pathogen free  
 (D) All of the above
029. Ideal platelet substitute must have characteristic features as below except  
 (A) Effective in-vivo haemostasis  
 (B) Should not generate immunogenic or immunosuppressive effect  
 (C) Short duration of action and short shelf life  
 (D) Have simple storage requirements

030. In Cohn's Fractionation method Albumin is obtained by  
 (A) Ethanol 8%, pH 7.2, Precipitate I (B) Ethanol 25% , pH 6.9, Precipitate II  
 (C) Ethanol 40% , pH 5.8, Precipitate IV (D) Ethanol 40% , PH 4.8, Precipitate V
031. Lectins are  
 (A) Saline extract of seeds having agglutination property with specific antigens  
 (B) Used in ABO and MN Typing  
 (C) Used in classification of bacteria  
 (D) All of the above
032. Enzymes in serology are useful as these  
 (A) Enhance activity of red cells with antibodies  
 (B) May destroy or modify antigen activity  
 (C) Reduce zeta potential from RBC surface  
 (D) All of the above
033. Which cells are involved in the production of antibodies?  
 (A) Dendritic cells (B) T lymphocytes  
 (C) B lymphocytes (D) Macrophages
034. The role of the macrophage during an antibody response is to:  
 (A) Make antibody (B) Lyse virus-infected target cells  
 (C) Activate cytotoxic T cells (D) Process antigen and present it
035. Which of the following MHC classes are found on antigen presenting cells?  
 (A) Class I (B) Class II  
 (C) Class III (D) Class IV
036. Which of the following refers to the effect of an excess amount of antigen present in a test system?  
 (A) Postzone (B) Prozone  
 (C) Zone of equivalence (D) Endzone
037. Which one of the following properties of antibodies is NOT dependent on the structure of the heavy chain constant region?  
 (A) Ability to cross the placenta (B) Isotype (class)  
 (C) Ability to fix complement (D) Affinity for antigen
038. When RBCs are stored, there is a "shift to the left." This means:  
 (A) Hemoglobin oxygen affinity increases, owing to an increase in 2, 3-DPG.  
 (B) Hemoglobin oxygen affinity increases, owing to a decrease in 2, 3-DPG.  
 (C) Hemoglobin oxygen affinity decreases, owing to a decrease in 2, 3-DPG.  
 (D) Hemoglobin oxygen affinity decreases, owing to an increase in 2, 3-DPG.
039. What is the minimum number of platelets required in a plateletpheresis component (90% of the sampled units)?  
 (A)  $3 \times 10^{11}$  (B)  $4 \times 10^{11}$   
 (C)  $2 \times 10^{11}$  (D)  $3.5 \times 10^{11}$

040. One criterion used by the FDA for approval of new preservation solutions and storage containers is an average 24-hour post-transfusion RBC survival of more than:
- (A) 50%. (B) 60%.  
 (C) 65%. (D) 75%.
041. What is the lowest allowable pH for a platelet component at outdate?
- (A) 6.4 (B) 5.9  
 (C) 6.8 (D) 6.2
042. Which of the following is NOT an FDA-approved test for quality control of platelets?
- (A) BacT/ALERT (B) eBDS  
 (C) Gram stain (D) Pan Genera Detection (PGD) test
043. Agarose gel electrophoresis is a technique used for:
- (A) DNA synthesis (B) RNA synthesis  
 (C) Separation of DNA molecules by size (D) Oligonucleotide synthesis
044. RFLP and SSP are techniques used for:
- (A) Protein isolation (B) RNA isolation  
 (C) DNA typing (D) Protein typing
045. Transcription mediated amplification:
- (A) Requires thermostable DNA polymerase  
 (B) Is an isothermal procedure  
 (C) Is an obsolete method currently replaced by SSOP  
 (D) Utilizes probes labeled with fluorescent tags
046. Therapeutic cytapheresis has a primary role in treatment of patients with:
- (A) Sickle cell disease and acute chest syndrome.  
 (B) Systemic lupus erythematosus to remove immune complexes.  
 (C) Leukemia to help increase granulocyte production.  
 (D) Myasthenia gravis to increase antibody production
047. Apheresis technology can be used to collect each of the following components except:
- (A) Leukocytes. (B) Macrophages.  
 (C) Hematopoietic progenitor cells. (D) Platelets.
048. Which of the following can be given to an apheresis donor to increase the number of circulating granulocytes?
- (A) DDAVP (B) Hydroxyethyl starch (HES)  
 (C) Immune globulin (D) G-CSF
049. Most apheresis equipment uses which of the following methods for separation?
- (A) Separation by centrifugation (B) Separation by membrane filtration  
 (C) Separation by adsorption (D) Separation by osmosis
050. If a donor donates a unit of whole blood or if it is impossible to return the donor's red cells during plateletpheresis, at least \_\_\_\_\_ weeks should elapse before a subsequent plateletpheresis procedure.
- (A) 2 (B) 4  
 (C) 6 (D) 8

