Revised Ordinance Governing Regulations and Curriculum

of

M.Sc. PERFUSION TECHNOLOGY

COURSE - 2019

Rajiv Gandhi University of Health Sciences,
Karnataka, Bangalore

The Emblem

The Emblem of the Rajiv Gandhi University of Health Sciences is a symbolic expression of the confluence of both Eastern and Western Health Sciences. A central wand with entwined snakes symbolises Greek and Roman Gods of Health called Hermis and Mercury is adapted as symbol of modern medical science. The pot above depicts Amrutha Kalasham of Dhanvanthri the father of all Health Sciences. The wings above it depicts Human Soul called Hamsa (Swan) in Indian philosophy. The rising Sun at the top symbolises knowledge and enlightenment. The two twigs of leaves in western philosophy symbolises Olive branches, which is an expression of Peace, Love and Harmony. In Hindu Philosophy it depicts the Vanaspathi (also called as Oushadi) held in the hands of Dhanvanthri, which are the source of all Medicines. The lamp at the bottom depicts human energy (kundalini). The script “Devahitham Yadayahu” inside the lamp is taken from Upanishath Shanth i Manthram (Bhadram Karnebh i Shrunuyanadev…), which says “May we live the full span of our lives allotted by God in perfect health” which is the motto of the Rajiv Gandhi University of Health Sciences.

ರಾಜೀವ್ ಗಾಂಧಿ ಆರೋಗ್ಯ ವಿಜ್ಞಾನಗಳ ವಿಶ್ವವಿದ್ಯಾಲಯ, ಕರ್ನಾಟಕ, ಬೆಂಗಳೂರು
RAJIV GANDHI UNIVERSITY OF HEALTH SCIENCES, KARNATAKA, BENGALURU
4th T Block, Jayanagar, Bengaluru – 560 041

Ref: ACA/DCD/AHS/M.Sc.PER.TEC/371/2019-20 **Date: 28/08/2019**

NOTIFICATION

Sub: Revised Ordinance pertaining to Regulation and Curriculum of M.Sc Perfusion Technology.

Ref: 1) Minutes of BOS Allied Health Sciences held on 13/05/2019
2) Proceedings of Faculty meeting held on 15/05/2019
3) Proceedings of AC meeting held on 17/06/2019
4) Proceedings of Syndicate meeting held on 29/06/2019

In exercise of the powers vested under Section 35(2) of RGUHS Act, 1994, the Revised Ordinance pertaining to Regulation and the curriculum of M.Sc Perfusion Technology is notified herewith as per Annexure.

The above Regulation shall be applicable to the students admitted to the said course from the academic year 2019-20 onwards.

By Order,
Sd/-
REGISTRAR

To

The Principals of all affiliated Allied Health Sciences Course colleges of RGUHS, Bangalore.

Copy to :

1. The Principal Secretary to Governor, Raj Bhavan, Bangalore - 560001
2. The Principal Secretary Medical Education, Health & Family Welfare Dept., M S Building, Dr.B.R. Ambedkar Veedhi, Bangalore – 01
3. PA to Vice – Chancellor/PA to Registrar/Registrar (Eva.)/Finance Officer, Rajiv Gandhi University Health Sciences, Bangalore
4. All Officers of the University Examination Branch/ Academic Section.
5. Guard File / Office copy.

REVISED ORDINANCE GOVERNING REGULATIONS & CURRICULUM OF M.Sc. PERFUSION TECHNOLOGY- 2019

SECTION-I
AIMS AND OBJECTIVES

1. Aims and Objectives:

The goals of postgraduate training in M.Sc Perfusion Technology are to train graduates who will:

- Practice the art and science of 'Perfusion' efficiently and effectively, backed by scientific knowledge and skill.
- Exercise empathy and a caring attitude and maintain high ethical standards.
- Continue to evince keen interest in continuing professional development whether in teaching or practice.
- Willing to share the knowledge and skills with any learner, junior or a colleague.
- To develop faculty for critical analysis and evaluation of various concepts and views & to adopt most rational approach
- Demonstrate understanding of basic sciences relevant to respective branches.
- Acquire the detailed knowledge about the fundamentals and advances of the respective branches.
- Update knowledge by self-study and by attending courses, conferences and seminars relevant to branch chosen.
- Undertake audit; use information and carryout research with the aim of publishing or presenting the work at various scientific gatherings**.**

Acquire adequate skills and competence in performing various tasks as required.

- Adopt ethical principles in all aspects of the professional practice**.**
- Foster professional honesty and integrity.
- Discharge the duties irrespective of social status, caste, creed or religion of the customer/client.
- Develop oral and written communication skills.
- Provide leadership and get the best out of his or her team in a congenial working atmosphere.
- Apply high moral and ethical standards while carrying out research.
- Be humble and accept the limitations in his or her knowledge and skill and ask for help from colleagues when needed.

SECTION-II

Regulations Governing M.Sc. Perfusion Technology

1. **Title of the Courses**

   Master of Science degree in Perfusion Technology, (M.Sc – Perfusion Technology)

2. **Duration of the Course**

   The duration of the course shall be on full time basis 2-years.

3. **Eligibility for Admission**

   - Graduates in B.Sc Perfusion Technology
   - Candidates passing B.Sc. in Perfusion Technology through correspondence course shall not be eligible

4. **Selection Criteria**

   - Selection shall be based on merit in the qualifying examination.

5. **Eligibility certificate**

- No candidate shall be admitted for the postgraduate degree course unless the candidate has obtained and produced the eligibility certificate issued by the university. The candidate has to make the application to the university with the following documents along with the prescribed fee.
- Pass / degree certificate issued by the university.
- Marks cards of all the university examinations passed.
- Migration certificate.
- Certificate of conduct
- Proof of SC/ST or category-I as the case may be
- Candidates should obtain the eligibility certificate before the last date for admission as notified by the university.
- A candidate who has been admitted to post-graduate course should register his/her name in the university within a month of admission after paying the registration fee.

6. Medium of instruction

English shall be the medium of instruction for the subjects of study as well as for the Examination.

7. Course of study

The course shall be pursued on full time basis. In first year there shall be an examination for main and subsidiary subjects. Students shall be posted to RGUHS approved hospitals or clinical laboratories during the practical hours.

Subjects for study and teaching hours for first year and second year M.Sc Perfusion Technology course are shown in Table – I and Table-II respectively.

Table - I Distribution of Teaching Hours in First Year M.Sc. Perfusion Technology Subjects

Sl.No.	Main Subjects	Theory No. of hours	Practical No. of hours	Total
1.	CARDIOLOGY	100	140	240
2.	CARDIAC SURGERY	100	140	240
3	INTRODUCTION TO OT & PERFUSION TECHNOLOGY	100	140	240
4	EQUIPMENTS IN PERFUSION TECHNOLOGY & PHYSIOLOGY & PATHOLOGY OF PERFUSION	100	140	240
5	PHARMACOLOGY OF CARDIOVASCULAR DRUGS	100	140	240
	Subsidiary subject:			
	a. Biostatistics	30	10	40
	b. Research methodology	30	--	30
	C. Medical Ethics	10		10
	Total	570	710	1280

Table- II Distribution of teaching hours in Second year M.Sc. Perfusion Technology subjects.

