CURRICULUM DEVELOPMENT
&
CREDIT-BASED EVALUATION

(Revised in September 2020)

RECOMMENDATIONS BY BOARD OF STUDIES FOR MD TRANSFUSION MEDICINE PROGRAM

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Aims and Objectives

The MD Transfusion Medicine course in *Sree Chitra Tirunal Institute for Medical Sciences and Technology (SCTIMST)* is a 3-year Junior Residency program which is conducted with a primary aim of training Medical graduates who are interested in obtaining a postgraduate degree (MD/DNB) in Transfusion Medicine.

1. To impart composite training in fundamental and applied aspects of Transfusion Medicine at postgraduate level leading to degree of MD in Transfusion Medicine [Blood transfusion and Immunohematology].

a) To understand the basic principles and concepts presented in the transfusion medicine core curriculum and develop a fund of basic knowledge in the field
b) To recognize problems in clinical medicine those are related to transfusion and apply concepts and principles in the core curriculum to clinical situations
c) To provide appropriate therapeutic solutions to transfusion medicine problems

2. To provide consultants and teachers in Transfusion Medicine in various medical colleges and institutions for operating a well-organized & efficient transfusion services.

3. To recognize significance of important research in the advancement of transfusion medicine and to impart training and stimulate interest in research in the field of Transfusion Medicine.

4. To recognize motivational, organizational and managerial skills for efficient operation of blood center.

After completion of the 3-year period, Post-graduates is expected to have an in-depth, comprehensive knowledge of all facets of Transfusion Medicine, have skills to effectively deliver high quality blood services and healthcare delivery, have attitudes and behaviour consistent with highest professional global standards, teaching, leadership and research in the field.

The candidate is expected to learn to develop an attitude of committed learning, teaching, and research for the welfare of the society.

Competence expected at end of Training Period

It is expected that at the end of the course, the Transfusion Medicine specialist will be specifically equipped for the following tasks.

Sound knowledge about starting a blood centre including the licensing procedure

- Provide direction to blood center with regard to organization of the collection, preparation, storage, distribution and clinical use of blood and components.
- Promote optimal use of blood products and develop a system for clinical control of their use
- Organization of Quality Management programme in blood transfusion services
- Develop skills needed for effective communication with the various stakeholders, blood donors, organizers, patients, colleagues, and ability to involve in the coordinated teamwork.
- Participate in research in blood transfusion medicine and upgrade the scientific knowledge by continuing medical education
- Organize training program for manpower development in the field
- Develop essential skills in teaching, leadership, conducting medical research, and to get them presented in scientific forums and published in peer-reviewed journals.

SYLLABUS (COURSE CONTENT)

The subject and course content of the syllabus is as follows:

SUBJECT	COURSE CONTENT
1. History of Transfusion Medicine	1.1. Identify and relate the important features of the history of Transfusion Medicine 1.2. Outline the scientific benchmarks in the evolution of Transfusion Medicine 1.3. Impact of wars in the development and evolution of Transfusion Medicine 1.4. Effect of specific innovations on Transfusion Medicine practice 1.5. Establishment of Blood Banks, blood preservation, blood containers 1.6. Recent trends in the practice of Transfusion Medicine
2. Physiology and Biochemistry of blood	2.1. Production, metabolism and morphology of Blood Cells. 2.2. Hemoglobin structure and functions. 2.3. Kinetics and functions of cellular elements of blood (normal and disease state) 2.4. Plasma Protein mechanism of Coagulation. 2.5. Hemo-dynamics of circulation. 2.6. Patho-physiology of blood donation. 2.7. Patho-physiology of hemorrhagic shock 2.8. Biochemical and hematological alternations during storage.
3. Genetics	3.1. Principles of genetics and inheritance. 3.2. Immunogenetics and blood groups. (Genetics of the major surface antigens of the formed elements of the blood) 3.3. Applied Genetics. 3.4. Anthropology. (Order and phenotypes of the ABO and Rh blood groups by frequency of occurrence in the major ethnic groups)
4. Immunology	4.1. Fundamentals of immunology & immunological techniques. 4.2. Immunology, immune response, immunoglobuins. 4.3. Immunological basis of iso-senstization 4.4. Antigens, Antibodies, complement, antihuman globulin test. 4.5. Humoral and Cellular immunity
5. Fundamentals of Immunohaematology	5.1. Biochemical properties and characteristics of blood group antigens and antibodies. 5.2. Identifications of natural and immune antibodies. 5.3. Leucocyte antigens and antibodies. 5.4. Platelet antigens and antibodies 5.5. Clinical and pathological consequence of antibodies to red cells 5.6. List of blood group systems in which antibodies are naturally occurring and the most important ones in which unexpected (irregular) antibodies occur

	5.7. Comparison of transfusion and pregnancy as immunizing events 5.8. Techniques for detection of antibodies / complements on red cell membrane and their interpretation. 5.9. Outline of mechanisms of red cell destruction 5.10. Importance of complement activation and antibody mediated red cell destruction
6. Blood group systems	6.1. Blood groups. 6.2. Biochemical properties and characteristics of the major surface antigens of the formed elements of the blood 6.3. Clinically significant antigen systems and associated phenotypes 6.4. Expression of these antigen systems on red cells and other cells in blood 6.5. Blood groups and disease associations. 6.6. Serological techniques for blood group antigens and antibodies. 6.7. Blood group reagents, Polyclonal and Monoclonal. 6.8. Blood group substances. 6.9. Function of neutrophil defense against bacterial infection 6.10. Role of the platelet in hemostasis 6.11.Function of lymphocyte subpopulations in normal and disease states 6.12. Pathophysiology and clinical features of disorders caused by abnormalities of cell function or number 6.13. Applied serology.
7. HLA system	7.1. Role of the HLA (major histocompatibility complex (MHC) system in transfusion, transplantation and associated diseases 7.2. Nomenclature used for the HLA (MHC) system 7.3. Inheritance of HLA antigens 7.4. Biochemical properties of Class I and II antigens 7.5. Distribution of the HLA antigens on blood cells and other tissues 7.6. Role of MHC in cellular immunology 7.7. Microlymphocytotoxicity assay - comparing its use for HLA typing and crossmatching. 7.8. Principles of the mixed lymphocyte culture test 7.9. Identification of clinical situations in which the mixed lymphocyte test is used for donor selection 7.10. Identification of significant HLA disease associations
8. Hemoglobin – structure and function	8.1. Structure and function of hemoglobin to normal and disease states 8.2. Role of hemoglobin in oxygen transport 8.3. Hemoglobin molecule indicating the oxygen-binding sites 8.4. Effect of abnormalities of hemoglobin in oxygen transportation. 8.5. Hemoglobin degradation

	8.6. Presence of iron in the blood and narrow storage compartment. 8.7. Iron metabolism 8.8. Bilirubin metabolism
9. Blood Coagulation	9.1. Principles of basic mechanism of blood coagulation to the diagnosis and treatment of coagulation disorder. 9.2. Interaction of soluble coagulation factors with platelets 9.3 Fibrinolytic pathway 9.4.Identify the abnormalities of coagulation in common hemostatic disorders 9.5. Fibrinolysis in normal and abnormal hemostasis 9.6.Describe the interactions among the coagulation, complement, kallikrein, and immunologic systems. 9.7. Describe the principles of the common screening tests for abnormalities in hemostasis. 9.8. Interpretation of results of coagulation tests in specific clinical situations. 9.9. Integrate clinical information with result of coagulations tests to establish a diagnosis and treatment plan. 9.10. Patho-physiology of Disseminated Intravascular Coagulation.
10. Hemodynamics of circulation	10.1. Principles of hemodynamics of circulation to the diagnosis and treatment of hypervolemia and hypovolemia. 10.2. Normal values for blood volume 10.3. Physiological mechanisms for control of blood volume. 10.4.Compensatory mechanism for abnormalities in blood volume 10.5. Symptoms and signs associated with abnormalities in blood volume. 10.6. Clinical and laboratory data to establish the diagnosis of hypervolemia and hypovolemia.
11. Donor recruitment, motivation and retention	11.1. Voluntary blood donation system and programme in India and other countries. 11.2. Categories of blood donors 11.3. Education & awareness of prospective blood donors about blood donations and health 11.4. Explain the concepts of community responsibility and individual responsibility towards voluntary blood donation programme 11.5. Analyze significant issues and techniques in donor recruitment, motivation and retention 11.6. Comparison between paid and volunteer blood donation systems 11.7. Motivating factors for blood donation 11.8. Whole blood donation Vs apheresis donation 11.9. Types: allogeneic, autologous, directed, apheresis 11.10. Impact of these types of donation on the safety and adequacy of the blood supply

	11.11. Public relationship with blood donors, camp organizers, NGOs, social workers 11.12. Organization of outdoor blood donation camps 11.13. Collection of blood from outdoor camps, blood mobiles, and in-house blood centres.
12. Donor selection and eligibility	12.1. Donor questionnaire and interview: Eligibility and deferral criteria 12.2. Acceptability criteria of blood donor 12.3. Counseling and Care of blood donors Pre-donation During-donation Post-donation 12.4. Identify the donor's risks in blood donation. 12.5. Identify potential risks to the recipient
13. Management of blood donation procedures	13.1. Blood collection procedures. 13.2. Blood containers and its configurations 13.3. Plasticizers 13.4. Anticoagulant and preservative solutions 13.5. Selection of blood containers 13.2. Patho-physiology of adverse reactions of blood donation 13.3. Prevention and management of adverse reactions of blood donation 13.4. Post donation advice and care
14. Blood component	14.1. Various types of blood components 14.2. Preparation and composition of blood components Basic steps in component production. Methods of preparation – sedimentation, centrifugation, apheresis 14.3. Functional composition of each component 14.4. Leucodepletion of each component Various methods and techniques 14.5. Storage conditions and storage lesions for each component with their shelf-life 14.6. Labeling of blood components 14.7. Transportation of blood components 14.8. Quality control standards of each component 14.9. Indication, dosage and administration of each component 14.10. Adverse effects of transfusion that may result from storage- induced change in blood components 14.11. Specialized blood components – irradiated, frozen, CMV free, HLA matched, Leucodepleted, washed 14.12. Stem cells Peripheral blood stem cells Umbilical cord blood stem cells 14.13. Dendritic cell 14.14. Cryopreservation