051. Which of the following are useful features of adding an additive solution to red cells?
- (A) Further extends the life of the red blood cells
  - (B) Facilitates improved flow during transfusion
  - (C) Provides additional adenine and dextrose for ATP generation
  - (D) All of the above
052. Which of the following is not an approved use for a sterile connecting device?
- (A) Extend the life span of an open system product
  - (B) Pool blood components
  - (C) Aliquot blood products into smaller doses
  - (D) Add a leukoreduction filter
053. Irradiated blood components are indicated for the following patients except:
- (A) Neonate requiring an exchange transfusion
  - (B) A 25-year-old immunocompromised man receiving platelets after chemotherapy
  - (C) A patient receiving a directed donor unit from a blood relative
  - (D) A 43-year-old woman receiving a knee replacement
054. A blood product storage unit should have the following:
- (A) A system to monitor temperature continuously
  - (B) An alarm to alert personnel if temperature limits are exceeded
  - (C) Sufficient capacity to store products in an orderly manner
  - (D) All of the above
055. Antibody binding is controlled from
- (A) The hypervariable sequences in the V regions
  - (B) The invariable region of the heavy chain
  - (C) The Fc fragment
  - (D) The carboxy-terminal end
056. Variation in red cell size observed on the peripheral smear is described as:
- (A) Anisocytosis
  - (B) Hypochromia
  - (C) Poikilocytosis
  - (D) Pleocytosis
057. Which of the following is the strongest activator of platelet?
- (A) Thrombin
  - (B) Serotonin
  - (C) Thromboxane A2
  - (D) Epinephrine
058. When an erythrocyte containing iron granules is stained with Prussian blue, the cell is called a:
- (A) Spherocyte
  - (B) Leptocyte
  - (C) Schistocyte
  - (D) Siderocyte
059. The Coulter principle for counting of cells is based upon the fact that:
- (A) Isotonic solutions conduct electricity better than cells do
  - (B) Conductivity varies proportionally to the number of cells
  - (C) Cells conduct electricity better than saline does
  - (D) Isotonic solutions cannot conduct electricity

060. Which of the following statistical terms reflects the best index of precision when comparing two CBC parameters?
- (A) Mean (B) Median  
 (C) Coefficient of variation (D) Standard deviation
061. Which condition will shift the oxyhemoglobin dissociation curve to the right?
- (A) Acidosis (B) Alkalosis  
 (C) Multiple blood transfusions (D) Increased quantities of hemoglobin S or C
062. Autoagglutination of red cells at room temperature can cause which of the following abnormal test results?
- (A) Low RBC count (B) High MCV  
 (C) Low hematocrit  (D) All of the above
063. Which is the major hemoglobin found in the RBCs of patients with sickle cell trait?
- (A) Hgb S (B) Hgb F  
 (C) Hgb A2  (D) Hgb A
064. Which of the following is *not* associated with hereditary spherocytosis?
- (A) Increased osmotic fragility (B) An MCHC greater than 36%  
 (C) Intravascular hemolysis (D) Extravascular hemolysis
065. Which of the following hemoglobin migrates to the same position as Hb A2 at pH 8.6?
- (A) Hb H (B) Hb F  
 (C) Hb C (D) Hb S
066. Sickle cell disorders are
- (A) Hereditary, intracorpuseular RBC defects  
 (B) Hereditary, extracorpuseular RBC defects  
 (C) Acquired, intracorpuseular RBC defects  
 (D) Acquired, extracorpuseular RBC defects
067. Reticulocytosis usually indicates
- (A) Response to inflammation (B) Neoplastic process  
 (C) Aplastic anemia  (D) Red cell regeneration
068. All of the following are characteristic findings in a patient with iron deficiency anemia *except*:
- (A) Microcytic, hypochromic red cell morphology  
 (B) Decreased serum iron and ferritin levels  
 (C) Decreased total iron-binding capacity (TIBC)  
 (D) Increased RBC protoporphyrin
069. What is the basic hematological defect seen in patients with thalassemia major?
- (A) DNA synthetic defect (B) Hgb structure  
 (C)  $\beta$ -Chain synthesis (D) Hb phosphorylation
070. A patient has an Hct of 30%, a hemoglobin of 8 g/dl, and an RBC count of  $4.0 \times 10^{12}/L$ . What is the morphological classification of this anemia?
- (A) Normocytic normochromic (B) Macrocytic hypochromic  
 (C) Microcytic hypochromic (D) Normocytic hyperchromic