Sl. No	Branches	Theory No. of hours	Practical No. of hours	Total
1.	CLINICAL APPLICATIONS OF PERFUSION TECHNOLOGY	120	200	320
2.	CARDIAC SURGERY WITHOUT CPB MECHANICAL CIRCULATORY SUPPORT & ROBOTIC CARDIAC SURGERY	120	200	320
3.	ORGAN TRANSPLANTATION	120	200	320
4.	HEMATOLOGY AS RELEVANT TO PERFUSION, BLOOD TRANSFUSION AND BLOOD CONSERVATION	120	200	320
	Total	480	800	1280

8. Attendance

Every candidate should have attended at least 80% of the total number of classes conducted in an academic year from the date of commencement of the term to the last working day as notified by university in each of the subjects prescribed for that year, separately, in theory and practical. Only such candidates are eligible to appear for the university examinations in their first attempt. A candidate lacking the prescribed percentage of attendance in any subject either in Theory or Practical in the first appearance will not be eligible to appear for the University Examination in that particular subject.

The course shall be pursued on full time basis. No candidate shall be permitted to work in a nursing home or laboratory outside the institution while studying the course. No candidate shall join any other course of study or appear for any other examination

conducted by this university or any other university in India or abroad during the period of study.

9. Monitoring Progress of Studies

Work Diary/Record Book Every candidate shall attend symposia, seminars, conferences, journal review meetings & lectures during each semester as prescribed by the department and not absent himself/herself from work without valid reasons. Every candidate shall maintain a work diary and record of his/her participation in the training programme. (Refer section III for model check lists and record book). Special mention may be made of the presentations by the candidate as well as details of laboratory work conducted by the candidate. The work diary and record shall be scrutinized and certified by the concerned faculty members.

Internal Assessment (IA):

Institutions running the course shall conduct three tests each in First and Second year for Internal Assessment. The third test shall be conducted one month prior to the university examination so that it also serves as preparatory examination. The marks obtained in these tests will be considered for internal assessment. Average of the best two marks will be computed for internal assessment and shall be sent to the university as per the notification issued by Registrar (Evaluation) before each university examination. Records and marks obtained in tests will be maintained by the college and made available to the university. Marks of periodic tests shall be displayed on the notice board by the principals without fail.

If a candidate is absent from the test due to genuine and satisfactory reason, such a candidate may be given a re-test within a fortnight.

The distribution of marks for internal assessment for subjects of study in first year and second year are shown in Tables III and IV respectively.

Table III. Distribution of Internal Assessment marks in first year M.Sc. Perfusion Technology course

Sl.No.	Main Subjects	Theory	Practical	Total
1.	CARDIOLOGY	20	20 {Practical- 15 + Record - 5	40
2.	CARDIAC SURGERY	20	20 {Practical- 15 + Record - 5	40
3	INTRODUCTION TO OT & PERFUSION TECHNOLOGY	20	20 {Practical- 15 + Record - 5	40
4	EQUIPMENTS IN PERFUSION TECHNOLOGY & PHYSIOLOGY & PATHOLOGY OF PERFUSION	20	20 {Practical- 15 + Record - 5	40
5	PHARMACOLOGY OF CARDIOVASCULAR DRUGS	20	20 {Practical- 15 + Record - 5	40
	Total	100	100	200

Table IV. Distribution of Internal Assessment marks in second year M.Sc. Perfusion Technology course

Sl. No	Branches	Theory	Practical	Total
1.	CLINICAL APPLICATIONS OF PERFUSION TECHNOLOGY	20	20 {Practical- 15 + Record - 5	40
2.	CARDIAC SURGERY WITHOUT CPB MECHANICAL CIRCULATORY SUPPORT & ROBOTIC CARDIAC SURGERY	20	20 {Practical- 15 + Record - 5	40
3.	ORGAN TRANSPLANTATION	20	20 {Practical- 15 + Record - 5	40
4.	HEMATOLOGY AS RELEVANT TO PERFUSION, BLOOD TRANSFUSION AND BLOOD CONSERVATION	20	20 {Practical- 15 + Record - 5	40

	Total	80	80	160

NOTE: A student must secure at least 50% of total marks fixed for internal assessment for a particular subject in order to be eligible to appear in university examination in that subject. The internal assessment marks **will not be added** to the marks obtained in the university examination for declaration of pass.

10. Dissertation

Each candidate pursuing M.Sc. Perfusion Technology course is required to carry out dissertation work on a selected topic under the guidance of a recognized post graduate teacher for a period of one year after the submission of synopsis. The results of such a work shall be submitted in the form of dissertation.

The dissertation is aimed to train in research methods and techniques. It includes identification of problem, formulation of hypothesis, search and review of literature, getting acquainted with recent advances, collection of data, critical analysis, interpretation of results and drawing conclusions.

Every candidate shall submit to the Registrar (Academic) of the University in the prescribed proforma, two hard copies of synopsis along containing particulars of proposed dissertation work within six months from the date of commencement of the course or on or before the date notified by the University. The synopsis shall be sent through proper channel.

The University shall arrange for review of synopsis and if found suitable shall register the dissertation topic. No change in the dissertation topic shall or guide shall be made without prior approval of the University.

The dissertation shall be written under the following headings:

- Introduction
- Aims or objectives of study
- Review of literature
- Materials and methods
- Results
- Discussion

- Conclusion
- Summary
- References
- Tables
- Annexure

The written text of dissertation shall not be less than 50 pages and shall not exceed 100 pages excluding references, tables, questionnaires and other annexure. It should be neatly typed in double line spacing on one side of paper (A4 size, 8.27" x 11.69") and bound properly. Spiral binding should not to be done. A declaration by the candidate that the work was done by him/her shall be included. The guide, head of the department and head of the institution shall certify the bonafide of the dissertation.

Four copies of dissertation shall be submitted to the university through proper channel along with a soft copy (CD), three months before the final examinations. It shall be assessed by two examiners appointed by the university, one internal and one external. Acceptance of the dissertation is a pre-requisite for a candidate to be eligible to appear in the final examination.

11. Guide

The eligibility academic qualification and teaching experience required for recognition as Guides by the RGUHS are:

a). Eligibility to be a guide

Shall be a full time teacher in the college or institution he or she is working.

b) Academic qualification and teaching/professional experience for each branch

- M.Ch / DNB in Cardio Thoracic Surgery with minimum of three years of teaching / professional experience.

Or

- MD / DNB in Anaesthesia working in cardiac surgical setup with minimum of five years of teaching / professional experience.

Or

- M.Sc in Perfusion Technology with minimum of five years of teaching / professional experience.

c) Age*:*

- The age of guide shall not exceed 65 years.

d) Student: Guide ratio - 5:1. A recognized guide shall supervise dissertation work of not more than five students per academic year.

12. Schedule of examination

- The University conducts two examinations in a year at an interval not less than four to six months.
- The number of examiners for practical and viva-voce shall be two, comprising of one internal and one external examiner appointed by the university.
- A candidate shall not be admitted to the practical examinations for the first time unless he/she produces the class record book certified by the Head of the Department.
- A failed candidate needs to appear for both theory and practical examination in the failed subject/s only in the subsequent examination.

13. Scheme of examination:

- **University examination:**

  There shall be two University examinations ,one at the end of 1st year and second at the end of 2nd year.

Eligibility to appear in university examination

A candidate shall be eligible to appear for first year examination at the end of one year from the commencement of the course. He/She should have satisfactorily completed the prescribed course and fulfilled the prescribed attendance.

To be eligible to appear in the II year examination a candidate shall have:

i) completed one year of study in II year, and ii) passed in all the subjects of I year.

- **Written examination**:

  (i). 1st year: 5 papers of three hours duration each, each paper consists of 100 marks.