	14.15. Cold chain maintenance
15. Blood derivatives	15.1. Difference between a blood component and blood derivative 15.2. Plasma fractionation – type and procedures 15.3. Viral inactivation – single donor/pooled units 15.4. Preparation and production of blood derivatives 15.5. List of blood derivatives that are prepared commercially. 15.6. Composition and function of each blood derivative 15.7. Storage conditions and storage lesions for each derivative with their shelf-life 15.8. Indication, dosage and administration of each derivative 15.9. Adverse effects of transfusion that may result from storage- induced change in blood derivatives
16. Blood Processing	16.1. Mandatory tests required for donor blood processing. 16.2. Potential recipient's complications if errors occur in donor blood processing. 16.3. Infectious diseases that can be transmitted through blood transfusion and emerging new infections 16.4. Evaluation of effectiveness of pre-transfusion hepatitis, syphilis, and HIV testing. 16.5. Testing protocols for pre-transfusion testing of infectious markers 16.6. Evaluation of testing kits for transfusion transmitted infections (TTI) 16.8. Principles of TTI testing kits – ELISA, Western Blot, Immunoassays, Nucleic acid Amplification testing, Dot Blot hybridization, and others
17. Pre-transfusion testing	17.1. Scientific principle for compatibility testing 17.2. Basic procedures for compatibility testing Patient's specimen and labeling requirements Patient's request form for blood and or components Patient identification requirements ABO grouping & Rh typing Red cell antibody screening Blood component identification requirement 17.2. Techniques for compatibility testing Criteria for selection of an appropriate donor unit Emergency and elective techniques. Typing and Screening. Tube / Micro techniques for cross matching Compatibility testing in special circumstances Newer methods of cross matching Solid phase Gel technology Electronic cross match
18. Reagents and preservatives solutions	18.1. Production and Standardization of biological reagents. 18.2. Preparation of Anticoagulant and Preservative Solutions.

	18.3. Preparation of Cell panels. 18.4. Lectins, LISS, PEG, CuSo4 solutions 18.5. Quality control of the reagents and solutions
19. Hemotherapy	19.1. **Acute Blood Loss** 19.1.1. Patho-physiology, diagnosis and transfusion support in acute blood loss Hemorrhagic Shock Massive transfusion 19.2. **General Surgery** 19.2.1. Preoperative planning and orders for transfusion need in planned and emergency surgeries. 19.2.2. Criteria for evaluating haemostatic safety during anesthesia and surgical intervention 19.2.3. Appropriate orders for blood and blood components for elective and emergency surgical procedure, including the use of type and screen 19.2.4. Use of the maximum surgical blood order schedule in preparing preoperative blood orders. 19.2.5. Methods of predicting estimated blood loss during surgery 19.2.6. Treatment for hypovolemia 19.2.7. Cause of inappropriate use of blood and blood wastage. 19.2.8. Importance of cold chain maintenance 19.2.9. Desirable cross match: transfusion ratio. 19.3. **Massive Transfusion** 19.3.1. Define massive transfusion and conditions requiring massive transfusion 19.3.2. Appropriate orders for compatibility testing in massive transfusion. 19.3.3. Identify the correct use of 'type- specific' blood 19.3.4. Identify the correct use of O-negative or O-positive blood in patients with unknown ABO type. 19.3.5. Rationale for use of various components in massive transfusion. 19.3.6. Coagulation and metabolic abnormalities in massive transfusion 19.3.7. Risks and benefits of blood salvage techniques during massive transfusion. 19.4. **Cardiac Surgery** 19.4.1. Assessment of blood demand for open heart surgeries 19.4.2. Blood and blood component support in cardiac surgery 19.4.3. Autologous transfusion in cardiac and vascular surgery 19.4.4. Importance of cold agglutinins in cardiac surgery

	19.4.5. Treatment of symptomatic coagulation abnormalities develop following cardiopulmonary bypass (CPB). 19.4.6. Laboratory tests to evaluate bleeding after CPB. . 19.5. **Nephrology** 19.5.1. Indication and limitations of blood component therapy in renal disease. 19.5.2. Use of blood components in end-stage renal disease undergoing hemodialysis. 19.5.3. Use of blood components in renal transplantation 19.6. **Oncology** 19.6.1. Blood support for patient with neoplastic disease. 19.6.2. Hematologic problems in patients with specific forms of neoplasia. 19.6.3. Appropriate use of blood components in the treatment of neoplastic disease 19.7. **Burns:** 19.7.1. Fluid losses associated with burns. 19.7.2. Operative and non-operative mechanisms of fluid and protein loss in burn patients. 19.7.3. Transfusion support in burn patients
20. Transfusion support in Hemoglobinopathies, hemostatic and coagulation disorders	20.1. Patho-physiology, diagnosis, clinical features, investigation, management and transfusion support in hemoglobinopathies - Thalassemia Sickle cell anaemia Other hemoglobinopathies 20.2. Patho-physiology, diagnosis, clinical features, investigation, management and transfusion support in. hemostatic and coagulation disorders Hemophilia Von willebrands disease Other clotting factor deficiencies Platelet disorders Qualitative disorders of platelets Quantitative disorders of platelets Disseminated Intravascular Coagulation Other hemostatic disorders
21. Fetal, Neonatal and Pediatric transfusion	21.1. Pathophysiology of Hemolytic Diseases of Newborn (HDN). 21.2. Antenatal serology, ABO and Rh immunization 21.3. ABO, RH and Other blood groups HDN 21.4. Clinical effects of haemolytic disease in the fetus/ new born. 21.5. Methods of prenatal diagnosis (e.g. maternal history, maternal antibody titre, maternal and paternal phenotypes, and amniocentesis).

	21.6. Investigations and management of HDN 21.7. Indications, including the rationale, for each form of therapy for HDN (early delivery, plasmapheresis of mother, intrauterine transfusion, phototherapy and exchange transfusion). 21.8. Exchange transfusion – principle and indications 21.9. Selection of blood for exchange transfusion 21.10. Methods of exchange transfusion 21.11. Complications of exchange transfusion 21.12. Intrauterine transfusion – principle and indications 21.13. Selection of blood for intrauterine transfusion 21.14. Methods of intrauterine transfusion 21.15. Complications of intrauterine transfusion 21.16. Define Rh immunoprophylaxis 21.17.Role of Rh immunoprophylaxis (antepartum and postpartum) in the prevention of HDN 21.18. Indications for its use, including dosage, timing and route of administration. 21.19. Compatibility testing for neonatal and paediatric transfusion 21.20. Appropriate blood samples for neonatal testing 21.21. Appropriate blood types (ABO, Rh etc) for neonatal transfusion. 21.22. Post transfusion risk specific in the neonatal patient. 21.23. Situations in which the fetus, neonate are at risk for graft- versus host disease(GVHD) 21.24. Pathophysiology, diagnosis and management of neonatal alloimmune trombocytopenia and neutropenia.
22. Anemia	22.1. Classification, pathophysiology, diagnosis and management of anemia Iron deficiency anemia Megaloblastic anemia Aplastic anemia Haemolytic anemia including fragmentation syndrome Anemia of chronic diseases – liver disease, uremia, Thyroid diseases, etc
23. Administration of blood and components	23.1. Selection of I.V. set for various components 23.2. On-line warmers 23.3. Bed side filtration for leucocyte 23.4. Flow rate of blood transfusion and duration 23.5. Proper Handling of blood and component units for transfusion 23.6. Identification of units with patient before transfusion 23.7. Monitoring of transfusion 23.8. Steps to be taken if patient exhibits adverse reactions 23.9. Materials to be collected and send for investigation of transfusion reactions
24. Hemolytic anemia	24.1. Classification of hemolytic anemia

	24.2. Differentiate between hemolytic and non hemolytic anemia. 24.3. Differentiate between immune and non-immune hemolytic anemia. 24.4. Classification, diagnosis, clinical picture, investigations and management of Autoimmune Hemolytic Anemia (AIHA). 24.5. Pathogenesis of warm reactive autoimmune hemolytic anemia 24.6. Diagnosis, investigation and treatment of warm reactive AIHA 24.7. Compatibility testing for warm reactive AIHA 24.8. Factors to be considered for transfusion therapy in warm reactive AIHA. 24.9. Pathogenesis of cold reactive autoimmune hemolytic anemia 24.10. Diagnosis, investigation and treatment of cold reactive AIHA 24.11. Compatibility testing for warm reactive AIHA 24.12. Factors to be considered for transfusion therapy in cold reactive AIHA 24.13. Pathogenesis of drug induced autoimmune hemolytic anemia 24.14. Diagnosis, investigation and treatment of drug induced AIHA 24.15. Compatibility testing for warm reactive AIHA 24.16. Factors to be considered for transfusion therapy in drug induced AIHA 24.17. Pathogenesis of paroxysmal nocturnal hemoglobinuria (PNH) 24.18. Diagnosis, investigation and treatment of PNH 24.19. Compatibility testing for PNH 24.20. Factors to be considered for transfusion therapy in PNH
25. Thrombocytopenia	25.1. Classification of thrombocytopenias 25.2. Differentiate between immune and non immune thrombocytopenia. 25.3. Pathophysiology, diagnosis, clinical features, investigations and management of idiopathic thrombocytopenic purpura (ITP) 25.4. Pathophysiology, diagnosis, clinical features, investigations and management of drug-induced thrombocytopenia 25.5. Distinguish drug-induced thrombocytopenia form ITP 25.6. Pathophysiology, diagnosis, clinical features, investigations and management of thrombotic thrombocytopenic purpura (TTP)