080. When performing a factor VIII activity assay, a patient's plasma is mixed with
- (A) Normal patient's plasma
  - (B) Factor VIII deficient plasma
  - (C) Plasma with a high concentration of factor VIII
  - (D) Normal control plasma
081. Refer to the following results
- PT = normal
- APTT = prolonged
- Bleeding time = increased
- Platelet count = normal
- Platelet aggregation to ristocetin = abnormal
- Which of the following disorders may be indicated?
- (A) Factor VIII deficiency
  - (B) DIC
  - (C) Von Willebrand's disease
  - (D) Factor IX deficiency
082. What type of B cells are formed after antigen stimulation?
- (A) Plasma cells and memory B cells
  - (B) Mature B cells
  - (C) Antigen-dependent B cells
  - (D) Receptor-activated B cells
083. How are cytotoxic T cells (TC cells) and natural killer (NK) cells similar?
- (A) Require antibody to be present
  - (B) Effective against virally infected cells
  - (C) Recognize antigen in association with HLA class II markers
  - (D) Do not bind to infected cells
084. What is the purpose of C3a, C4a, and C5a, the split products of the complement cascade?
- (A) To bind with specific membrane receptors of lymphocytes and cause release of cytotoxic substances
  - (B) To cause increased vascular permeability, contraction of smooth muscle, and release of histamine from basophils
  - (C) To bind with membrane receptors of macrophages to facilitate phagocytosis and the removal of debris and foreign substances
  - (D) To regulate and degrade membrane cofactor protein after activation by C3 convertase
085. Which immunoglobulin class(es) has (have) a J chain?
- (A) IgM
  - (B) IgE and IgD
  - (C) IgM and sIgA
  - (D) IgG3 and IgA
086. A super antigen, such as toxic shock syndrome toxin-1 (TSST-1), bypasses the normal antigen processing stage by binding to and cross linking:
- (A) A portion of an immunoglobulin molecule and complement component C1
  - (B) Toll-like receptors and an MHC class I molecule
  - (C) A portion of an immunoglobulin and a portion of a T-cell receptor
  - (D) A portion of a T-cell receptor and an MHC class II molecule

087. Why is a chemiluminescent immunoassay (CIA) or enzyme immunoassay (EIA) the method of choice for detection of certain analytes, such as hormones, normally found in low concentrations?
- (A) Because of low cross reactivity
  - (B) Because of high specificity
  - (C) Because of high sensitivity
  - (D) Because test systems may be designed as both competitive and noncompetitive assays
088. What comprises the indicator system in an indirect ELISA for detecting antibody?
- (A) Enzyme-conjugated antibody + chromogenic substrate
  - (B) Enzyme conjugated antigen + chromogenic substrate
  - (C) Enzyme + antigen
  - (D) Substrate + antigen
089. What substance is detected by the rapid plasma reagin (RPR) and Venereal Disease Research Laboratory (VDRL) tests for syphilis?
- (A) Cardiolipin
  - (B) Anticardiolipin antibody
  - (C) Anti-T. pallidum antibody
  - (D) Treponema pallidum
090. A biological false-positive reaction is least likely with which test for syphilis?
- (A) VDRL
  - (B) Fluorescent T. pallidum antibody absorption test (FTA-ABS)
  - (C) RPR
  - (D) All are equally likely to detect a false-positive result
091. Which is most likely a positive Western blot result for infection with HIV?
- (A) Band at p24
  - (B) Band at gp60
  - (C) Bands at p24 and p31
  - (D) Bands at p24 and gp120
092. What is the advantage of 4th-generation rapid HIV tests over earlier rapid HIV tests?
- (A) They use recombinant antigens
  - (B) They detect multiple strains of HIV
  - (C) They detect p24 antigen
  - (D) They are quantitative
093. Which of the following statements regarding infection with hepatitis D virus is true?
- (A) Occurs in patients with HIV infection
  - (B) Does not progress to chronic hepatitis
  - (C) Occurs in patients with hepatitis B
  - (D) Is not spread through blood or sexual contact
094. Which test detects antibodies that have attached to tissues, resulting in a type-II cytotoxic reaction?
- (A) Migration inhibition factor assay (MIF)
  - (B) Direct immunofluorescence (IF)
  - (C) Immunofixation electrophoresis (IFE)
  - (D) Hemagglutination

095. Which of the following conditions will most likely result in a false-negative DAT test?
- (A) Insufficient washing of RBCs
  - (B) Use of heavy chain-specific polyclonal anti-human Ig
  - (C) Use of excessive centrifugal force
  - (D) Use of a sample obtained by finger puncture
096. A patient receives a transfusion of packed red cells and fresh frozen plasma and develops an anaphylactic, non hemolytic reaction. She reports receiving a transfusion 20 years earlier. She had no reaction to the previous transfusion, but she did feel "poorly" a few weeks later. Which of the following transfused substances most likely elicited the reaction?
- (A) IgA
  - (B) Group A antigen
  - (C) Rho (D) antigen
  - (D) An antigen belonging to the Duffy system
097. What type of serological testing does the blood bank technologist perform when determining the blood group of a patient?
- (A) Genotyping
  - (B) Phenotyping
  - (C) Both genotyping and phenotyping
  - (D) Polymerase chain reaction
098. Which of the following statements is true?
- (A) An individual with the BO genotype is homozygous for B antigen
  - (B) An individual with the BB genotype is homozygous for B antigen
  - (C) An individual with the OO genotype is heterozygous for O antigen
  - (D) An individual with the AB phenotype is homozygous for A and B antigens
099. In this type of inheritance, the father carries the trait on his X chromosome. He has no sons with the trait because he passed his Y chromosome to his sons; however, all his daughters will express the trait.
- (A) Autosomal dominant
  - (B) Autosomal recessive
  - (C) X-linked dominant
  - (D) X-linked recessive
100. Which typing results are most likely to occur when a patient has an acquired B antigen?
- (A) Anti-A 4+, anti-B-3+, A1 cells neg, B cells neg
  - (B) Anti-A 3+, anti-B neg, A1 cells neg, B cells neg
  - (C) Anti-A 4+, anti-B 1+, A1 cells neg, B cells 4+
  - (D) Anti-A 4+, anti-B 4+, A1 cells 2+, B cells neg
101. What should be done if all forward and reverse ABO results as well as the autocontrol are positive?
- (A) Wash the cells with warm saline, autoadsorb the serum at 4°C
  - (B) Retype the sample using a different lot number of reagents
  - (C) Use polyclonal typing reagents
  - (D) Report the sample as group AB
102. How is an individual with genotype Dce/dce classified?
- (A) Rh positive
  - (B) Rh negative
  - (C) Rh null
  - (D) Total Rh