  (ii). 2nd year: **4 papers** of three hours duration each, each paper consists of 100 marks

Practical examination: There shall be one practical examination in each of the subject . The marks for each practical examination shall be 75 marks.

- **Viva- voce: -** This shall aim at assessing depth of knowledge, logical reasoning, confidence and oral communication skills. Both internal and external examiners shall conduct the viva- voce. Total marks shall be 25.

The particulars of subjects for examination and distribution of marks are shown in the Table –V & Table –VI

Table-V. Main Subjects for Examination and Distribution of marks for First year

SUBJECTS	No. of papers	Theory Exam (marks)	Practical (marks)	Viva (Marks)	Grand Total (Marks)
CARDIOLOGY	01	100	75	25	200
CARDIAC SURGERY	01	100	75	25	200
INTRODUCTION TO OT & PERFUSION TECHNOLOGY	01	100	75	25	200
EQUIPMENTS IN PERFUSION TECHNOLOGY & PHYSIOLOGY & PATHOLOGY OF PERFUSION	01	100	75	25	200
PHARMACOLOGY OF CARDIOVASCULAR DRUGS	01	100	75	25	200
Subsidiary subject: ** Sec A. Biostatistics SECB. Research methodology	01	60 40	---	---	100
TOTAL		**600**	**375**	**125**	**1100**

****Respective colleges shall conduct examination for subsidiary subjects and send the marks to the University. Prescribed percentage of marks for a pass in subsidiary subject is 35.**

Table-VI. Main Subjects for Examination and Distribution of marks for Second year

SUBJECTS	No. of papers	Theory Exam (marks)	Practical (marks)	Viva (Marks)	Grand total (Marks)
CLINICAL APPLICATIONS OF PERFUSION TECHNOLOGY	01	100	75	25	200
CARDIAC SURGERY WITHOUT CPB MECHANICAL CIRCULATORY SUPPORT & ROBOTIC CARDIAC SURGERY	01	100	75	25	200
ORGAN TRANSPLANTATION	01	100	75	25	200
HEMATOLOGY AS RELEVANT TO PERFUSION, BLOOD TRANSFUSION AND BLOOD CONSERVATION	01	100	75	25	200
TOTAL		**400**	**300**	**100**	**800**

***Records –To be assessed by the external examiners during University Practical examination.**

SCHEME OF EXAMINATION

THEORY EXAMINATION

There shall be one paper in each subject of 3-hour duration, carrying 100 marks.

Duration : 3 hours
Max. Marks : 100

Distribution of marks

Type of questions	No of questions for each subject	No. of questions and marks for each question	Total marks
Long essay	2	2 x 20	40
Short essay	6	6 x 10	60

Each subject has 6 – 8 modules and at least one question from each module has to be asked.

PRACTICAL EXAMINATION

Duration : 3 hours
Max. Marks : 100

A). PRACTICAL -75

1. OSCE: Spotters with specific question appropriate to the subject (e.g. specimens, slides, instruments, test reports etc.)
2. Charts for interpretation
3. OSPE: Practical demonstration (appropriate to the subject)

B. VIVA- VOCE - 25

The Viva-voce exam will carry 25 marks and both the internal and external examiners will conduct the examination.

14. Criteria for Pass.

a. Criteria for pass in a subject:

For declaration of pass in any subject in the University examination, a candidate shall pass both in Theory and Practical examination components separately, as stipulated below: Theory component consists of marks obtained in University Written paper. For a pass in a theory subject, a candidate shall secure not less than 50% of maximum marks in each paper prescribed for the University examination separately. For pass in practical examination the candidate has to secure 50% marks in aggregate i.e. marks obtained in the practical and viva-voce examination added together provided the candidate has secured 40% marks in practical examination.. A failed candidate is required to appear for both Theory and Practical in the subsequent examination in that subject. .

b. Criteria for pass;

In First and Second year

To consider as pass in first / second year, a candidate has to appear in all the papers prescribed for each subject and has to pass in all the prescribed subjects of the University examination for the concerned year.

15.Carry over

A candidate who has appeared in all subjects of first year in the university examination is eligible to go to second year provided he/she has passed in at least (any)three subjects.

However, failed candidate has to pass the failed subject to become eligible to appear for second year university examination.

16. Number of attempts

A candidate is permitted not more than **three** attempts (actual appearance) to pass the first year examination or **within two academic years** from the year of admission, whichever is earlier. A candidate will not be allowed to continue the course if he/she fails to comply with the above stipulation.

17. Maximum duration for completion of course: A candidate shall complete the course within four years from date of admission. Failing which the candidate will be discharged.

18. Eligibility for award of degree

A candidate shall have passed in all the subjects of first and second year to be eligible for award of degree.

1st Year
M. Sc – Perfusion Technology
CARDIOLOGY

100 Hours

1. **The Electrical Activity of the Heart: the Electrocardiogram:** The cardiac action potential, the electrocardiogram.

2. **Diseases of the Coronary Arteries:** Causes, Pathology and Prevention, Coronary Heart Disease – Angina and Unstable Angina; Coronary Heart Disease – Myocardial Infraction: Treatment of acute infraction, complications of acute myocardial infraction and their management, late complications of infraction, risk stratification at hospital discharge, drug treatment at discharge, rehabilitation.
   Role of ECPR during emergency PCI

3. **Heart Failure:** The Pathophysiology of heart failure, clinical syndromes of heart failure, the management pf cardiac failure, acute circulatory failure (shock), cardiac transplantation.
   Role of VAD in heart failure patients

4. **Disorders of Rate, Rhythm and Conduction:** Mechanisms of arrhythmias, disturbances of rate and rhythm, disorders of conduction, investigation of arrhythmias, management of arrhythmias.
   Introduction to electro physiological study, radio frequency ablation, Holter ECG, temporary and permanent Pacemaker after cardiac surgery,

5. **Rheumatic Fever and its Sequelae, Disorders of the Cardiac Valves:** Mitral valve disease, aortic valve disease, tricuspid valve disease, pulmonary valve disease, infective endocarditis, TAVI, TAVR, Mitraclip, Cardiobanding.

.

6. **Congenital Heart Disease:** The varieties of congenital heart disease.
7. TEE basics for perfusionist – TEE views and its importance, role of TEE during CPB-Dearing of heart

Textbook:
- Cardiology, 7th Edition, Desmond G. Julian, J. Campbell Cowan, James M. McLenachan

SCHEME OF EXAMINATION OF CARDIOLOGY.
M.Sc - PERFUSION TECHNOLOGY

PAPER :- CARDIOLOGY **Max marks : 20mks**

Type of Question	No	Marks	Questions to be answered	Total
Long Essay				
Short Essays				

PRACTICALS

140 Hours

CARDIOLOGY

Clinical scenario given to the candidate for diagnosis and treatment of following disorders:

a. Unstable angina
b. Myocardial infarction
c. Left ventricular aneurysm
d. Congestive heart failure
e. Cardiac arrhythmia
f. Atrial septal defect
g. Ventricular septal defect
h. Tetralogy of Fallot
i. Hypertension

1st Year
M. Sc – Perfusion Technology

CARDIAC SURGERY

100 Hours

1. **Ischaemic Heart Disease:** Pathophysiology of ischaemic disease: Indications for CABG, Contraindication to CABG, Planning coronary artery surgery, Conduit, selection, Principles of saphenous vein harvest, Saphenous vein harvest, LIMA harvest, RIMA harvest, Alternative conduits, Distal anastomoses on bypass, Jump or sequential grafts, Endarterectomy, Positioning the heart in OPCAB , Proximal anastomoses to aorta, Redo coronary artery bypass surgery , Problem scenarios in redo surgery , Left ventricular aneurysm , LV aneurysmectomy ,Ischaemic ventriculoseptal defect (VSD), Ischaemic mitral regurgitation, Results of coronary artery bypass surgery.