	25.7. Pathophysiology, diagnosis, clinical features, investigations and management of fetal and neonatal thrombocytopenia 25.8. Appropriate management of thrombocytopenias, including the role of transfusion therapy
26. Neutropenia	26.1. Classification of neutropenia 26.2. Etiopathogenesis, diagnosis, investigation and treatment of neutropenia. 26.3. Differentiate between immune and nonimmune neutropenia 26.4. Clinical and laboratory features of immune neutropenia. 26.5. Role of drugs in the induction of immune and nonimmune neutropenias. 26.6. Appropriate management in the care of patients with neutropenia 26.7. Role of granulocyte transfusion
27. Apheresis	27.1. Basic principles of apheresis technology 27.2. Technology of apheresis (Manual or Automated) 27.3. Cell separators – types and principle 27.4. Indications, risk and benefits of apheresis procedures 27.5. Donor Hemapheresis (platelets, red cell, granulocytes, plasma) Donor selection Procedure Replacement fluids Anticoagulants Monitoring of central venous canula Complications Management of complications 27.6. Clinical disorders for therapeutic phlebotomy, red-cell exchange, plateletpheresis and plasma exchange. 27.7. Distinguish appropriate from inappropriate uses of therapeutic apheresis procedures. 27.8.Therapeutic apheresis (red cell exchange, plasma exchange Indications Procedure Complications 27.9. Newer methods of apheresis - Immunoadsorption
28. Adverse effects of blood transfusion	28.1. Definition and classification of transfusion reactions 28.2. Etiopathogenesis of transfusion reactions 28.3. Clinical presentation of transfusion reactions 28.4. Investigation for transfusion reactions 28.5. Management of transfusion reactions 28.6. Prevention of transfusion reactions 28.7.Immunological reactions (etiology, pathogenesis, investigation, clinical outcome, prevention and management) Hemolytic transfusion reaction

	Intravascular reactions (immediate) *Extravascular reactions (anamnestic/delayed)* Non-hemolytic / febrile transfusion reactions Allergic and Anaphylactic reactions Platelet alloimmunization White cell alloimmunization Transfusion associated Graft vs Host reactions Transfusion Related Acute Lung Injury (TRALI) 28.8.Non-immunological reactions (etiology, pathogenesis, investigation, clinical outcome, prevention and management) Metabolic effect of transfusion *Acidosis, hypocalcemia, hyperkalemia, hypothermia* Volume overload Non-cardiac pulmonary oedema Iron overload Transfusion transmitted infections *Bacterial, viral, parasitic* (*HIV, HBV, HCV, Malaria, syphilis, others)* 28.9. Bedside steps to be taken by physicians, floor nurse, and laboratory staff in response to suspected transfusion reactions.
29. Autologous transfusion	29.1. Definition and classification of autologous transfusion 29.2. Basic principles, indications, contra-indications Pre-operative autologous deposit Acute normovolemic hemodilution Intra-operative blood salvage including equipment (cell savers) Post-operative cell salvage 29.3. Advantages and disadvantages of autologous transfusion 29.4. Directed donation – indications, advantages, disadvantages
30. Quality management programme	30.1. Quality management practices in blood transfusion services. 30.2. Electronics, software and Plastics in transfusion medicine. 30.3. Development of Standard Operating Procedures (SOP) manual 30.4. Quality control of Reagents Instruments Disposables Personnel Infrastructure Blood & Components Testing procedures 30.5. Quality assurance

	Internal quality assurance (IQA) External quality assurance (EQA) 30.6. Servicing and calibration of equipment – log book for equipment 30.7. Medical audit 30.8. Hospital transfusion committee 30.9. Good manufacturing practice (GMP) 30.10. Turnaround time 30.11. ISO certification 30.12. Accreditation
31. Bio-safety and waste management	31.1. Bio-safety levels in health care set up and blood banks 31.2. Bio-safety measures in blood centre, blood donation camps 31.3. Waste generation and segregation 31.4. Waste disposal 31.5. Sterilization procedures in transfusion technology 31.6. Post exposure prophylaxis 31.7. Vaccination
32. Blood substitutes and hematopoietic agents	32.1. Volume expanders available for clinical use (crystalloids, natural colloids, synthetic colloids) Biochemical and physiological characteristics Clinical indications and dosage Adverse effects 32.2. Synthetic Oxygen carrying compounds (perflurochemicals and hemoglobin solutions) Biochemical and physiological characteristics Clinical indications and dosage - usefulness Adverse effects Investigation reports 32.3. Plasma derivatives Basic principles of preparation & composition Clinical indications and dosage Efficacy of the products 32.4. Hematopoietic growth factors 32.5. Recombinant clotting factors
33. Transplantation	33.1. Transfusion practice in Organ transplantation. Role of antigen matching and or compatibility in selecting organs or tissues for transplantation. 33.2. Organs and tissues for which ABO compatibility is considered essential. 33.3. Role of the major histocompatibility complex (HLA) in graft survival. 33.4. Bone marrow transplantation – Processing, Harvesting 33.5. Immunohematological problems in ABO mismatched BMT 33.6. Peripheral stem cell transplantation – Donor preparative regimens, Harvesting, Complications, Cryopreservation, Cell counting targets, Engraftment monitoring,

	33.7. Umbilical cord blood transplantation – Collection, Processing, Storage 33.8. Transfusion support in specialized conditions – kidney, liver 33.9. Effect of pre-transplant transfusion on graft survival in renal and bone marrow transplantation. 33.10. Adverse effects associated with transfusion of immune compromised recipients 33.11. Graft vs Host reaction 33.12. Irradiation of blood products - Indications, dosage, adverse effects 33.13. Tissue banking
34. Newer technologies	34.1. Principle, methods and relevance in Transfusion Medicine 34.2. Western Blot assay 34.3. Polymerase chain reaction 34.4. Nucleic acid Amplification technology for viral genome detection 34.5. Dot Blot Hybridization 34.6. DNA sequencing 34.7. Flow Cytometry 34.8. Plasma Fractionation 34.9. Hybridoma technology 34.10. Recombinant technology 34.11. Pathogen Inactivation 34.12. Gene Therapy 34.13. Proteomics 34.14. Microarray technology 34.15. Basics of animal experimentation
35. Medico-legal consideration	35.1. Ethical & legal considerations pertaining to transfusion practice 35.2. Forensic serology - Identification of blood stains 35.3. Paternity testing or Disputed Paternity Resolving different genetic systems in paternity or other forensic testing. Exclusion from non-exclusion in paternity testing Limitation of paternity testing 35.4. Religious issues in transfusion Management of transfusion therapy in individuals with religious objection to transfusion. Examine religious objections to transfusion Identify religious groups which interdict transfusion. Acceptable situations for intraoperative blood salvage Identify legal avenues for obtaining permission to administer transfusions that are medically indicated but religiously interdicted.

	Ethics of seeking legal avenues for obtaining permission to administer transfusions that are medically indicated but religiously interdicted. 35.5. Ethical and legal considerations pertaining to donation of bone marrow/peripheral stem cell by unrelated donors and recipient. Role of informed consent Procedure for obtaining informed consent. Role and importance of confidentiality. Procedures to assure confidentiality.
36. Organisation and function of regional blood service and hospital transfusion service	36.1. Planning and development of Transfusion Services. 36.2. Interactions between regional blood centres and hospital based blood services. 36.3. Organization of Blood Donor services Donor motivation and promoting voluntary blood donation . Operation of mobile blood camps. Donor recruitment, retention and care. Donor confidentiality, assurance, notification and referral 36.4. Organization and functions of blood centre, including quality management programme 36.5. Organization and function of hospital transfusion services, including issues of appropriateness of transfusion and informed consent. 36.6. Hospital Transfusion Committee – roles and responsibilities 36.7. Records and Statistics. 36.8. Development of forms, labels, records etc. 36.9. Bio statistics and Health Economics. 36.10. Inventory management. 36.11. Medical audits - Blood audits. 36.12. Accreditation of blood banks
37. Regulatory agencies	37.1. Drugs & Cosmetics Act of India 37.2. License requirement for blood centres 37.3. National Blood Policy 37.4. Role of government and non-government agencies for transfusion services NACO and NBTS SCAS and SBTC NABH, ISO, GMP DCG (I)/CDSCO Consumer Protection Act Indian Red Cross Voluntary organization for blood donation 37.5. Accreditation of blood centres. 37.6. Community Medicine related to Transfusion Medicine 37.7. International agencies for BTS

	FDA, GE AABB ISBT, FIODS WHO, IRCC 37.8. Look back policy
38. Automation and Computerization in blood bank services	38.1. Automated blood grouping & processing 38.2. Automation in TTI testing 38.3. Instrumentation & use of bar codes 38.4. Use of computers in blood banking including 38.5. Implementation of Blood Establishment Computer Software (BECS)

TRAINING PROGRAM

Practical / Clinical / Laboratory experience to be imparted at
Year I, II and III

The candidates joining the course must work as full-time residents during the whole period of their postgraduate training. They will be required to attend a minimum of 80% of training period. Candidate shall be given full time responsibility and assignments and their participation in all facets of the educational process assured. Postgraduate students must maintain a record log-book of the work carried out by them on daily basis and the training undergone by them during the period of training. These log-books shall be checked and assessed by the Head and other faculties.

TEACHING /LEARNING METHODS:

Learning will essentially be self-learning.