103. Testing reveals a weak D that reacts 1+ after indirect antiglobulin testing (IAT). How is this result classified?
- (A) Rh-positive (B) Rh-negative, Du positive  
(C) Rh-negative (D) Rh-positive, Du positive
104. A patient developed a combination of Rh antibodies: anti-C, anti-E, and anti-D. Can compatible blood be found for this patient?
- (A) It is almost impossible to find blood lacking the C, E, and D antigens  
(B) rr blood could be used without causing a problem  
(C) R0R0 may be used because it lacks all three antigens  
(D) Although rare, ryr blood may be obtained from close relatives of the patient
105. What antibodies could an R1R1 make if exposed to R2R2 blood?
- (A) Anti-e and anti-C (B) Anti-E and anti-c  
(C) Anti-E and anti-C (D) Anti-e and anti-c
106. What type of blood should be given to an individual who has an anti-Leb that reacts 1+ at the IAT phase?
- (A) Blood that is negative for the Leb antigen  
(B) Blood that is negative for both the Lea and Leb antigens  
(C) Blood that is positive for the Leb antigen  
(D) Lewis antibodies are not clinically significant, so any type of blood may be given
107. Which of the following statements is true concerning the MN genotype?
- (A) Antigens are destroyed using bleach-treated cells  
(B) Dosage effect may be seen for both M and N antigens  
(C) Both M and N antigens are impossible to detect because of cross interference  
(D) MN is a rare phenotype seldom found in routine antigen typing
108. How can interfering anti-P1 antibody be removed from a mixture of antibodies?
- (A) Neutralization with saliva (B) Agglutination with human milk  
(C) Combination with urine (D) Neutralization with hydatid cyst fluid
109. An antibody shows strong reactions in all test phases. All screen and panel cells are positive. The serum is then tested with a cord cell and the reaction is negative. What antibody is suspected?
- (A) Anti-I (B) Anti-i  
(C) Anti-H (D) Anti-p
110. Which characteristics are true of all three of the following antibodies: anti-Fya, anti-Jka, and anti-K?
- (A) Detected at the IAT phase; may cause hemolytic disease of the newborn and hemolytic transfusion reactions  
(B) Not detected with enzyme-treated cells  
(C) Requires the IAT technique for detection; usually not associated with HDN  
(D) Enhanced reactivity with enzyme-treated cells; may cause severe hemolytic transfusion reactions

111. An antibody is detected in a pregnant woman and is suspected of being the cause of fetal distress. The antibody reacts at the IAT phase but does not react with DTT-treated cells. This antibody causes in vitro hemolysis. What is the most likely antibody specificity?
- (A) Anti-Lea (B) Anti-Lua  
(C) Anti-Lub (D) Anti-Xga
112. What does a minor crossmatch consist of ?
- (A) Recipient plasma and recipient red cells  
(B) Recipient plasma and donor red cells  
(C) Recipient red cells and donor plasma  
(D) Donor plasma and donor red cells
113. A donor was found to contain anti-K using pilot tubes from the collection procedure. How would this affect the compatibility test?
- (A) The AHG major crossmatch would be positive  
(B) The IS (immediate spin) major crossmatch would be positive  
(C) The recipient's antibody screen would be positive for anti-K  
(D) Compatibility testing would not be affected
114. Screening cells, major crossmatch and patient autocontrol are positive in all phases. Identify the problem.
- (A) Specific cold alloantibody  
(B) Specific cold autoantibody  
(C) Abnormal protein or nonspecific autoantibody  
(D) Cold and warm alloantibody mixture
115. What is the disposition of a donor red blood cell unit that contains an antibody?
- (A) The unit must be discarded  
(B) Only the plasma may be used to make components  
(C) The antibody must be adsorbed from the unit  
(D) The unit may be labeled indicating it contains antibody and released into inventory
116. What corrective action should be taken when rouleaux causes positive test results?
- (A) Perform a saline replacement technique  
(B) Perform an autoabsorption  
(C) Run a panel  
(D) Perform an elution
117. When may an IS crossmatch be performed?
- (A) When a patient is being massively transfused  
(B) When there is no history of antibodies and the current antibody screen is negative  
(C) When blood is being emergency released  
(D) When a patient has not been transfused in the past 3 months