2. **Valvular Heart Disease:** Pathophysiology of aortic stenosis, Pathophysiology of aortic regurgitation, Timing of surgery – aortic, Principles of aortic valve replacement, Aortic valve implantation, Stentless aortic valve replacement, Homograft aortic valve replacement, The Ross procedure, Aortic root replacement, Aortic root enlargement, Principles of valve sparing procedures, Results of aortic valve surgery, Pathophysiology of mitral stenosis, Pathophysiology of mitral regurgitation, Timing of surgery – mitral, Principles of mitral valve repair , Mitral Valvotomy, Principles of mitral valve repair, Mitral valve replacement , Tricuspid valve disease , Surgery for

infective endocarditis, Combined Valvular procedures , Alternative approaches , Results of mitral and tricuspid valve surgery.

3. **Congenital heart disease: Embryology of heart**, Overview of congential heart surgery, Patent ductus arteriosus, Anomalous pulmonary venous connection, Coarctation of the aorta, Atrial septal defects, Ventricular septal defects , Atrioventricular septal defects, Truncus arteriosus, AV alignment abnormalities, Transposition of the arteries, Ebstein's anomaly , Tetralogy of Fallot ,Hypoplastic left heart syndrome , Basic operative technique , Arterial switch (Jatene), Rastelli operation, Damus-kaye-stansel operation, Norwood operation, Glenn shunt and hemi – Fontan, Fontan operation , Pulmonary artery banding, Aortopulmonary shunts, Tetralogy of Fallot repair , Pulmonary valvotomy, Aortopulmonary window repair, Coarctation of the aorta repair, Interrupted aortic arch repair, LVOT obstruction repair.
   Role of perfusionist during Perventricular device closure and hybrid procedures.

4. **Diseases of the thoracic aorta**: Pathology of aortic dissection, Diagnosis of type A aortic dissection, Management of type A dissections, Set – up for repair of aortic dissection, Repair of Debakey type II dissection, Repair of Debakey type I dissection, Management of type B dissections, Other repair techniques, Pathology of aortic aneurysms, Diagnosis of aortic aneurysms, Management of aortic aneurysms, Surgery for ascending aneurysms, Valve sparing surgery techniques, Surgery for aortic arch aneurysms, Repair of descending aortic aneurysms , Bypass for descending aorta surgery, Traumatic aortic transection
   Hybrid TEVAR

5. **Minimal access surgery:** Incisions, basic surgical instruments and perfusion disposibles- Cannulas, VAVD, etc..Options for Cardiopulmonary bypass, LIMA harvest, Coronary artery bypass grafting (CABG), Valve surgery.

6. **Complications of cardiac surgery:** Normal postoperative course, Overview of complications, Hypotension and tamponade, Chest pain and ischemia, Late arrhythmias, Hypertension, Pericardial problems, Complications of valve surgery, Respiratory complications, Renal Complications, Gastrointestinal symptoms, Gastrointestinal complications, Hepatobiliary complications, Stroke, Management of stroke, Neurological complications, Wound infections, wound complications, Hematological complications.

7. **Cardiac Anaesthesia:** Basic Principles of anaesthesia, Conduct of anaesthesia, Pre-bypass anaesthetic management, Anaesthetic management of bypass, Anaesthetic management post – bypass, Anaesthesia for off – pump surgery.
   Basics of Mechanical ventilation, various modes of ventilation.

Textbook:
Oxford specialist handbook in surgery (Cardio thoracic surgery), Indian Edition, Joanna Chikwe, Emma Beddow, Brain Glenville.

SCHEME OF EXAMINATION OF CARDIAC SURGERY.
M.Sc - PERFUSION TECHNOLOGY

PAPER :- CARDIAC SURGERY **Max marks : 20mks**

Type of Question	No	Marks	Questions to be answered	Total
Long Essay				
Short Essays				

PRACTICALS

140 Hours

CARDIAC SURGERY

Brief description of surgical steps involved in:

a. Coronary artery bypass grafting (on pump CABG)
b. Mitral valve replacement
c. Aortic valve replacement
d. ASD closure
e. VSD closure
f. TOF repair
g. Redo sternotomy
h. Off-pump CABG

1st Year
M. Sc – Perfusion Technology
INTRODUCTION TO – OT & PERFUSION TECHNOLOGY
100 Hours

1. **Introduction to the operating room environment & protocols:** General protocols followed in the operating room, Hand washing, Unsterile-substerile-sterile methods followed in the O R environment, Handling of Disposables in the O R, Handling &maintenance of equipments in the OR, Protocols followed in CCU

2. **Introduction to the various components of Cardiopulmonary bypass system**

3. **Introduction to the basics of CPB procedures**

4. **Basics of electricity & functioning of electro medical equipments.** Electric safety (Earthing) & care of apparatus. Electricity & electro medical equipments & safe guards Static electricity

5. **Sterilization – material & methods**

6. **Cardiopulmonary resuscitation:** Basic cardiac life support, Advanced cardiac life support

7. **Intensive coronary unit & recovery room concepts**

8. **Biomedical waste & its management**

Textbook:

1. Cardiopulmonary bypass; Principles and practice, Glenn P. Gravelee, Richard F. Davis , Mark Kurusz & Joe R. Utley; 2nd edition; Lippincott Williams & Wilkins 2000.

2. Techniques in Extracorporeal circulation, Philip H. Kay & Christopher M. Munsch

SCHEME OF EXAMINATION OF INTRODUCTION TO – OT & PERFUSION TECHNOLOGY.
M.Sc - PERFUSION TECHNOLOGY

PAPER :-INTRODUCTION TO – OT & PERFUSION TECHNOLOGY
Max marks : 20mks

Type of Question	No	Marks	Questions to be answered	Total
Long Essay				
Short Essays				

PRACTICALS

140 Hours
- Practical aspects of the theory topics

1st Year
M. Sc – Perfusion Technology

EQUIPMENTS IN PERFUSION TECHNOLOGY & PHYSIOLOGY & PATHOLOGY OF PERFUSION
100 Hours

EQUIPMENTS IN PERFUSION TECHNOLOGY

1. Blood Pumps, Principles of Oxygenator Function: Gas Exchange, Heat Transfer, and Operation

2. Circuitry and Cannulation Techniques, Cardiotomy Suction and Venting

Complications of different types of cannulations, cannulation strategy when switching from CPB to ECLS and vice versa.

PHYSIOLOGY & PATHOLOGY OF PERFUSION

3. Blood – Surface Interface, Pulsatile Cardiopulmonary Bypass

4. Hemodilution and Priming Solutions, Hypothermia: Physiology and Clinical Use

5. Surgical Myocardial protection, Changes in the pharmacokinetics of Drugs Administered During Cardiopulmonary Bypass
6. Assesing the Adequacy of perfusion and importance of goal directed perfusion

7. Immune and Inflammatory responses after Cardiopulmonary Bypass, Embolic Events, Endocrine, Metabolic, and Electrolyte response

8. Cardiopulmonary Bypass and the Lung, Cardiopulmonary Bypass and the Kidney

9. Splanchnic, Hepatic, and Visceral effects, Neurologic Effects

10. Recent developments in equipments in perfusion technology & physiology & pathology of perfusion
    Equipments in online monitoring and assessing perfusion adequacy,
    NIRS – significance and importance during CPB

Textbook:

1. Cardiopulmonary bypass; Principles and practice, Glenn P. Gravelee, Richard F. Davis , Mark Kurusz & Joe R. Utley; 2nd edition; Lippincott Williams & Wilkins 2000.
2. Techniques in Extracorporeal circulation, Philip H. Kay & Christopher M. Munsch
3. Warm heart surgery , Tomas Antonio Salerno

SCHEME OF EXAMINATION OF EQUIPMENTS IN PERFUSION TECHNOLOGY PHYSIOLOGY & PATHOLOGY OF PERFUSION.