Following teaching-learning methods shall be followed-

i. Group teaching sessions:

- Journal review
- Subject seminar presentation
- Group discussion
- Clinical case presentations pertaining to transfusion therapy.
- Presentation of the findings of an exercise on any of the sub- specialties
- Participation in CME programs and conferences

ii. Suggested schedule of rotation:

I. Intrinsic rotation:

The candidates will be rotated through various sections of the Transfusion Medicine department as under:

A) Blood donor management: 6 months

Donor recruitment & motivation
Donor counseling and notification
Blood donor selection
Phlebotomy
Post donation care of donor
Outdoor blood donation camps
Record keeping, documentation, donor directory

B) Component preparation and Apheresis: 5 months

Preparation of various blood components - PRBC, FFP, Cryoprecipitate, Leuco reduced components, Washed red cells, Platelet concentrates
Irradiation of blood components
Storage & quality control of components
Donor apheresis – platelets, plasma, red cells, stem cells

Therapeutic plasma exchange

C) Transfusion transmitted infection screening: 4 months

Screening of various markers - HIV, HCV, HBsAg, Syphilis, Malaria, CMV
Methodology - ELISA, Rapid, Chemiluminescence, NAT
Molecular techniques

D) Immunohematology: 5 months

Blood Grouping and Typing – ABO, Rh and Minor red cell antigen
Weak D testing, Genotyping
Anti-human globulin test
Secretor status
Resolution of grouping discrepancy
Irregular Antibody screening – detection, identification and titration
Diagnosis of AIHA, PNH
Investigation of Transfusion reaction
Antenatal serology
Antibodies in Multi – transfused patients

E) Pre transfusion testing & Cross matching: 4 months

Cross – matching
Transfusion support in - Hemoglobinopathies, coagulation disorders, bleeding disorders, hemolytic anemia, transplantation, cardiac surgery, surgical and medical elective and emergency

F) Quality control / computers / records: 1 month

Total period: 25 months

II. Extrinsic rotation (Training in allied departments):

The candidates will be rotated through other departments within the institute or neighboring hospitals as well as deputed to other institution within or outside the state when such facilities are not available in the hospital. They are as under:

A) Dept of Pathology/Hematology division (SCTIMST): 1 week

Complete blood picture
Reading of peripheral smear
Coagulation work up

B) Dept of Microbiology (SCTIMST): 2 weeks

Bacterial culture
Grams staining

C) Dept of Anesthesiology (SCTIMST): 2 weeks

Intra-operative hemodilution
Operation of cell saver
Intra operative cell salvage
Blood substitutes

D) Dept of Thrombosis Research Unit (BMT wing): **2 weeks**

Plasma Fractionation
Flow Cytometry
Coagulation tests
Platelet Serology

E) Dept of Clinical Hematology (GMC, Trivandrum): **3 weeks**

Hemoglobinopathies
Coagulation disorders
Bleeding diathesis

F) Dept of Pediatrics and Neonatology (GMC, Trivandrum): **2 weeks**

Exchange transfusion
Phototherapy
Neonatal bleeding/coagulation disorders
Management of Thalassemia

G) Dept of Obstetrics and Gynecology (GMC, Trivandrum): **2 weeks**

Antenatal serology
Intrauterine transfusion
APH, PPH

H) Malabar Cancer Centre (Thalassery): **2 weeks**

HLA typing – all methods
Bone marrow transplantation
Peripheral Stem cell collection
Procedures for harvesting, processing and storage
CD 34 counts
Cryopreservation

I) Deputation to National Institute of Immunohematology, Mumbai: **1 month**

Immunohematology procedures
Immunophenotyping including flowcytometry
Immunofluoresence
Molecular grouping

Total period: **5 months**

GRAND TOTAL: **30 months**

The remaining 6 months will be for final preparation of Thesis, submission of paper for publication and preparation for Final Examination.

Practical and Laboratory Training

Practical training shall be imparted by posting the students in various sub-specialties (sections) as detailed in the intrinsic and extrinsic rotation. Student shall be actively involved in day to day working of all the sections.

He/she will be trained under the guidance of teachers in all the aspects of practice of transfusion therapy and basic blood banking techniques including blood collection, processing, storage of blood products, component preparation, pre transfusion testing, apheresis, screening of blood products and hemotherapy, including stem cell transplantation.

Residents should be an expert in carrying out laboratory investigations and clinical work-up on the following techniques during their rotation posting:

Area of Rotation posting	**Content of practical training**	**Learning Objectives**
Orientation (1 month)	Brief orientation to computer system, blood bank activities, teaching program.	Be conversant with computer system & operation of blood bank activities.
Blood donation	Donor recruitment, Donor motivation, Donor selection & Phlebotomy Post donation care of donor. Outdoor blood donation camps – organization and supervision. Donor counseling and notification.	Should be able to select healthy donor and defer unsuitable donors, perform phlebotomy with aspetic precautions, and manage donor reactions. Should also be trained in donor counseling and notification along with proper record keeping and documentation of donor room activities
Apheresis – Donor and Therapeutic	Access evaluation, donor suitability, selection of machine, manipulation of product, QC of product, donor observation for adverse effects and its management. Indications, contra indications, replacement fluids, frequency, monitoring of TPE.	Should be able to perform the procedure independently, obtain quality product and manage any adverse effects. Should be able to select proper patient, machine, plan TPE, select replacement fluids and monitor the patient and investigations.
Blood Component preparation	Preparation of various blood components. Leucocyte removal and Irradiation of blood components.	Should be able to identify units for preparing various blood components, principle and technique of using

	Storage & quality control of components.	refrigerated centrifuges for preparing components. Should be able to understand factors affecting quality of components, their storage and cold chain maintenance and transportation.
Transfusion transmitted infections	Screening of various markers - HIV, HCV, HBsAg, Syphilis, Malaria, CMV. Methodology - ELISA, Spot, Rapid, Automated analyzer, NAT. Molecular techniques. Laboratory safety.	Should be able to understand blood screening principles and disposal of reactive units. Should be able to validate ELISA, NAT and other test, maintain QC. Should be able understand good laboratory practices.
Immunohaematolgy	Blood Grouping and Typing – ABO, Rh and Minor red cell antigen. ABO sub-grouping and resolving ABO discrepancies. Du testing, Genotyping. Anti-human globulin test – Direct and Indirect. Secretor status for ABH substances. Irregular Antibody screening – detection, identification and titration. Diagnosis of AIHA, PNH. Investigation of Transfusion reaction. Investigations in Antenatal serology. Antibodies in Multi – transfused patients.	Should be able to interpret immuneohematological tests. Should be able to provide consultation to physicians regarding transfusion reactions and their management.
Pre transfusion testing & Cross matching	Compatibility testing for adults, neonates, infants. Investigation of difficult cross match. Formal consultation on transfusion support in complex cases, checking indications & dosage for blood components, emergent issue of blood. Transfusion in special cases such as massive transfusion,	Should be able to provide consultation on transfusion therapy. Should be able to resolve difficult & complex cross matching problems. Ensure appropriate and judicial use of blood and components.

	organ transplantation, platelet refractoriness.	
PBSCT, Umbilical cord stem cells, Bone marrow stem cells	Harvesting, processing, storage, thawing, infusion of PBSC, Umbilical cord stem cells and bone marrow. Immunohematological monitoring of ABO mismatch transplants. Transfusion support – CMV issues, irradiation.	Should be able to understand common procedures and basic concepts behind PBSC processing, umbilical cord blood and bone marrow stem cells.
Quality control / computers / records	Quality control of procedures, components, equipment, reagents, diagnostic kits, consumables. Quality assurance programme. Development of various documents in all sections of blood center, SOP manuals. Regulatory compliance. Documentation, record keeping. Blood establishment computerized software.	Should be able to understand QC principles, recognize common management & regulatory issues, identify management strategies.
Department of Pathology/Hematology	Complete haemogram. Preparation and reading of peripheral smear. Coagulation work up.	Should be able to interpret all hematological and coagulation investigations.
Department of Microbiology	Bacterial culture. Grams staining.	Should be able to identify bacterial growth.
Department of Anesthesiology	Pre-operative hemodilution. Operation of cell saver. Intra operative cell salvage. Blood substitutes.	Should be able to carry out autologous transfusion procedures and understand clinical use of blood substitutes.
Department of Clinical Hematology	Hemoglobinopathies. Coagulation disorders. Bleeding diathesis.	Should be able to diagnose, carry out investigations and management of these hematological disorders.
Department of Pediatrics/ Neonatology	Exchange transfusion. Phototherapy. Neonatal bleeding/coagulation disorders. Management of Thalassemia.	Should be able to carry out investigations and transfusion support to neonatal and pediatric patient.

Department of Obstetrics	Antenatal serology. Intrauterine transfusion. APH, PPH.	Should be able to carry out serological investigations and advice the obstetricians on transfusion therapy. Should also provide adequate transfusion support for intrauterine transfusion.
Cancer Hospital	Leukemia. BMT Stem cell harvesting. HLA typing	Should be able to provide transfusion support in cancer patients.
Deputation to NIIH, Mumbai	Immunohematology procedures Immuno-phenotypiny including flowcytometry Immuno-fluoresence. Molecular blood grouping	Should learn all sort of immunohematological procedures and molecular testing for blood typing.

DUTIES AND RESPONSIBILITIES

The student selected for M.D. Transfusion Medicine programme will be designated as Junior Resident. They will be joining and working in the Department of Transfusion Medicine of Sree Chitra Tirunal Institute for Medical Sciences and Technology (SCTIMST). This course will be started at the beginning of the academic year (usually in January), every year.

After an introductory month in the course, residents will be delegated duties in the department by the Departmental Head. Residents will be rotating through various sections of Blood Bank (after the introductory month) and are responsible for daytime (8 am – 5 pm) call on standard workdays during their rotation. Besides, they are also responsible for carrying out night (5 pm - 9 am), and round the clock holiday and weekend Blood Bank call. On-call residents must be available by mobile and other appropriate modalities.