118. A patient has a hemolytic reaction to blood transfused 8 days ago. What is the most likely cause?
- (A) Immediate, non-immunologic probably due to volume overload
  - (B) Delayed immunologic, probably due to an antibody such as anti-Jka
  - (C) Delayed non immunologic, probably due to iron overload
  - (D) Immediate, immunologic, probably due to clerical error, ABO incompatibility
119. What may be found in the serum of a person who is exhibiting signs of TRALI (transfusion-related acute lung injury)?
- (A) Red blood cell alloantibody
  - (C) Antileukocyte antibody
  - (B) IgA antibody
  - (D) Allergen
120. A male cancer patient with a hemoglobin of 6 g/dl was admitted to the hospital with acute abdominal pain. Small bowel resection was indicated, but the attending physician wanted to raise the patient's hemoglobin to 12 g/dL before surgery. How many units of RBCs would most likely be required to accomplish this?
- (A) 2
  - (C) 6
  - (B) 3
  - (D) 8
121. A unit of whole blood is collected at 10:00 a.m. and stored at 20°C–24°C. What is the last hour platelet concentrates may be made from this unit?
- (A) 4:00 p.m.
  - (C) 7:00 p.m.
  - (B) 6:00 p.m.
  - (D) 8:00 p.m.
122. All of the following statements regarding FFP are true, except:
- (A) FFP must be prepared within 24 hours of collection
  - (B) After thawing, FFP must be transfused within 24 hours
  - (C) Storage temperature for FFP with a 1-year shelf life is  $\leq -18^{\circ}\text{C}$
  - (D) When thawed, FFP must be stored between 1°C–6°C
123. All of the following are true regarding washed RBCs, except:
- (A) RBCs are washed with 1–2 L of normal saline
  - (B) Volume is 180 ml
  - (C) Shelf life is extended
  - (D) Leukocytes are removed
124. Transfusion of an irradiated product is indicated in all of the following conditions except:
- (A) Exchange transfusion
  - (B) Bone marrow transplant
  - (C) Severe combined immunodeficiency syndrome (SCIDS)
  - (D) Warm autoimmune hemolytic anemia (WAIHA)
125. What course of action should be taken if a medical laboratory scientist inadvertently irradiates a unit of red cells twice?
- (A) Issue the unit
  - (B) Discard the unit
  - (C) Change the expiration date; then issue the unit
  - (D) Note on the irradiation sticker that the unit was irradiated twice and issue

126. Which component has the longest expiration date?  
 (A) Cryoprecipitate (B) FFP  
 (C) Frozen RBCs (D) Platelet concentrates
127. What is the number of white blood cells permitted in a unit of leukoreduced red cells?  
 (A)  $< 5 \times 10^{10}$  (B)   $< 5 \times 10^6$   
 (C)  $< 8.3 \times 10^5$  (D)  $< 8.3 \times 10^6$
128. The principle of the antiglobulin test is:  
 (A) IgG and C3d are required for RBC sensitization.  
 (B) Human globulin is eluted from RBCs during saline washings.  
 (C) Injection of human globulin into an animal engenders passive immunity.  
 (D) AHG reacts with human globulin molecules bound to RBCs or free in serum.
129. Solid-phase antibody screening is based on:  
 (A) Adherence. (B) Agglutination.  
 (C) Hemolysis. (D) Precipitation.
130. What do Coombs control cells consist of?  
 (A) Type A-positive cells coated with anti-D  
 (B) Type A-negative cells coated with anti-D  
 (C) Type O-positive cells coated with anti-D  
 (D) Type O-negative cells coated with anti-D
131. Pain at infusion site and hypotension are observed with what type of reaction?  
 (A) Delayed hemolytic transfusion reaction  
 (B) Acute hemolytic transfusion reaction  
 (C) Allergic reaction  
 (D) Febrile non hemolytic reaction
132. Which transfusion reaction presents with fever, maculopapular rash, watery diarrhea, abnormal liver function and pancytopenia?  
 (A) Transfusion-associated sepsis  
 (B) Transfusion-related acute lung injury  
 (C) Transfusion-associated graft-versus-host disease  
 (D) Transfusion-associated allergic reaction
133. Absolute IgA deficiency is a classic example of a severe allergic reaction. Results indicating an absolute IgA deficiency:  
 (A)  $< 0.05$  mg/dL (B)  $< 0.50$  mg/dL  
 (C)  $< 0.50$  gm/dL (D)  $< 5$  mg/dL
134. The main difference between the fetus and the newborn is:  
 (A) Bilirubin metabolism. (B) Maternal antibody level.  
 (C) Presence of anemia. (D) Size of RBCs.
135. RhIG is indicated for:  
 (A) Mothers who have anti-D. (B) Infants who are Rh-negative.  
 (D) Mothers who are Rh-negative.