M.Sc - PERFUSION TECHNOLOGY

PAPER :-EQUIPMENTS IN PERFUSION TECHNOLOGY PHYSIOLOGY & PATHOLOGY OF PERFUSION
Max marks : 20mks

Type of Question	No	Marks	Questions to be answered	Total
Long Essay				
Short Essays				

PRACTICALS

140 Hours

EQUIPMENTS IN PERFUSION TECHNOLOGY PHYSIOLOGY & PATHOLOGY OF PERFUSION

1. Identification of parts of any integrated membrane Oxygenator system
2. Identification and description of different parts of roller pump.
3. Identification and description of different parts of Centrifugal pump.
4. Different parts of an Arterial line filter.
5. Identification and description different types of connectors & tubing's.
6. Identification & describe different types of cannulae.
7. Description an of Adult Extra Corporeal Bypass Circuit.
8. Identification and description of Online Cardioplegia delivery system.
9. Assembly of a Heart Lung machine with an Extra Corporeal circuit.
10. Priming and de-airing of an assembled Extra Corporeal Circuit.
11. Priming and de-airing of an Online Cardioplegia delivery system.
12. Determination of occlusion in a roller pump.
13. Method to calibrate the Heart Lung machine.
14. Determination of safety features of the Heart Lung machine.
15. Calculation PCV on CPB and amount of blood to be added to bring the PCV to the target PCV. Calculation body surface area of an individual, Systemic Vascular Resistance. (i). Interpretation and correction of a given arterial blood gas report. (2). Interpretation and correction of a given electrolyte abnormality, (3). Performing and ACT estimation and interpretation of results (4). Other methods to monitor anti coagulation on CPB.

1st Year
M. Sc – Perfusion Technology

PHARMACOLOGY OF CARDIOVASCULAR DRUGS

100 Hours

1. **Anti-anginal agents:** Beta-blocking antes, nitrates, calcium channel blockers

2. **Anti-failure agents:** Diuretics

3. **Angiotensin – converting enzyme (ACE):** inhibitors, angiotensin-II, Receptor Blockers (ARBs) and aldosterone antagonism

4. **Digitalis:** acute inotropes and inotropic dilators

5. **Antihypertensive drugs:**

6. **Antiarrhythmic drugs**

7. **Antithrombotic agents**: platelet inhibitors, anti coagulants and fibrinolytics

8. **Lipid –**lowering and antiatherosclerotic drugs
9. **Various drugs used during CPB –** dosage for both adult and pediatric CPB, alterations of drug dosage

10. **Recent developments in pharmacology of cardiovascular drugs-** Milrinone, levosimendan, argatroban, bivalirudin, Bio-glues , Factor VIII and Fibrinogen

Textbook:

Drugs for the heart, Lionel H Opie, Bernard J Gersh, 5th Edition

SCHEME OF EXAMINATION OF PHARMACOLOGY OF CARDIOVASCULAR DRUGS

M.Sc - PERFUSION TECHNOLOGY

PAPER :- PHARMACOLOGY OF CARDIOVASCULAR DRUGS

Max marks : 20mks

Type of Question	No	Marks	Questions to be answered	Total
Long Essay				
Short Essays				

PRACTICALS

140 Hours

PHARMACOLOGY OF CARDIOVASCULAR DRUGS

Common cardiovascular drugs and main actions & side effects:

a. Nitrates
b. β-Blockers
c. Calcium channel blockers
d. Digoxin
e. Angiotensin receptor antagonists
f. Angiotensin receptor blockers
g. Common anti-arrhythmic agents
h. Heparin
i. GP II b / III a blockers
j. Aspirin & clopidogrel

2nd Year
M. Sc – Perfusion Technology
CLINICAL APPLICATIONS OF PERFUSION TECHNOLOGY

120 Hours

1. Conduct of cardiopulmonary bypass & termination of bypass
2. Management of unusual problems encountered in initiating and maintaining cardiopulmonary bypass.
3. Cardiopulmonary bypass in infants and children

4. Extra corporeal membrane oxygenation for respiratory or cardiac support – Cannulation Strategies management (technical, medical, hematological, complications) Patient retrieval (road/air), ECMO Classifications (as RVAD, as LVAD, as ECCO2R, etc.,) –ECMO logistic management for retrieval, Inter and Intra Hospital.

4. Extra corporeal cardiopulmonary support for resuscitation and invasive cardiology outside the suite
5. Non-cardiovascular applications of cardiopulmonary bypass
6. Role of Perfusionist in Oncology treatement -HIPEC
7. Perfusion for thoracic aortic surgery
8. Cardiopulmonary bypass for minimal invasive cardiac surgery
9. Recent developments clinical applications of perfusion technology

Textbook:

1. Cardiopulmonary bypass; Principles and practice, Glenn P. Gravelee, Richard F. Davis , Mark Kurusz & Joe R. Utley; 2nd edition; Lippincott Williams & Wilkins 2000.
2. Techniques in Extracorporeal circulation, Philip H. Kay & Christopher M. Munsch
3. Warm heart surgery , Tomas Antonio Salerno

SCHEME OF EXAMINATION OF CLINICAL APPLICATIONS OF PERFUSION TECHNOLOGY

M.Sc - PERFUSION TECHNOLOGY

PAPER :- CLINICAL APPLICATIONS OF PERFUSION TECHNOLOGY

Max marks : 20mks

Type of Question	No	Marks	Questions to be answered	Total
Long Essay				
Short Essays				

PRACTICALS

200 Hours

CLINICAL APPLICATIONS OF PERFUSION TECHNOLOGY

1. Designing an ideal pediatric CPB circuit description of the differences between adult and pediatric circuit.
2. Designing a ECMO circuit and describe the components
3. Assembly of an ECMO circuit and priming.
4. Designing of an ideal CPB circuit for an Aortic arch repair surgery and description the advantages
5. Change of oxygenator during CPB
6. Change of pump loop
7. Management of massive air embolism
8. Management of arterial pump failure
9. Manage a simulated perfusion accident on a dummy CPB circuit including changing oxygenators when on CPB, managing falling/leaking reservoir levels, venous airlocks, air in the arterial line, cardioplegia delivery failure, increased arterial line pressure, recognition of a possible dissection, run away pump head, recognition of heat exchanger water leak into the CPB circuit, reaction time assessment etc.
   Calculating vascular resistance on CPB and management of increased perfusion pressure on bypass.

2nd Year
M. Sc – Perfusion Technology
CARDIAC SURGERY WITHOUT CPB
MECHANICAL CIRCULATORY SUPPORT & ROBOTIC CARDIAC SURGERY
120 Hours

Cardiac surgery without CPB

Patients selection for less invasive operations (MID CAB, OP-CABG), technical considerations in off-pump surgery, stabilizing devices, intra coronary stunts, primary off-pump CABG in impaired left ventricular function, alternative approaches to coronary artery disease, beating heart surgery supported by assist devices.