The following activities need to be carried out by them:

1. Review the SCTIMST blood centre LOGBOOK each morning and follow-up all in-house patients receiving blood transfusions.
2. Attend and report on problematic cases from wards/ICUs at morning Blood Bank rounds.
3. Review selected patients, upon request by Blood Bank Supervisor. Prepare presentations and seminars and attend lectures, rounds, in-services, and laboratory sessions as scheduled.
4. Handle all problem cases, irregular antibodies, positive direct Coombs tests, patients requiring blood warmer, etc.
5. Consult on patients with incompatible crossmatches, release of Rh-positive blood to Rh negative individuals in case of emergency, Rh immune globulin dosage, etc.
6. Carry on first line communication with physician clinical staff and technical staff regarding problem patients.
7. Prospectively review, assess and document disposition of all requests for elective transfusion of platelets, fresh frozen plasma, cryoprecipitate and coagulation factor concentrates. This should include a discussion with the requesting physician and consultation with the Professor or designate Blood Bank, if necessary.
8. Expedite delivery of emergency specimens to the Blood Bank for send out to a reference laboratory.
9. Review antibody panels in conjunction with problem patients review.
10. Review all transfusion reactions by consulting all pertinent written and electronic records and interviewing the patient; document these and present to Professor of Blood Bank.
11. Advise clinicians of the results of Blood Bank workups and of recommendations.
12. Observe actual transfusions at SCTIMST, as part of the Quality Assurance Program. Each resident will review 10 each a month and document adherence to or breaches of standards for administration of transfusions. The resident will distribute and present the SCTIMST audit at Transfusion Committee.
13. Prepare and present at Transfusion Committee meetings, Quality Assurance and other reports requested by the Blood Bank Professor.

14. Research selected administrative, technical, quality assurance or medical questions, depending upon resident interest and the current needs of the Blood Bank.
15. Mentor other residents as to appropriate areas of concentration in preparation for residency and board examinations questions in blood banking.
16. Coordinate Blood Bank-related activities, e.g., communication with apheresis staff and residents, to maximize apheresis experience.
17. Review interesting clinical cases with other residents and faculties.
18. Attend clinical specialty and blood bank meetings, conferences, as a physician representative from SCTIMST Blood Bank.
19. Attend Transfusion Medicine conferences sponsored by SCTIMST, and other outside organizations if/when time permits.
20. Maintain amicable, professional relationships with clinical house staff, blood bank technology staff, and other colleagues.

- **Residents should consult initially with the Faculties of Transfusion Medicine on any issues impacting on them as a group, and secondarily with attending physicians as needed.**

Daily Responsibilities:

1. Take all calls for the Blood Banks.
2. Check anything that is important in logbook of SCTIMST for morning meeting with Professor/faculty of Blood Bank.
3. Follow-up all transfusion reactions by review of all pertinent paper/electronic records, patient interview, documentation of data and presentation to Blood Bank Faculty.
4. Review clinical condition and hemotherapy plan for in-house patients. Contact Senior Resident of Clinical department. Report to Blood Bank Supervisor.
5. Follow-up patients who have received transfusions. Check charts for completed consent forms and complete Review of Blood Product Forms. Document on Component/Derivative approval forms.
6. Check that positive direct Coombs tests and screens are reported to clinicians as needed.
7. Call clinicians to obtain samples for send out to reference laboratories.
8. Check if any products are approved by physicians (review clinical diagnosis, reason for Blood Bank products, current clinical condition and future needs for products).
9. Make wastage and outdate inquiries for blood bank and hospital.
10. QA: Review and document non-reported transfusion reactions and discuss with Supervisor
11. Recall and Lookback: Check patient's records for information.
12. Attend therapeutic apheresis session of patient undergoing such treatment in ward and document observations on the Pheresis Documentation Sheet. Submit completed sheet to Supervisor
13. Wear white coat in the laboratory and for apheresis sessions and patient visits.

RECOMMENDED BOOKS AND JOURNALS

A. Books:

1. P.L. Mollison. Blood Transfusion in Clinical Medicine, published by Oxford, ELBS & Blackwell Scientific Publication, Oxford

2. J.D. Cash. Progress in Transfusion Medicine. Vol No. I, II, III, IV, published by Churchill Livingstone, London

3. L.D. Petz, S.N. Swisher, S. Kleinman, et al. Clinical Practice of Transfusion Medicine, published by Churchill Livingstone, New York.

4. J.A.F. Napier. Blood Transfusion Therapy: A problem oriented approach, published by John Willey & Sons: Chichester.

5. C.D. Hillyer, L.E. Silberstein, P. Ness. Blood Banking and Transfusion Medicine: Basic Principles and Practice, published by Churchill Livingstone.

6. J. McCullough. Transfusion Medicine, published by McGraw-Hill Professional.

7. W.H. Churchill, S.R. Kurtz. Transfusion Medicine, published by Blackwell Scientific publication, Oxford

8. R.W. Beal & J.P. Isbister. Blood Component therapy in Clinical Practice, published by Blackwell Scientific Publications: Oxford

9. P.D. Mintz. Transfusion Therapy: Clinical Principles and Practice, published by AABB.

10. C T S Sibinga: P.C. Das & Greenwalt. Future development in Blood Banking, published by Martinus Nijhoff Publishers, Boston.

11. S.V. Rudmann. Textbook of Blood Banking and Transfusion Medicine, published by Saunders.

12. M.L. Turgeon. Fundamentals of Immunohematology, Theroy and Technique, published by Williams & Wilkins.

13. Technical Manual of American Association of Blood Banks, published by AABB.

14. K.E. Boorman, B.E. Dodd. Blood group Serology, published by Churchill Livingstone, London.

15. D.M, Harmening. Modern Blood Banking and Transfusion Practices, published by F.A. Davis Company, Philadelphia.

16. M.F. Murphy, D.H. Pamphilion. Practical Transfusion Medicine, published by Blackwell Publishing.

17. B.D. Spiess, R.K. Spence, A. Shander. Perioperative Transfusion Medicine, published by lIppincott Williams & Wilkins.

18. L.A. Kay, E.R. Huehns. Clinical Blood Transfusion, published by Churchill Livingstone, London.

19. Collection, Fractionation, Quality Control and uses of blood & Blood products, published by World Health Organisation, Geneva.

20. R.R. Race & R. Sanger. Blood groups in Man, published by Black well Scientific Publication, Oxford

21. A.E. Mourant. The Distribution of Human Blood Groups, published by Black well Scientific Publication, Oxford.

22. P.H. Anderson, C.C. Thomas. The Human Blood Group, published by Springfield, USA

23. C. Salmon. The Human Blood group, published by Year Book Medical publication, New York

24. P.D. Isstt. Applied Blood Group Serology, published by Montogmony Scientific Publication, Florida.

25. R.M. Winslow. Blood Substitutes. Published by Academic Press

26. C.J. van Oss, M. Dekker. Transfusion Immunology and Medicine, published by Year Book Medical Publication, New York

27. Clinical Use of Blood Handbook, published by World Health Organisation, Geneva

28. J. Robinson, H.W. Liss. Blood Separation and Plasma Fractionation, published by Year Book Medical publication, New York.

29. E.C. Rossi, T.L Simon, W.N. Dzik, E.L. Snyder, G.S. Moss. Principles of Transfusion Medicine, published by Lippincott Williams & Wilkins

30. M.E. Brecher, L.C. Lasky, L.A. Issitt. Hematopoietic Progenitor Cells: Processing, Standards and Practice, published by S Karger.

31. K. Atkinson, R. Champlin, J. Ritz, W.E. Fibbe, et al. Clinical Bone marrow and Blood stem cell transplantation, published by Cambridge University Press.

32. H.E. Broxmeyer. Cellular Characteristics of Cord Blood and Cord Blood Transplantation, publishsed by AABB Press.

33. H.B. Anstall, P.M. Urie. A manual of Hemotherapy, published by John Wiley & Sons.

34. E.D. Quinley. Immunohematology: Principles and Practice, published by Lippincott Williams & Wilkins.

35. M.L. Turgeon. Fundamentals of Immunohematology – Theory and Technique, published by Lea & Febiger.

36. P.H. Anderson, P.M. Ness. Scientific Basis of Transfusion Medicine, published by Saunders.

37. K. Murawski, F. Poetooni. Transfusion Medicine: Recent Technological advances, published by Blackwell Scientific Pub, Oxford

38. C.T.S. Sibinga, P.C. Das, H.F. Tassel. Quality Assurance in Blood Banking and its impact, published by Martinus Nijhoff Pub, Boston

39. C.T.S. Sibinga, P.C. Das, G. Opel. Transplantation and Blood Transfusion, published by Martinus Nijhoff Pub, Boston

40. C.T.S. Sibinga, P.C. Das, T.j. Greenwalt. Future development in blood banking, published by Martinus Nijhoff Pub, Boston (Repetition- same as 10.)

41. J.J. Barbara, P.S.G. Wright. Microbiology in Blood Transfusion, published at Bristol.

42. R.K. Saran. Transfusion Medicine Technical Manual, published by WHO

43. A.B. Dutta. Blood Banking and Transfusion, published by CBS Publishers & Distributors.

44. G.H.R. Rao, T. Eastlund, L. Jagannathan, Handblook of Blood Banking & Transfusion Medicine, published by Jaypee Brothers.

45. B P L Mooe. Red Cross Blood transfusion Service, published by Canadian Red Cross Society, Toronto.

46. Blood transfusion Services, published by Australian Red Cross Society, Sydney.

47. Handbook for Blood Bank Medical officers, NACO

B. **Journals:**

1. **TRANSFUSION**, American Association of Blood Banks, published by J.B.Lippincott Company, Philadelphia.