136. A woman without prenatal care delivers a healthy term infant. A cord blood sample shows the infant is A-positive with a positive DAT. The workup of the unexpected finding should include:
- (A) Anti-C3 antiglobulin test.
  - (B) ABO testing of the mother.
  - (C) Direct antiglobulin testing of the mother's specimen.
  - (D) ABO and Rh typing of the father.
137. A patient developed an anti-Jka antibody 5 years ago. The antibody screen is currently negative. To obtain suitable blood for transfusion, which procedures apply?
- (A) Type the patient for the Jkb antigen as an added part to the crossmatch procedure.
  - (B) Crossmatch random donors with the patient's serum, and release the compatible units for transfusion to the patient.
  - (C) Type the patient and donor units for the Jka antigen and then crossmatch the Jka negative units with the patient serum.
  - (D) Computer-crossmatch Jka negative donor units.
138. Blood donor and recipient samples used in crossmatching must be stored for a minimum of how many days following transfusion?
- (A) 2
  - (B) 5
  - (C) 7
  - (D) 10
139. Which is not an example of the most common form of error associated with fatal transfusion reactions?
- (A) Phlebotomist labels patient A tubes with patient B information.
  - (B) Technologist enters results of patient A testing into patient B field.
  - (C) Wrong RBC unit is tagged for transfusion.
  - (D) Antibody below detectable levels during pretransfusion testing.
140. A positive DAT indicates:
- (A) Antibody in serum.
  - (B) Antibody on red cell.
  - (C) Antigen in serum.
  - (D) Antigen on red cell.
141. Which combination of the following can be seen if a patient is experiencing an intravascular transfusion reaction?
- (A) Hemoglobinuria, increased haptoglobin, decreased bilirubin, hemoglobinemia
  - (B) Decreased haptoglobin, hemoglobinuria, hemoglobinemia, increased bilirubin
  - (C) Decreased haptoglobin, hemoglobinuria, hemoglobinemia, decreased bilirubin
  - (D) None of the above
142. The primary intent of an intrauterine transfusion is to
- (A) Prevent kernicterus
  - (B) Prevent graft-versus-host disease
  - (C) Increase the albumin in the fetus to prevent hemolysis
  - (D) Increase the fetal hematocrit to prevent hydrops

143. The rosette test is used to
- (A) Screen for fetal lung maturity
  - (B) Screen for massive fetomaternal hemorrhage
  - (C) Screen for IgG antibodies
  - (D) Quantitate massive fetomaternal hemorrhage
144. The K-B result is 15 cells. The dose of Rh immune globulin needed to prevent sensitization to anti-D in an Rh positive woman is
- (A) None of the below
  - (B) 1 vial
  - (C) 2 vials
  - (D) 3 vials
145. NAITP is a condition in which a
- (A) Mother develops specific platelets antibodies that destroy fetal platelets
  - (B) Mother develops nonspecific antibodies to platelets that destroy fetal platelets
  - (C) Fetus develops anti-PIA1
  - (D) Fetus develops nonspecific platelet antibodies
146. Which of the following is characteristic of paroxysmal cold hemoglobinuria?
- (A) The autoantibody is usually IgM
  - (B) The antibody is biphasic
  - (C) The antibody is usually detected in pretransfusion tests
  - (D) The antibody has a high titer at 4\_C
147. Which of the following is the least encountered reason for a positive IgG DAT with a nonreactive eluate?
- (A) Drug-dependent antibody
  - (B) Anti-A or anti-B from plasma-containing product(s)
  - (C) Non immunologic IgG uptake due to increased plasma IgG
  - (D) None of the above
148. The immunodominant sugar responsible for blood group A specificity is:
- (A) L-fucose.
  - (B) N-acetyl-D-galactosamine.
  - (C) D-galactose.
  - (D) Uridine diphosphate-N-acetyl-D-galactose.
149. An ABO type on a patient gives the following reactions:
- | Patient Cells with |        |         | Patient Serum with |         |
|--------------------|--------|---------|--------------------|---------|
| Anti-A             | Anti-B | Anti-A1 | A1 cells           | B cells |
| 4+                 | 4+     | Neg     | 2+                 | Neg     |
- The reactions above may be seen in a patient who is:
- (A) A1 with acquired B.
  - (B) A2B with anti-A1.
  - (C) AB with increased concentrations of protein in the serum.
  - (D) AB with an autoantibody