Mechanical circulatory support

INTERMACS classification

1. IABP
2. Cardiac assist devices
    a. General aspects of mechanical support
    b. Extracorporeal devices
    c. Intracorporeal devices
    d. Future devices
3. Devices used to bridge to transplantation
    a. Thoratec VAD
    b. Novacor LVAD
    c. Heart mate
    d. Totally artificial heart

4. Assist devices: criteria of patient selection, preparation of patient for implantation (medical preparation, psychological, economical preparations), switching from ECLS to CPB to Assist device - perfusion strategies. Long term survival results, present mortality and morbidity rates of every particular device

Robotic cardiac surgery:
Cardio pulmonary bypass during port – access surgery and robotic surgery: endovascular catheter system, minimally invasive cardiac surgery, directs vision, micro-incision and video-assisted, and robotic operations.

Recent developments issues in perfusion

Textbook:

1. Cardiac assists devices, Daniel J. Goldstein & Mehmet C.Oz, Futura Publishing Company, 2000
2. Cardiopulmonary bypass; Principles and practice, Glenn P. Gravelee, Richard F. Davis , Mark Kurusz & Joe R. Utley; 2nd edition; Lippincott Williams & Wilkins 2000.
3. Techniques in Extracorporeal circulation, Philip H. Kay & Christopher M. Munsch

SCHEME OF EXAMINATION OF CARDIAC SURGERY WITHOUT CPB MECHANICAL CIRCULATORY SUPPORT & ROBOTIC CARDIAC SURGERY

M.Sc - PERFUSION TECHNOLOGY

PAPER :- CARDIAC SURGERY WITHOUT CPB MECHANICAL CIRCULATORY SUPPORT & ROBOTIC CARDIAC SURGERY

Max marks : 20mks

Type of Question	No	Marks	Questions to be answered	Total
Long Essay				
Short Essays				

2nd Year
M. Sc – Perfusion Technology
CARDIAC SURGERY WITHOUT CPB
MECHANICAL CIRCULATORY SUPPORT & ROBOTIC CARDIAC SURGERY
200 Hours

PRACTICALS

1. Designing a LVAD / RVAD circuit and describe the components
2. Assembling the LVAD/RVAD circuit and prime.
3. Set up of an IABP; indentation the dicrotic notch, end diastolic point, unassited systole, and assisted systole.
4. Description of proper timing, timing errors, complications and contra indications of IABP therapy. Diagrammatic representation of picture of pressure wave of 1:2 assist.
5. Identification & use of octopus in off-pump CABG
6. Identification & use of star fish in off-pump CABG
7. Indications for use of IABP for off-pump procedures
8. Shunts used for systemic –pulmonary shunts in pediatric cardiac surgery and for aortic surgery.
9. Intra coronary shunts in off-pump CABG.

2nd Year
M. Sc – Perfusion Technology
ORGAN TRANSPLANTATION

120 Hours

1. **Heart transplantation**
   Basic transplant immunology, Patient and donor selection, Matching donor to recipient, Donor preparation, Orthotropic/heterotrophic Cardiac transplantation, Intensive care management, Immunosuppression and rejection, Surgical complications and results.

   Contents of transplant kit, dimensions of transplant box for Heart, lung , heart and lung..

   TRANSMEDICS organ retrieval system.

2. **Heart-lung transplantation**
   Recipient selection, donor selection and graft harvest, surgical procedure, Pathophysiology before / after transplantation, preoperative management.

3. **Lung transplantation**
   Recipient selection, Donor selection and graft harvest, surgical procedures of lung transplantation (single-lung / double-lung transplantation) , Pathophysiology before / after transplantation , postoperative management
   Perfadex and perfadex plus solution for lung protection
4. **Liver transplantation:** role of perfusionist
5. **Renal transplantation:** role of perfusionist
6. Prosthetic heart valves (mechanical/ bioprosthetic)
7. Homografts
8. Grafts – collagen impregnated grafts, trifurcated grafts, arch vessel, composite valved grafts

Books for organ transplantation

Textbook:

1. Heart, lung and heart lung transplantation: In
Kaplan's Cardiac Anaesthesia, 5th Edition, Joel A Kaplan (Editor)
Elsevier Saunders, Philadelphia 2006.

2. Oxford specialist handbook in surgery (Cardio thoracic surgery),
Indian Edition, Joanna Chikwe, Emma Beddow, Brain Glenville.

SCHEME OF EXAMINATION OF ORGAN TRANSPLANTATION

M.Sc - PERFUSION TECHNOLOGY

PAPER :- ORGAN TRANSPLANTATION

Max marks : 20mks

Type of Question	No	Marks	Questions to be answered	Total
Long Essay				
Short Essays				

PRACTICALS

200 Hours

i). Identification of various mechanical and bioprosthetic heart valves): Mechanical & bioprosthetic valves & annuloplasty rings; ball & cage valve, tilting-disc valves (porcine, bovine and stent – less valves), Annuloplasty: Rigid rings , complete & partial rings , soft rings , bio-degradable sings.

ii). Identification of various homografts specimens. Describe the process of harest, processing preservation and handling of homografts

iii). Identification of various grafts (synthetic): Desirable materials used for manufacture of sympathetic grafts, pre-clotted grafts, collagen – coated grafts, bifurcated grafts: Methods of sterilization of systemic grafts. Difference between homografts and synthetic grafts.

2nd Year

M. Sc – Perfusion Technology

HEMATOLOGY AS RELEVANT TO PERFUSION, BLOOD TRANSFUSION AND BLOOD CONSERVATION

120 Hours

A. **Hematology:** Anticoagulation for cardiopulmonary bypass, Heparin neutralization, Hematologic effects of cardiopulmonary bypass, Management of Coagulopathies associated with cardiopulmonary bypass.
B. **Hemodilution –** advantages and disadvantages, various types of priming fluids.

C. **Blood transfusion**: Transfusion practices, Transfusion algorithms, Thromboelastogram – principle and its uses during ECMO and bleeding patients.

D. **Blood conservation**: Autologous blood donation, acute perioperative normovolemic hemodilution or "blood pooling", intraoperative blood salvage, postoperative autologous blood salvage, erythropoietion therapy to replace blood loss, Pathophysiology and epidemiology of hemostatic abnormalities,
E. **Antifibrinolytics, Cell saver principles and its uses,** Topical agents for reducing blood loss.

Textbook

1. Cardiopulmonary bypass; Principles and practice, Glenn P. Gravelee, Richard F. Davis, Mark Kurusz & Joe R. Utley; 2nd edition; Lippincott Williams & Wilkins 2000.
2. Techniques in Extracorporeal circulation, Philip H. Kay & Christopher M. Munsch

SCHEME OF EXAMINATION OF HEMATOLOGY AS RELEVANT TO PERFUSION, BLOOD TRANSFUSION AND BLOOD CONSERVATION

M.Sc - PERFUSION TECHNOLOGY

PAPER :- HEMATOLOGY AS RELEVANT TO PERFUSION, BLOOD TRANSFUSION AND BLOOD CONSERVATION

Max marks : 20mks

Type of Question	No	Marks	Questions to be answered	Total
Long Essay				
Short Essays				

PRACTICALS

HEMATOLOGY AS RELEVANT TO PERFUSION, BLOOD TRANSFUSION AND BLOOD CONSERVATION

200 Hours

. Draw and discuss coagulation cascade
2. Describe action and uses of heparin
3. Describe action & side effects of protamine
4. Describe on heparin alternatives
5. Platelet dysfunction during CPB
6. Leukocyte depletion during CPB
7. Factors causing hemolysis during CPB
8. Monitoring of anti-coagulation during CPB
   a). ACT
   b). Heparin protration titration
   c). Heparin concentration
   d). Sonoclot
   e). Thromboelastography
9. Discuss coagulation disorder associated CPB
10. Draw and discussion on algorithm approach for hemostatic therapy in cardiac patients.
11. Draw and discussion on algorithm approach for postoperative red cell transfusion in cardiac surgical patients.
12. Cost effectiveness of autologous blood donation in cardiac surgery.