2. **VOX SANGUINIS**, International Journal of Blood Transfusion, published by S.Karger Medical and Scientific Publishers.

3. **TRANSFUSION MEDICINE**, published by Blackwell Publishing.

4. **TRANSFUSION MEDICINE REVIEW**, published by W. B. Saunders Co., Ltd

5. **TRANSFUSION AND APHERESIS SCIENCE**, published by Elsevier

6. **STEM CELLS**, published by AlphaMed Press.

7. **IMMUNOHEMATOLOGY**, published by American Red Cross.

8. **CURRENT ISSUES IN TRANSFUSION MEDICINE**, published by The University of Texas M. D. Anderson Cancer Center.

9. **JOURNAL OF CLINICAL APHERESIS**, published by Wiley InterScience.

10. **BONE MARROW TRANSPLANTATION**, published by Nature publishing group.

11. **BLOOD**, published by American Society of Hematology

12. BRITISH JOURNAL OF HEMATOLOGY

13. AMERICAN JOURNAL OF HEMATOLOGY

14. THROMBOSIS AND HEMOSTASIS

15. SEMINARS IN HEMATOLOGY

16. EUROPEAN JOURNAL OF HEMATOLOGY

17. SEMINARS IN THROMBOSIS AND HEMOSTASIS

18. LANCET

19. BRITISH MEDICAL JOURNAL

20. NEW ENGLAND JOURNAL OF MEDICINE

ACADEMIC COMMITTEE OF THE DEPARTMENT

The structure and role of academic program committee.

The academic program committee consists of Head of the Department/Division, (HOD) Program-in charge, (PIC) Program Coordinator (PC) Mentor, Guide, Moderator and Resident
Academic In charge.

Following are the responsibilities of each in the academic activities of the department

A. Role of Professor and HOD

1. Overall supervision of the conduct of academic programs and evaluation process in the department.
2. Assess the quality and adequacy of content of academic program.
3. Evaluate the progress of each student through the APC.
4. He / She will be member of the appraisal committee and will assess the remedial measures taken to enhance performance of the resident.
5. Conduct of the external examination and supervision of conduct of internal examinations.

B. Role of Program in charge (PIC)

1. Will be responsible for ensuring the implementation of academic programs.
2. Assign equal number of academic programs for each resident for each year and ensure it is conducted.
3. Supervise the conduct of evaluation of academic programs by PC.
4. Supervise the internal evaluation process.
5. Organize external and internal examinations.
6. Verify and validate entry of marks in the e-portfolio after it has been verified and validated by PC.
7. Report to BOS/academic council, deficiencies, suggestions and feedback on the upgraded curriculum and evaluation.

C. Role of program coordinator (PC)

1. Circulate monthly academic roster of department and send a copy to the academic division for its records.

2. Maintain dossier for each resident till the end of the course.
3. Circulate and collect evaluation forms after each academic program.
4. Maintain register of attendance in academic programs of both students and faculty. In the attendance of faculty indicate why someone was not available (sabbatical, casual leave, duty leave, research posting, others) or for residents (emergency, CL, duty leave). There should be no entries after the session is over. The names and number of faculty who did the evaluation should be clear on the evaluation form.
5. Enter and validate entry of information and marks for each student for each program at the end of each month in the e-portfolio.
6. E-portfolio entry, if made by dept secretary, should be verified and validated.
7. Monitor log book entries.
8. Organize appraisal meetings.
9. Collect resident feedback.
10. Organize internal examination.
11. Report to PIC periodically about progress and problems with implementation and resolve them.
12. The residents will be continuously evaluated by the faculty day today on their performances in work places like laboratories, donor area, outdoor camps, Pain clinics, wards, ICUs, inter departmental consultations and the evaluation forms must be given to PC.
13. The PC will coordinate with PIC and HOD on the clinical Performance of the candidates.

D. Guide.

1. The mentor could be the thesis guide for post-graduate courses or any other faculty member nominated by the APC.
2. He/ She can guide the resident in the selection of appropriate thesis topic, process of submission to TAC and IEC, both procedures being mandatory.
3. Ensure participation and presentation in a national conference-mandatory requirement.
4. Guidance for publication of research paper.
5. Review abstract submitted for conference and ensures that abstract is sent to e-portfolio.
6. Participate in appraisal meeting conducted by departmental academic team.
7. Committee and assist in planning remedial actions for candidates' progress.

E. Role of Co-Guide

1. Appointed by the HOD to help in the thesis of a particular resident. He along with the resident identifies topics, help resident in getting ethics approval, writing proposal for funding if required, monitors the conduct of study including adverse events.
2. He/ She reports to **Program In-charge** about the progress of thesis.
3. Guide and counsel students in managing work and stress.
4. Guidance students in planning their careers.

Weekly Academic Programmes for Curriculum Implementation

Sl. No	Academic Sessions	Day	Time

1	Seminars/Symposium	Tuesday and Friday	10.00 AM -11.00 AM
2	Journal Club/ Recent Advances	Friday	11.30 AM -12.30 PM
3	Monthly Audit of Departmental Activities	Once in a month	2.00 PM – 3.00 PM
4	Case Discussion/ Problem solving issues	Twice in a month	2.00 PM – 3.00 PM
5	Practical – Laboratory	Saturday	10.00 AM – 12.00 Noon

THESIS

The candidate is expected to undertake a mandatory research project for thesis submission. The mentor or the guide of the project will be identified by the **Head of department** in consultation with the **Program in Charge** in the initial 6

months of admission. The areas of project work should be decided in discussion with these mentors, and the research project should be presented in the departmental research meeting at the end of 9 months of joining the training period. The projects should be modified as per the suggestions from the department, and presented for approval from technical advisory committee and institute ethical committee. The regular progress of research work should be presented at 3-monthly research meetings in the department.

The completed research work should be presented at completion of 26 months of residency. The completed thesis will be submitted to Academic Division by the end of June in the Year 3 of residency, both by soft copy and hard copy. The thesis will be sent for external evaluation to two examiner or expert from the panel and evaluation may be completed within two months.

An article of 2500- 3000 words in manuscript format Viz, abstract, introduction, materials and methods, results, discussion, limitations, conclusion and reference with relevant tables and figures must be submitted along with thesis submission for publication purpose.

Publication requirement

The research projects after completion should have been published or publishable in peer reviewed journals at the end of training period after the thesis evaluation by external examiners. The residents should have at least one clinical paper submitted in a peer-reviewed journal indexed in “Index Medicus” prior to appearing the final examination.

Conference participation requirement

Residents are encouraged to attend conference and present papers.

A minimum of one abstract presentation at conference at either national or regional/ state level is also mandatory.

Internal Evaluation

The examination includes internal assessment during the tenure and at the completion of the 3-year course. It should include both theory and practical aspects. Maintaining an appropriately documented clinical dossier as evidence having undertaken the minimum required training activities is essential.

The final examination should be conducted in an appropriate manner befitting the highest academic degree. It should include both theoretical and practical evaluation.

An objective examination will be conducted covering the topics discussed at every yearly interval and will be evaluated for internal assessment. A minimum of 50% scoring is required for clearing the examination. If the candidate gets lesser than 50%, a reappraisal can be done as per the BOS requirement.

E-Portfolio and Log book

The Resident should maintain a daily logbook regarding the clinical, laboratory, academic activities they were involved, verified and countersigned by the consultants.

An e-portfolio will be maintained by Program Coordinator for each student. The credits obtained by the student based on their clinical, academic performances, marks in the internal exam will be entered in the e-portfolio. The e-portfolio will be accessible to residents which will enable them in judging their own performance at each year.

Contents of E-portfolio for each Resident

I. General information: Name, employee code, dept., course, year of joining, year of evaluation.

II. Evaluation of academic programs.

A. Name of academic activity
i. Journal club
ii. Seminar

Before each academic activity

1. Name of topic (will link to archived file)
2. Name of Moderator
3. Actual marks scored

B. Postings: Clinical postings, Donor section, Laboratory, other departments, etc,

1. Name of Posting
2. Duration
3. Marks scored for each posting
4. Credit for the module

At the end of the year Grade will be assigned based on total mark for the module.

For external posting each department has to formulate the evaluation form that has to be sent to the supervisor of the Laboratory and departments where posted.
C. **Mandatory courses.**

Statistics: Attendance, marks, grade
BMT posting: Attendance marks, grade

D. **Conference participation**

1. National, international, regional
2. Type of presentation
3. Name of conference, venue
4. Organizer of conference
5. Title of abstract and link to
6. Awards if any

E. Any extra-curricular activities

SCHEME OF EXAMINATION

The evaluation is based on internal and external examination. A total of 1000 marks is distributed as follows

Internal examination: **100 marks**

An examination shall be conducted as per MCI guidelines as well as SCTIMST norms to assess the competency of the candidates for which the degree will be conferred upon.

Final examination: 900 marks

The final examination will be divided into three categories

1. Theory examination – comprising of 4 papers
2. Practical examination
3. Grand viva voce (includes thesis presentation and log-book discussion)

A. Theory papers: 100 Marks allotted for each paper (Total: 400 marks)

Paper I: Basic applied aspects related to Transfusion Medicine
Paper II: Immunohaematology, immunogenetics, and applied serology
Paper III: Blood donor organization, technology of components, preservation of blood, clinical hemotherapy.
Paper IV: Recent advances in transfusion technology, regulatory compliances and hemotherapy practices.

Pattern of Question paper: There will be 10 short note type questions carrying 10 marks each, No choice in short notes. All questions to be attempted.

B. Practical examination: 400 Marks allotted

Pattern of Practical examination:

i) Long case (1 in number): It will carry 100 marks

Long case will assess the laboratory and clinical skill of the candidate: There will be one exercise covering all aspects of Transfusion Medicine. Some examples are as under.