150. You are working on a specimen in the laboratory that you believe to be a Bombay phenotype. Which of the following reactions would you expect to see?
- (A) Patient's cells + *Ulex europaeus* = no agglutination  
 (B) Patient's cells + *Ulex europaeus* = agglutination  
 (C) Patient's serum + group O donor RBCs = no agglutination  
 (D) Patient's serum + A1 and B cells = no agglutination
151. An ABO type on a patient gives the following reactions:
- | Patient Cells With |        | Patient Serum With |         |         |             |
|--------------------|--------|--------------------|---------|---------|-------------|
| Anti-A             | Anti-B | A1 cells           | B cells | O cells | Autocontrol |
| 4+                 | Neg    | 2+                 | 4+      | 2+      | Neg         |
- These results are most likely due to:
- (A) ABO alloantibody.  (B) Non-ABO alloantibody.  
 (C) Rouleaux.  (D) Cold autoantibody.
152. Tests with anti A or anti B give weak reactions, but the cells are non-reactive with anti H lectin or with anti H serum from Oh persons. What is the genotype?
- (A) Bombay group  (B) Para Bombay group  
 (C) Variant Oh group  (D) Oh group
153. A3 Subgroup Distinguished from other A antigen subgroups
- (A) 4+ reaction with reaction with anti-A1  
 (B) 4+ reaction with anti A2  
 (C) Mixed field agglutination with anti A and anti AB  
 (D) Weak reaction with Anti AB
154. Rh system genes are
- (A) RHD and RHCE.  (B) RHD and LW.  
 (C) RHD and RHAG.  (D) RHCE and RHAG.
155. Cells carrying a weak D antigen require the use of what test to demonstrate its presence?
- (A) Indirect antiglobulin test  (B) Direct antiglobulin test  
 (C) Microplate test  (D) Warm autoadsorption test
156. Biochemically speaking, what type of molecules are Rh antigens?
- (A) Glycophorins  (B) Simple sugars  
 (C) Proteins  (D) Lipids
157. Rh antibodies are primarily of which immunoglobulin class?
- (A) IgA  (B) IgD  
 (C) IgG  (D) IgM
158. Red cells not agglutinated by anti D are further tested for
- (A) Weak D  (B) Partial D  
 (C) Both (A) and (B)  (D) None of the above

159. Prevalence of weak D among the Indian blood donor population is  
 (A) 0.1% (B) 0.01%  
 (C) 1% (D) 0.5%
160. The duffy blood group system is functionally associated with  
 (A) Invasion by *P.falciparum* (B) Red cell urea transporter  
 (C) Maintenance of membrane integrity (D) Invasion by *P.vivax*
161. What is the titer and score for this prenatal anti-D titer? (Refer to Fig.)  
 Anti-D titer results  

Dilution	1:1	1:2	1:4	1:8	1:16	1:32	1:64	1:128	1:256	1:512	1:1024
Results	4+	4+	3+	2+	1+	1+	0	0	0	0	0

 Saline control – No reaction  
 (A) Titer = 64; score = 52 (B) Titer = 1:32; score = 15  
 (C) Titer = 64; score = 21 (D) Titer = 32; score = 52
162. Stem cells from HPC donors may be mobilized with:  
 (A) Plerixafor (B) Filgrastim (G-CSF)  
 (C) Chemotherapy (D) All of the above
163. The cellular marker used to quantify the collection of HPCs using flow cytometry is:  
 (A) CD4 (B) CD33  
 (C) CD34 (D) CD59
164. Which of the following terms describe an HPC transplant where donor and recipient are the same person?  
 (A) Allogeneic (B) Autologous  
 (C) Syngeneic (D) Hematopoietic
165. Three weeks after sustaining a car accident that required emergency transfusion of blood products for resuscitation, an allogeneic HPC transplant recipient developed fever, erythematous skin rash, diarrhea, and cytopenias, which ultimately were fatal. What intervention may have prevented this outcome?  
 (A) The use of leukoreduced blood products  
 (B) The use of irradiated of blood products  
 (C) The use of CMV-negative blood products  
 (D) The use of washed blood products
166. The majority of HLA antibodies belong to what immunoglobulin class?  
 (A) IgD (B) IgE  
 (C) IgG (D) IgM
167. Of the following diseases, which one has the highest relative risk in association with an HLA antigen?  
 (A) Ankylosing spondylitis (B) Juvenile diabetes  
 (C) Narcolepsy (D) Rheumatoid arthritis

168. What is the molecular technique that detects undefined alleles?  
 (A) Restriction fragment length polymorphism  
 (B) Sequence-specific primer typing  
 (C) Sequence-specific oligonucleotide typing  
 (D) Direct nucleotide sequencing
169. In which of the following genetic systems is the allele frequency distribution continuous (not discrete)?  
 (A) DNA polymorphisms by RFLP (B) DNA polymorphisms by PCR  
 (C) RBC antigens (D) RBC enzymes
170. The HLA genes are located on which chromosome?  
 (A) 2 (B) 4  
 (C) 6 (D) 8
171. Antigens exclusively present on RBCs  
 (A) ABO (B) Le<sup>a</sup> and Le<sup>b</sup>  
 (C) Rh (D) All
172. ISBT Number 002 is assigned to  
 (A) Rh  (B) MNS  
 (C) Kell (D) Kidd
173. IgM antibodies are  
 (A) Anti P1, Anti N, Anti I (B) Anti C, Anti K  
 (C) Anti Fya, Anti Fyb (D) All of the above
174. A patient's blood type is AB-negative, but there are no AB-negative red blood cell units available. What donor units could be selected?  
 (A) A-negative (B) O-positive  
 (C) B-positive (D) All of the above
175. A patient requires 15 units of thawed plasma for an apheresis procedure. The patient's blood type is O-negative. What donor units could be selected?  
 (A) O-negative (B) AB-positive  
 (C) A-negative  (D) All of the above
176. Most antibodies react at neutral pH between 6.8 and 7.2. Enhanced reactivity at pH of 6.5 is demonstrated by  
 (A) Anti M (B) Anti N  
 (C) Anti A (D) Anti B
177. The normal human cell contains \_\_\_\_\_ pairs of chromosomes.  
 (A) 12  (B) 23  
 (C) 46 (D) 92
178. With which of the following would an anti-K showing dosage react most strongly?  
 (A) A red cell of the genotype Kk (B) A red cell of the genotype kk  
 (C) A red cell of the genotype KK (D) None of the above