SECTION-IV
MONITORING LEARNING PROGRESS

It is essential to monitor the learning progress of each candidate through continuous appraisal and regular assessment. It not only also helps teachers to evaluate students, but also students to evaluate themselves. The monitoring be done by the staff of the department based on participation of students in various teaching / learning activities. It may be structured and assessment be done using checklists that assess various aspects. Model Checklists are given in this Chapter, which may be copied and used.

The learning out comes to be assessed should include:

i) ***Acquisition of Knowledge***: The methods used comprise of `Log Book' which records participation in various teaching / learning activities by the students. The number of activities attended and the number in which presentations are made are to be recorded. The logbook should periodically be validated by the supervisors. Some of the activities are listed. The list is not complete. Institutions may include additional activities, if so, desired.

Journal Review Meeting (Journal Club): The ability to do literature search, in depth study, presentation skills, and use of audio- visual aids are to be assessed. The assessment is made by faculty members and peers attending the meeting using a checklist (see Model Checklist – I, Section IV)

Seminars / Symposia: The topics should be assigned to the student well in advance to facilitate in depth study. The ability to do literature search, in depth study, presentation skills and use of audio- visual aids are to be assessed using a checklist (see Model Checklist-II, Section IV)

ii) Teaching skills: Candidates should be encouraged to teach undergraduate medical students and paramedical students, if any. This performance should be based on assessment by the faculty members of the department and from feedback from the undergraduate students (See Model checklist III, Section IV)

iii) Dissertation: Please see checklist IV and V in Section IV.

iv) Work diary / Log Book- Every candidate shall maintain a work diary and record his/her participation in the training programmes conducted by the department such as journal reviews, seminars, etc. Special mention may be made of the presentations by the candidate as well as details of experiments or laboratory procedures, if any conducted by the candidate.

v) *Records:* Records, log books and marks obtained in tests will be maintained by the Head of the Department and will be made available to the University.

Logbook

The logbook is a record of the important activities of the candidates during his training; Internal assessment should be based on the evaluation of the logbook. Collectively, log books are a tool for the evaluation of the training programme of the institution by external agencies. The record includes academic activities as well as the presentations and procedures carried out by the candidate.

Format for the logbook for the different activities is given in Tables 1 and 2 of Section IV. Copies may be made and used by the institutions.

Procedure for defaulters: Every department should have a committee to review such situations. The defaulting candidate is counseled by the guide and head of the department. In extreme cases of default the departmental committee may recommend that defaulting candidate be withheld from appearing the examination, if she/he fails to fulfill the requirements in spite of being given adequate chances to set himself or herself right.

Format of Model Checklists

CHECKLIST-I
MODEL CHECKLIST FOR EVALUATION OF JOURNAL REVIEW PRESENTATIONS

Name of the student: Date:

Name of the faculty/ Observer:

Sl No.	**Items for observation during presentation**	**Poor 0**	**Below average 1**	**Average 2**	**Good 3**	**Very Good 4**
1	Article chosen was					
2	Extent of understanding of scope & objectives of the paper by the candidate					
3	Whether cross-references have been consulted					
4	Whether other relevant references have been consulted					
5	Ability to respond to questions on the paper /subject					
6	Audio-visuals aids used					
7	Ability to defend the paper					
8	Clarity of presentation					
9	Any other observation					
	Total score					

CHECKLIST-II:
MODEL CHECK LIST FOR THE EVALUATION OF THE SEMINAR PRESENTATIONS

Name of the student: Date:

Name of the faculty/ Observer:

Sl No.	Items for observation during presentation	Poor 0	Below average 1	Average 2	Good 3	Very Good 4
1	Article chosen was					
2	Extent of understanding of scope & objectives of the paper by the candidate					
3	Whether cross-references have been consulted					
4	Whether other relevant references have been consulted					
5	Ability to respond to questions on the paper /subject					
6	Audio-visuals aids used					
7	Ability to defend the paper					
8	Clarity of presentation					
9	Any other observation					
	Total score					

CHECKLIST - III
MODEL CHECK LIST FOR EVALUATION OF TEACHING SKILL

Name of the student: Date:

Name of the faculty/ Observer:

SL. No.		Strong Point	Weak point
1	Communication of the purpose of the talk		
2	Evokes audience interest in the subject		
3	The introduction		
4	The sequence of ideas		
5	The use of practical examples and /or illustrations		
6	Speaking style (enjoyable, monotonous, etc., specify)		
7	Summary of the main points at the end		
8	Ask questions		
9	Answer questions asked by the audience		
10	Rapport of speaker with his audience		
11	Effectiveness of the talk		
12	Uses of AV aids appropriately		

CHECKLIST - IV
MODEL CHECK LIST FOR DISSERTATION / PROJECT WORK PRESENTATIONS

Name of the student: Date:

Name of the faculty/ Observer:

Sl No.	**Points to be considered**	**Poor 0**	**Below average 1**	**Average 2**	**Good 3**	**Very Good 4**
1	Interest shown in selecting topic					
2	Appropriate review					
3	Discussion with guide and other faculty					
4	Quality of protocol					
5	Preparation of proforma					
	Total score					

CHECKLIST – V

CONTINUOUS EVALUATION OF DISSERTATION / PROJECT WORK BY GUIDE/ CO-GUIDE

Name of the student: Date:

Name of the faculty/ Observer:

Sl No.	**Items for observation during presentation**	**Poor 0**	**Below average 1**	**Average 2**	**Good 3**	**Very Good 4**
1	Periodic consultation with guide/ co-guide					
2	Depth of Analysis/ Discussion					
3	Department presentation of findings					
4	Quality of final output					
5	Others					
	Total score					

OVERALL ASSESSMENT SHEET

Date:

Check list No.	Name of the students			
	A	B	C	D
1				
2				
3				

Signature of the HOD Signature of the Principal

The above overall assessment sheet used along with logbook should form the basis for certifying satisfactory completion of course of study, in addition to the attendance requirement.

KEY
Mean score: Is the sum all the scores of checklists 1 to 5
A, B, C: Name of the students

LOG BOOK

Table 1: Academic activities attended
Name:
Admission Year:
College:

Date	**Type of activity, Specific Seminar, Journal club, presentation, UG teaching**	**Particulars**

LOG BOOK

Table 2 : Academic presentations made by the student
Name :
Admission Year:
College:

Date	Topic	Type of activity, Specific Seminar, Journal club, presentation, UG teaching

MANAGEMENT INFORMATION SYSTEM REPORT

1. Name of the college imparting M.Sc. Perfusion Technology

2. Details of M.Sc.

Sl. No	Name of the Branch & Teaching faculty	Sanctioned Strength	Admitted	Name of the subjects to be studied at 1st Year M.Sc. Perfusion Technology	
1					
2					

3. No. of experiments/assignments conducted for 1st year M.Sc. Perfusion Technology students

Sl. No	Branch	Subject		Assigned by RGUHS	Conducted	%	Remarks
1.		No	Name				
2							

4. No. of theory classes conducted for 1st year M.Sc. Perfusion Technology students

Sl. No	Branch	Subject		RGUHS Norms (25)	Conducted	%	Remarks
1.		No	Name				
2.							
3.							