- blood donor / apheresis donor selection,
- blood processing,
- component preparation,
- immunohematology,
- antenatal serology
- transfusion reaction management
- quality control of reagents, equipment, components
- coagulation testing,

 basic hematology tests,
 transfusion transmitted infection screening
The duration of each exercise shall be 2 hour. Each exercise shall be followed by Viva on the particular exercise.

ii) Short case (2 in number): Each short case will carry 50 marks

There shall be 2 short cases on immunohematology / hemotherapy exercise /donor room procedures/ administrative issues for each candidate. The candidate is required to make his own assessment of the problem and come out with solutions.

The duration of each exercise shall be 30 minutes. Each exercise shall be followed by Viva on the particular exercise.

iii) Spots (10 in number): Each spotter will carry 10 marks

The duration of each spot shall be 3 minutes. At the end of time, the candidate shall be questioned on the spots and give their clinical/technical/laboratory opinion.

iv) Clinical case presentation: It will carry 50 marks

The candidate will be given a clinical case to be presented before the examiners. The candidate will be examined on the presentation style, communication skill, and clinical acumen.

v) Video review: It will carry 50 marks

The candidate will be shown a power point presentation or video presentation of few clinical / laboratory situations. The candidate will be required to answer and provide their opinion on each situation.

For example: A picture of a patient with black patches across his skin following a blood transfusion. The candidate will be asked to give different possibilities and their investigations.

C. Grand Viva voce: 100 Marks allotted

Candidates will be examined by all the examiners together on various aspects of Transfusion Medicine as per the contents in the syllabus to assess the candidate’s

knowledge about the subject, comprehension, analytical approach, expression and interpretation of data.

They will be asked for:

i) Discussion on Thesis

The candidate will provide the detail work done on their dissertation project and what was the final outcome of their objectives

ii) Log book discussion

The candidate will be questioned on various activities as mentioned in their log book to verify their credentials.

Final marking scheme for M.D. Examination

The candidate has to score the following minimum marks in their theory, practical and viva voce separately to be declared successful:

1. Theory examination: 200 out of 400
2. Practical examination: 200 out of 400
3. Viva voce: 50 out of 100
4. Internal assessment: 50 out of 100

The total minimum marks the candidate should score is 500 out of 1000

Credit Distribution of Residents Evaluation

	Year 1	Year 2	Year 3	Total
Seminar	**5**	**5**	**5**	**15**
Journal Club	**3**	**3**	**3**	**9**

Monthly Audit of Dept Activities	**5**	**0**	**0**	**5**
Core Competency Assessment	**25**	**25**	**25**	**75**
1. Donor Room Procedures	**5**	**5**	**5**	
2.TTI laboratory	**5**	**5**	**5**	
3.Blood Component	**5**	**5**	**5**	
4. Immunohematology	**5**	**5**	**5**	
5. Patient Care	**3**	**3**	**3**	
6.Quality Control Measures	**2**	**2**	**2**	
Log Book	**3**	**3**	**3**	**9**
Thesis			**20**	**20**
BMT training			**5**	**5**
Biostatistics training			**5**	**5**
Paper Publications			**10**	**10**
Conference presentations			**10**	**10**
CME attended			**6**	**6**
Workshop attended			**3**	**3**
Conferences attended		**5**	**5**	**10**
Awards received			**2**	**2**
Internal Examination	**5**	**5**		**10**
Attendance/Punctuality	**2**	**2**	**2**	**6**
TOTAL				**200**

A) Mandatory Marks (60 credits)

List mandatory courses and fixed credits

1 Medical Statistics and research methodology: CREDIT=05
2. Biomedical Technology posting: CREDIT=05
3. Publication in a journal CREDIT=10

4. Awards	CREDIT =02
5. Presentation of Paper in national Conference	CREDIT=20
6. Workshop attended:	CREDIT=03
6. Attendance and Punctuality	CREDIT=06
7. Log Book	CREDIT=09

100% attendance is mandatory for Biomedical Technology wing and Biostatistics course.

B) Evaluation of Thesis Projects (20 credits)

1. Mid-term evaluation of projects mandatory and will carry credits
2. Prospective / Retrospective Study
3. Ethical Committee clearance / Institute funding obtained
4. Contribution of candidates experience in the study
5. Descriptive data collection / Quantitative data subjected to statistical analysis.
6. Midterm Review: At 18 months of MD course: Aims and objectives, review of literature, materials and methods (exclusion / inclusion criteria), data collection and presentation (% of target of the project) and preliminary data analysis.
7. Review at 30 months: Presentation of the full project as thesis and also in publishable form, complete with statistical analysis, discussion, study limitations, conclusion, and bibliography.
8. Overall impact of the project in adding to our knowledgebase, and patient management. Between 30-34 months, the project should be sent for publication to peer reviewed journals.
9. Presentation of the project work as scientific presentation at national level and at state level- mandatory.

C) Internal Examination (10 credits)

There will be 2 internal examinations, each having 100 marks during the 3-year course. These examinations will have objective/subjective questions, including case-based scenarios. It will be evaluated by the faculty members of the department. The results will be conveyed to the residents as a part of the regular appraisal.

Student Feedback and Reappraisal

Feedback form from resident at the end of completion of each module and seminars will be mandatory and will be handed over to Program in charge for identifying deficiencies and making corrective actions. Moreover, six monthly meetings with the residents by Program coordinator will be conducted to get their overall feedback and academic progress and will be reported to head of department.

Outstanding Achievements and Awards

(Credits: 2)

A resident, who is outstanding in research or academic activities, has publication in high impact journals or getting awards in conference qualifies for additional credits which are given as follows:

Assessment of the outstanding achievements can be made using the following criteria:

1. Attendance & Punctuality
2. Overall marks scored in the exams
3. Publication in high impact journals
4. Scientific presentations in conferences/CME/training programmes
5. Awards received during the Residency period
6. Number of conferences (state or national), CME, workshops, trainings attended
7. Extraordinary contributions to blood donor and patient management.

Annexures

A) EVALUATION OF JOURNAL REVIEW PRESENTATIONS

(Credits: 3/year. Total: 9)

Name of the Resident:

Topic of Presentation:

Date:

Sl. No.	Items of observation during Presentation	Moderator	Faculty 1	Faculty 2	Faculty 3	Faculty 4
1	Extent of understanding of scope & objectives of the paper of the candidate					
2	To critically evaluate methods, analysis and interpretations of study					
3	Whether cross references have been consulted					
4	Whether other relevant publications consulted					
5	Ability to respond to questions on the paper /subject					
6	Ability to defend the paper					
7	Clarity of Presentation					
8	Audio – Visual aids used					
9	Ability to propose new research ideas based on study discussed					
	TOTAL SCORE (out of 100)					

B) EVALUATION OF SEMINAR PRESENTATIONS

(Credits: 5/year. Total: 15)

Name of the Resident:

Topic of Presentation:

Date:

Sl. No.	Items of observation during Presentation	Moderator	Faculty 1	Faculty 2	Faculty 3	Faculty 4
1	Whether all relevant publications consulted					
2	Understanding of the subject					
3	Completeness of the preparation					
4	Clarity of presentation					
5	Current concepts coverage					
6	Ability to answer the questions					
7	Time scheduling					
8	Appropriate use of Audio – Visual aids					
9	Overall performance					
	TOTAL SCORE (out of 100)					

CEVALUATION OF MONTHLY DEPARTMENTAL REVIEW

(Credits: 5 in 1st Year only. Total: 5)

Name of the Resident:

Month of Presentation:

Date:

Sl. No.	Items of observation during Presentation	Moderator	Faculty 1	Faculty 2	Faculty 3	Faculty 4
1	Whether all relevant Areas of the department covered					
2	Accuracy of all data, including percentages					
3	Completeness of the preparation					
4	Clarity of presentation					
5	Any new activities included in the presentation					
6	Ability to answer the questions					
7	Time scheduling					
8	Appropriate use of Audio – Visual aids					
9	Overall performance					
	TOTAL SCORE (out of 100)					

D) CORE COMPETENCY EVALUATION

(Credits: 25/year. Total: 75)

Name of the Resident:

Assessment period (every 3 months):

Name of the assessing faculty:

1. Medical Knowledge in the Specialty and allied Subspecialties

No.	Points for Evaluation	Poor	Below Average	Average	Good	Very Good
1	Analytical skills					
2	Clinical knowledge					
3	Fundamental knowledge					
4	Knowledge of recent updates					
5	Knowledge of clinical guidelines in Transfusion Medicine and other sub-specialties					
	Cite reasons for poor grade & suggestions for future improvement					

2. Evaluation of Clinical and Laboratory Work in Transfusion Medicine

(Credits: 25 / Year. Total: 75)

I. Evaluation of Donor Room Procedures (5 credits/year, Total: 15)

No.	Points for Evaluation	Poor	Below Average	Average	Good	Very Good
1	Regularity of attendance					

	and punctuality to attend outdoor Blood Donation Camps					
2	Interaction, attitude and behaviour with Blood Donors, Donor Organizers and other staffs					
3	Fundamental and working knowledge of Donor selection, counselling and medical examination					
4	Knowledge of recent updates in donor room procedures					
5	Knowledge of clinical guidelines in Blood Donation					
6	Interaction with colleagues and supporting staff					
7	Maintenance of donor records, donor deferral, donor counselling, donor reaction, donor notification, donor suggestions and inventory Records					
8	Skills in managing and treating donor reactions					

9	Teaching and training of junior colleagues					
10	Overall quality of work in Camps and in-house Donation centre					
11	Cite reasons for poor grade & suggestions for future improvement					

II. Evaluation of TTI Laboratory (5 credits/year, Total: 15)

No.	Points for Evaluation	Poor	Below Average	Average	Good	Very Good
1	Analytical skills in TTI laboratory					
2	Clinical knowledge of TTI					