179. A gene that produces no detectable product is referred to as  
 (A) An Amorph (B) A trait  
 (C) A allele (D) A polymorph
180. A single nucleotide change can cause which of the following:  
 (A) No change in the codon for an amino acid  
 (B) A stop codon  
 (C) A change from one amino acid to another  
 (D) All of the above
181. For antigen prediction in the neonatal setting, the most common source of fetal DNA is:  
 (A) Amniocytes (B) Fetal RBCs  
 (C) Cord blood (D) Endothelial cells
182. A review of previous records indicates a patient is group O. The current sample testing indicates the patient is group A. Blood is needed urgently. What red blood cells should be selected for transfusion?  
 (A) Group AB (B) Group B  
 (C) Group O (D) Group A
183. A patient has an anti-E. What crossmatch should be performed?  
 (A) A "computer" crossmatch (B) An immediate-spin crossmatch  
 (C) A crossmatch is not required  (D) A crossmatch that includes an incubation phase and testing with an antihuman globulin reagent.
184. Common sources of ABO discrepancies due to technical error include all the following except:  
 (A) Clerical mix-ups (B) Contaminated reagents  
 (C) Warming of the test  (D) Patients with agammaglobulinemia
185. Approximately what percentage of A2 individuals have evidence of anti-A1 in the sera?  
 (A) None of the below  (B) 1% to 8%  
 (C) 13% to 18% (D) 50% or more
186. Approximately what percentage of adult levels of A and B antigen are present at birth?  
 (A) 10% (B) 25%  
 (C) 50% (D) 100%
187. Fetal development of ABO antigens begins in the:  
 (A) First week of fetal life (B) Second week of fetal life  
 (C) Sixth week of fetal life (D) Second trimester
188. Which one of the following characteristics is common for anti-Lu<sup>a</sup>?  
 (A) Warm reacting  (B) Mixed field appearance  
 (C) IgG only (D) Hemolysis at 37°C
189. Which of the following blood system antibodies are notorious for weakening over time?  
 (A) Rh (B) Duffy  
 (C) Diego  (D) Kidd

190. Which region does not contain HLA genes but does contain genes that code for complement components?  
 (A) Class I (B) Class II  
 (C) Class III (D) None of the above
191. A donor experiences facial muscle twitch during plateletpheresis, what should be done?  
 (A) Detach ACD line  (B) Decrease return rate  
 (C) Add saline to the line (D) Stop the procedure
192. True for QC of blood components  
 1. At least 1% of all components/month  
 2. <100 components/month, then at least 4  
 3. 75% or more must meet specifications  
 4. Volume should be recorded on all units  
 (A) 1, 3 (B) 2, 3  
 (C) 1, 2, 3 (D) 1, 2, 3, 4
193. Frozen RBC can be stored upto  
 (A) 10 years (B) 25 years  
 (C) 1 year (D) 5 year
194. Half life of hydroxyl Ethyl Starch (HES) is  
 (A) 6 hrs (B) 12 hrs  
 (C) 24 hrs (D) 48 hrs
195. Government of India made test for Human Deficiency Virus (HIV ) mandatory by notifying in Drug And Cosmetics act on \_\_\_\_\_  
 (A) 1991 (B) 1985  
 (C) 1989 (D) 1990
196. Government Of India published the national blood policy in the year  
 (A) 2002 (B) 1999  
 (C) 2001 (D) 1998
197. “Witbesky test” is used for  
 (A) Irregular antibody screening  (B) Secretary status  
 (C) Compatibility testing (D) Transfusion reactions
198. Anticoagulant commonly used in Apheresis procedure  
 (A) CPD  (B) ACD  
 (C) CPDA (D) EDTA
199. Lethal triad of massive transfusion  
 (A) Anemia, coagulopathy and hypothermia  
 (B) Coagulopathy, hypothermia, acidosis  
 (C) Hypothermia, acidosis, anemia  
 (D) Anemia, coagulopathy, acidosis
200. HLA-DR, HLA-DQ, and HLA-DP are which type of molecules?  
 (A) Class I  (B) Class II  
 (C) Class III (D) Class IV