5. Number of theory and practical classes taken by 2nd year M.Sc. Perfusion Technology students for under graduate Program (Optional)

6. No. of Journal clubs department wise for 1st year and 2nd year M.Sc. Perfusion Technology students

Total No. of students Dept Wise	Norms for half yearly Report	Achieved Number	% Achievement	Remarks
1st year M.Sc. Perfusion Technology No.=	2 per candidate per year			
2nd year M.Sc. Perfusion Technology No.=	2 per candidate per year			

7. Number of seminars for 1st year and 2nd year M.Sc. Perfusion Technology students

Total No. of students : 10	Norms for half yearly Report	Achieved Number	% Achievement	Remarks
1st year M.Sc. Perfusion Technology No.=10	2 per candidate			
2nd year M.Sc. Perfusion Technology No.= 08	2 per candidate			

8. Number of interdepartmental meetings

Norms for half yearly Report	Achieved Number	% Achievement	Remarks
1	2	200%	Interactive and productive

9. Number of visits to pharmaceutical industry/research center/hospital for 1st year and 2nd year M.Sc. Perfusion Technology students

Norms for half yearly Report	Achieved Number	% Achievement	Remarks
1	02	200	Educative & informative

10. Number of guest lectures for postgraduate Program

Norms for half yearly Report	Achieved Number	% Achievement	Remarks
2	03	150	Need focused and educative

11. Number of research papers published in the year in the college –

12. Any other additional information such as consultancy/collaboration/conducting Seminars & workshops or attending seminar & workshops or conference.

SECTION-V

ETHICS IN M.Sc. PERFUSION TECHNOLOGY

(Should be taught to the 1st year students of M.Sc. Perfusion Technology)

Introduction: With the advances in science and technology and the increasing needs of the patient, theirs families and community, there is a concern for the health of the community as a whole. There is a shift to greater accountability to the society. It is therefore absolutely necessary for each and every one involved in the health care delivery to prepare themselves to deal with these problems. Technicians like the other professionals are confronted with many ethical problems.

Standards of professional conduct for technicians are necessary in the public interest to ensure an efficient laboratory service. Every technician should not only be willingly to play his part in giving such a service, but should also avoid any act or omission which would prejudice the giving of the services or impair confidence, in respect, for technician as a body.

To accomplish this and develop human values, it is desired that all the students under go ethical sensitization by lectures or discussion on ethical issues.

Introduction to ethics-
What is ethics?
General introduction to Code of Laboratory Ethics
How to form a value system in one's personal and professional life?
International code of ethics

Ethics of the individual-
Technician relation to his job
Technician in relation to his trade
Technician in relation to medical profession
Technician in relation to his profession

Professional Ethics-
Code of conduct
Confidentiality
Fair trade practice
Handling of prescription
Mal practice and Negligence
Professional vigilance

Research Ethics-

Animal and experimental research/ humanness
Human experimentation
Human volunteer research - informed consent
Clinical trials
Gathering all scientific factors
Gathering all value factors
Identifying areas of value – conflict, setting priorities
Working out criteria towards decision
ICMR/ CPCSEA/ INSA Guidelines for human / animal experimentation

Recommended reading

- Francis C.M., Medical Ethics, I Edition, 1993, Jay pee Brothers, New Delhi p189.
- Good Clinical Practices: GOI Guidelines for clinical trials on Pharmaceutical Products in India (www.cdsco.nic.in)
- INSA Guidelines for care and use of Animals in Research – 2000.
- CPCSEA Guidelines 2001(www.cpcsea.org).
- Ethical Guidelines for Biomedical Research on Human Subjects, 2000, ICMR, New Delhi.
- ICMR Guidelines on animal use 2001, ICMR, New Delhi.

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ANNEXURE-I

CATEGORIES OF BIO-MEDICAL WASTE

	Waste Category ** Type	Treatment a Disposal ** Options
Category No. 1	Human Anatomical Waste: (human tissues, organs, body parts)	Incineration deep burial
Category No. 2	Animal Waste: (animal tissues, organs, body parts, carcasses, blooding parts, fluid, blood and experimental animals used in research, waste generated by veterinary hospitals colleges, discharge form hospitals, animal houses)	Incineration deep burial
Category No. 3	Microbiology & Biotechnology Waste: (wastes from laboratory cultures, stocks or specimens or micro-organisms live or attenuated vaccines, human and animal Cell culture used in research and infectious agents from research and industrial laboratories, wastes from production of biologicals, toxins, dishes and devices used for transfer of cultures)	Local autoclaving / micro waving / incineration.
Category No. 4	Waste sharps: (Needles, syringes, scalpels, blades, glass, etc, that may cause puncture and cuts. This includes both used and unused sharps)	Disinfection (chemical treatment / autoclaving / micro –waving and mutilation / shredding
Category No. 5	Discarded Medicines and Cytotoxic drugs: (wastes comprising of outdated, contaminated and discarded medicines)	Incineration / destruction and drugs disposal in secured landfills.
Category No. 6	** Solid Waste: (Items contaminated with blood, and body fluids including cotton, dressings, soiled plaster casts, Eners, beddings, other material contaminated with blood)	Incineration Autoclaving / micro waving
Category No. 7	Solid Waste: (Wastes generated form disposable items other than the waste ** sharps such as tubings, catheters, intravenous sets, etc)	Disinfection by chemical treatment, autoclaving / micro-waving and mutilation / shredding
Category No. 8	Liquid Waste: (Waste generated from laboratory and washing, cleaning, housekeeping and disinfecting activities)	Disinfection by chemical treatment and discharge into drains
Category No. 9	Incineration Ash: (Ash from incineration of any biomedical waste)	Disposal in municipal landfill

** As per Bio-Medical Waste (Management & Handling) (Second Amendment) Rules 200, dated 02.06.2000.

SECTION-VI

MINIMUM REQUIREMENT OF INFRASTRUCTURE, LABORATORY FACILITIES AND STAFF:

(i). Basic Infrastructure:

Institute should have its own hospital with full-fledged cardiac surgical service with the following facilities:

- 4 cardiac operating rooms
- One perfusion department
- Class room with capacity for 30 students, measuring 500 sq.ft
- One departmental Seminar room measuring 250sq.ft for each branch with A.V aids – OHP, Slide projector and computer with accessories are compulsory. LCD Projector (optional) Other infrastructure criteria- Principals room, students common room, staff room, Library, office room, Store room, preparation room etc will be as per minimum criteria. Norms of B.Sc Perfusion Technology course.
- Minimum of 500 open-heart procedures per year.

(ii). Infrastructure subject wise

- Anatomy laboratory
- Physiology laboratory
- Perfusion equipments
    i. Heart Lung Machine and Accessories (@ one machine per student)
    ii. Heater Cooler – one machine per patient
    iii. IABP - 2
    iv. A C T Machine - 2
    v. Blood Gas Analyzer - 2
    vi. Centrifugal pump -2

(iii). Teaching staff requirement:

Teaching staff should be actively involved in imparting education in the particular subject:

- Professor – 1
- Associate Professor (5 years teaching experience) – 1
- Assistant Professor (3 years teaching experience) – 1
- Lecturer (M.Sc Perfusion Technology) – 2
- Tutor (B.Sc Perfusion Technology) – 2

Qualification

- M.Ch / DNB in cardio thoracic surgery
- MD in Anaesthesia with cardiac experience (5 years)
- M.Sc in Perfusion Technology