3	Fundamental knowledge on testing assays of various TTIs					
4	Knowledge of recent updates in TTI screening					
5	Knowledge of National guidelines in TTI testing					
6	Knowledge of PPE, Bio-safety, Waste Management, Post-exposure prophylaxis					
7	Maintenance of TTI testing results with in-house controls and inventory Records					
8	Teaching and training of junior colleagues					
9	Overall quality of work in TTI laboratory					
10	Cite reasons for poor grade & suggestions for future improvement					

III. Evaluation of Blood Component (5 credits/year, Total: 15)

No.	Points for Evaluation	Poor	Below Average	Average	Good	Very Good
1	Skills in all types of blood component preparation, storage, quality control measures					

2	Thorough clinical knowledge of blood components					
3	Fundamental knowledge on various equipment required for blood component preparation and storage					
4	Knowledge of recent updates in blood components					
5	Knowledge of National guidelines in blood components and clinical use of blood					
6	Maintenance of records of blood components and inventory records					
7	Teaching and training of junior colleagues					
8	Overall quality of work in Blood component laboratory					
	Cite reasons for poor grade & suggestions for future improvement					

IV. Evaluation of Immunohematology (5 credits/year, Total: 15)

No.	Points for Evaluation	Poor	Below Average	Average	Good	Very Good
1	Analytical skills in Immunohematology					
2	Clinical knowledge of Basics and					

	clinical aspect of immunohematology					
3	Fundamental knowledge on immune-hematological testing					
4	Knowledge of recent updates in immunohematology					
5	Knowledge of National guidelines in IH testing					
6	Knowledge of problem solving IH cases					
7	Maintenance of IH testing results with in-house controls and inventory Records					
8	Teaching and training of junior colleagues					
9	Overall quality of work in IH laboratory					
	Cite reasons for poor grade & suggestions for future improvement					

V. Evaluation of Patient Care (3 credits/year, Total: 9)

No.	Points for Evaluation	Poor	Below Average	Average	Good	Very Good
1	Gathering information of patients for Autologous transfusion, Therapeutic					

	apheresis, PRP therapy, Transfusion Reactions and other					
2	Clinical knowledge and judgement					
3	Fundamental knowledge of evaluation and work-up					
4	Counselling, risk assessment and obtaining preoperative consent for blood transfusion and other treatment modalities					
5	Planning, investigations and Management of cases					
6	Knowledge of recent updates					
7	Expertise in problem solving scenarios					
8	Knowledge of clinical guidelines in Transfusion Medicine and other sub-specialties					
9	Interaction with faculties, residents and supporting staff					

10	Teaching and training of junior colleagues					
11	Maintenance of case Records					
12	Overall quality of clinical work					
	Cite reasons for poor grade & suggestions for future improvement					

VI. Evaluation of Quality Control Measures (2 credits/year, Total: 6)

No.	Points for Evaluation	Poor	Below Average	Average	Good	Very Good
1	Analytical skills on Quality control					
2	Clinical knowledge on QC, QA, Audits					

3	Fundamental knowledge on QC, QA, EQAS					
4	Knowledge of recent updates Quality Assurance					
5	Maintenance of Quality Control records, participation in EQAS programme and Bio-safety records					
6	Knowledge of National guidelines on Quality Management Practices in Blood Services and Bio-waste management					
7	Cite reasons for poor grade & suggestions for future improvement					

3.Professionalism

No.	**Points for Evaluation**	**Poor**	**Below Average**	**Average**	**Good**	**Very Good**
1	Compassion					
2	Ethical Judgement					
3	Level of professionalism					

4	Self-awareness for improvement					
5	Team Player					
6	Cite reasons for poor grade & suggestions for future improvement					

4. Interpersonal and Communication Skills

No.	Points for Evaluation	Poor	Below Average	Average	Good	Very Good
1	Communication skills					
2	Presentation skills					
3	Writing skills					
4	Function as a Role Model					
5	Leadership skills					
	Cite reasons for poor grade & suggestions for future improvement					

e)LOG BOOK

(5 Credits)

Overview of activities during residency period

1) Posting details during residency period

AREAS OF POSTINGS	TOTAL DURATION	MINIMUM DURATION

Blood Donation Area		6 months
Blood Component Preparation and Apheresis		5 months
Infectious Disease Screening		4 months
Immunohematology Section		4 months
Cross matching Section		4 months
Quality Control and Documentation		2 months
Department of Pathology		1 week
Department of Microbiology		2 weeks
Department of Anaesthesiology		2 weeks
Department of Thrombosis Research Unit		2 weeks
Biostatistics		1 week
Biotechnology		1 week
Department of Paediatrics		2 weeks
Department of Obstetrics and Gynaecology		2 weeks
Department of Clinical Haematology		3 weeks
Malabar Cancer Centre, Thalassery		2 weeks
National Institute of Immunohaematology, Mumbai		1 month

1) Posting details during residency period

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Department of Pathology		1 week
Department of Microbiology		2 weeks
Department of Anaesthesiology		2 weeks
Department of Thrombosis Research Unit		2 weeks
Biostatistics		1 week
Biotechnology		1 week
Department of Paediatrics		2 weeks
Department of Obstetrics and Gynaecology		2 weeks
Department of Clinical Haematology		3 weeks
Malabar Cancer Centre, Thalassery		2 weeks
National Institute of Immunohaematology, Mumbai		1 month

2) Procedures performed during period of Residency

i) Donor Room Procedures

TYPE OF PROCEDURES	**Minimum No. to be performed under Supervision**	**No. performed under Supervision**	**Minimum No. to be performed independently**	**No. to be performed independently**

Donor Counselling	**20**		**500**	
Donor Screening	**20**		**5000**	
Donor Hb. Tests	**20**		**1000**	
Donor Phlebotomy	**100**		**5000**	
Donor Reaction Management	**25**		**100**	
Blood Donation Camps	**10**		**100**	
Donor Notification	**10**		**20**	
Donor awareness	**20**		**100**	

ii) Blood Component Preparation

TYPE OF PROCEDURES	**Minimum No. to be components prepared under Supervision**	**No. prepared under Supervision**	**Minimum No. to be prepared independently**	**No. to be prepared independently**

Packed Red Cells	100		2000	
Fresh Frozen Plasma	100		2000	
Cryoprecipitate	100		1000	
Platelet concentrates	100		2000	
Single Donor Platelets	5		20	
Leucofiltered Red Cells	25		200	
Washed Red Cells	10		50	
Irradiated Red Cells	5		20	

iii) Infectious Disease Screening

TYPE OF PROCEDURES	**Minimum No. to be components prepared under Supervision**	**No. prepared under Supervision**	**Minimum No. to be prepared independently**	**No. to be prepared independently**

Chemiluminescence (HIV, HBV, HCV)	500		5000	
ELISA	100		1000	
RPR/VDRL/TPHA	100		5000	
Malaria Antigen testing	100		5000	
NAT	100		1000	

iv) Immunohaematology Procedures

TYPE OF PROCEDURES	**Minimum No. to be components prepared under Supervision**	**No. prepared under Supervision**	**Minimum No. to be prepared independently**	**No. to be prepared independently**

Preparation of various cell suspensions	20		200	
Blood Grouping (Cell and Serum)	100		5000	
Antibody Screening (Op Cells/O cells/ IAT)	100		5000	
DAT	100		500	
3-cell panel for Antibody	10		100	
11-cell panel for Antibody	10		100	
Elution of Antibody	20		100	
Preparation of Lectins	5		20	
Secretor Status with Saliva	5		25	
Minor Blood Group Phenotyping	10		100	
Titration of Antibodies	10		100	

v) Cross-matching Procedures

TYPE OF PROCEDURES	**Minimum No. to be components prepared under Supervision**	**No. prepared under Supervision**	**Minimum No. to be prepared independently**	**No. to be prepared independently**

Compatibility testing for elective cases by test tube	50		200	
Compatibility testing for emergency cases	50		50	
Compatibility testing for elective cases by Gel method	100		100	
Compatibility testing for elective cases by Automation	100		200	
Evaluation of Transfusion Reaction	10		30	
Evaluation of AIHA	10		30	

vi) Quality Control and Documentation

TYPE OF PROCEDURES	**Minimum No. to be components prepared under Supervision**	**No. prepared under Supervision**	**Minimum No. to be prepared independently**	**No. to be prepared independently**

Q. C. of Red cells	25		100	
Q. C. of Reagents	25		500	
Q. C. of TTI testing	50		500	
Q. C. of Blood Components	50		500	
Q. C. of NS, LISS,	25		200	
Q. C. of Hb. estimation	25		500	

vi) Patient related activities

TYPE OF PROCEDURES	**Minimum No. to be components prepared under Supervision**	**No. prepared under Supervision**	**Minimum No. to be prepared independently**	**No. to be prepared independently**

No. of PRP prepared	50		100	
No. of Autologous transfusion	20		50	
No. of Therapeutic Apheresis	10		20	
No. of Therapeutic Phlebotomy	10		20	
No. of Transfusion Reaction evaluated	10		30	

3) Academic activities during residency period

Academic Activities	**Number**		
	Year 1	**Year 2**	**Year 3**
Seminars			
Journal Club			

Case presentation			
Conferences attended			
CME attended			
Workshops attended			
Presentation in Conferences/CME			
Publications in Indexed Journals			
Publications in Non-indexed Journals			

4) Academic activities attended during residency period

Date	**Type of Academic Activity Seminars/JC/Training/Presentation**	**Presented by (particulars)**

5) Academic presentation during residency period

Date	Topic	Type of Academic Activity Seminars/JC/Training/Presentation

Student Feedback form

Name of Resident:

Topic:

Date:

	Poor	Average	Good	Very Good
Understood the subject in depth				
Able to put the information to practice				
Speaker cleared all doubts				
Presentation was up to date				

Do you need further training-Yes/ No