Programme name: Bachelor of Science in Perfusion Technology.

Programme code : 1902.

PREAMBLE

The B.Sc. Perfusion Technology course is 3 years degree course aimed at training the students in the technology aspects of medical care with a good scientific foundation. These students will be in a position to completely assist the Anaesthetist & Surgeons in high tech anaesthetist & surgical theatre. They will be in demand both within the country and outside as allied Healthcare personnel with advanced training in the latest technologies in their specialty, these graduates will play an important role in determining the quality of health care provided.

Learning Objectives:

By the end of the course, the student should be able to :

1. Understand the history and development of perfusion technology and cardiopulmonary bypass
2. Describe the basic anatomy of cardiac system, respiratory system, renal system and basic anatomy of other systems.
3. Describe basic biochemical parameters and physiological changes
4. Describe physiologic details of cardiac system
5. Describe basic pathologic disorders related to the cardiac system
6. Identify common drugs used for cardiac conditions
7. Demonstrate knowledge of history of
8. Describe working of a heart- lung machine.
9. Describe basics of perfusion technology
10. Describe recent advances of perfusion technology
11. Demonstrate skills of a perfusion technician and ability to assist in routine, emergency and complicated cases.

DURATION OF COURSE

The duration of the course shall be for period of three years including six months compulsory training in sixth semester.

Annual intake

The annual intake capacity of KIMS DEEMED TO BE UIVERSITY , Karad is 3 students.

ELIGIBILITY FOR ADMISSION

A candidate seeking admission to the Bachelor of Science- Perfusion Technology course shall have passed.

1) The two year Pre- University examination or equivalent as recognized by KIMSDU with Physics, Chemistry and biology as principle subjects of study.

OR

2) Pre degree course from a recognized university (two years after ten years schooling) with physics, chemistry, and biology as principle subjects of study.

OR

3) Any equivalent examination recognized by KIMSDU for the above purpose with Physics, Chemistry and biology as principle subjects of study.

Fees: As per University policy

Selection method : Entrance Examination conducted by the University

Faculty:

Course Director- Dr A.Y. Kshirsagar M.S, F.I.C.S, F.A.I.S, F.M.A.S (Medical Director)

Course co-ordinator- Dr Pravin . P. Salunkhe (M.S. Mch C.V.T.S.Surgeon)

Dr. Samrat Madanaik (M.D, D.M. Cardiac Anesthesia)

Dr. V.K. Dhulkhed (M.D. Anesthesia)

Dr. Mrs. N.V. Kanase (M.D. Anesthesia, Fellowship in Cardiac Anesthesia)

Infrastructure

We have a fully functional Cardio-thoracic department with dedicated staff. A fully functional Cardio-thoracic O.T with heart lung machine.

Contributing departments

- C.T.V.S DEPARTMENT
- DEPARTMENT OF ANAESTHESIA

MEDIUM OF INSTRUCTION

The medium of instruction and examination shall be English.

ATTENDENCE

Every candidate shall attend at least 80% of total number of classes conducted in a calendar year from date of commencement of the term to the last working day as notified by the 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. Special classes conducted for any purpose shall not be considered for the calculation of percentage of attendance for eligibility. A candidate lacking in prescribed percentage of attendance in any one or more subjects either in theory or practical in the first appearance will not be eligible to appear the University Examination either I one or more subjects.

BSc. Perfusion technology SEMESTER I			
Sr. Number	**Content**	**No. Hours**	**Credits.**
A. CORE SUBJECT			
a - Theory			
1) Paper I	Applied Anatomy & Other Applied Basics (i)	75	5
2)Paper II	Applied Physiology (i)	60	4
3)Paper III	Applied Biochemistry (i)	60	4
b – Practical			
1)Paper I	Applied Anatomy & Other Applied Basics (i)	60	2
2)Paper II	Applied Physiology (i)	90	3
3)Paper III	Applied Biochemistry (i)	60	2
B. Posting to departments (ANY ONE)			
a - Theory			
1.	-----	------	-----
2.	------		
b - Practical			
1.	------	------	------
2.	-------		
C. Generic Elective.(Any One) **Biosafety, Bioethics,**			
a.- **Theory**			
1.	------	30	2
b - **Practical**			
1.	--------	90	3
	Total	525	25

BSc. Perfusion technology SEMESTER II			
Sr. Number	**Content**	**No. Hours**	**Credits.**
A. CORE SUBJECT			
a - Theory			
1) Paper I	Applied Anatomy & Other Applied Basics (ii)	45	3
2)Paper II	Applied Physiology (ii)	60	4
3)Paper III	Applied Biochemistry (ii)	60	4
b – Practical		**b – Practical**	
1)Paper I	Applied Anatomy & Other Applied Basics (ii)	60	2
2)Paper II	Applied Physiology (ii)	90	3
3)Paper III	Applied Biochemistry (ii)	60	2
B. Posting to departments AEE(ANY ONE)			
a - Theory			
1.	Posting to the pharmacology or microbiology (lectures)	60	4
b - Practical			
1.	Posting to the pharmacology or microbiology (Practical)	90	3
C. Generic Elective.(Any One)			
a.- **Theory**			
1.	----------	----------	--------
b - **Practical**			
1.	----------	---------	---------
	Total	525	25

BSc. Perfusion technology SEMESTER III			
Sr. Number	**Content**	**No. Hours**	**Credits.**
A. CORE SUBJECT			
a - Theory			
1) Paper I	Applied Pathology & Pharmacology-I (i)	75	5
2)Paper II	Perfusion Technology (i)	75	5
3)Paper III	Basic Sciences and microbiology (i)	75	5
b – Practical			
1)Paper I	Applied Pathology & Pharmacology-I (i)	90	3
2)Paper II	Perfusion Technology (i)	120	4
3)Paper III	Basic Sciences and microbiology(i)	90	3
B. Posting to departments.(ANY ONE)			
a - Theory			
1.	--------	------	------
2.	--------		
b - Practical			
1.	--------	------	--------
2.	--------		
C. Generic Elective.(Any One)			
a.- **Theory**			
1.	--------	------	------
b - **Practical**			
1.	--------	------	------
	Total	525	25

Perfusion technology SEMESTER IV			
Sr. Number	**Content**	**No. Hours**	**Credits.**
A. CORE SUBJECT			
a - Theory			
1) Paper I	Applied Pathology & Pharmacology-I (ii)	45	3
2)Paper II	Perfusion Technology (ii)	60	4
3)Paper III	Basic Sciences and microbiology (ii)	60	4
b – Practical			
1)Paper I	Applied Pathology & Pharmacology-I (ii)	60	2
2)Paper II	Perfusion Technology (ii)	90	3
3)Paper III	Basic Sciences and microbiology(ii)	60	2
B. Posting to departments (ANY ONE)			
a - Theory			
1.	Posting to the physiology or Pathology. (Lecture)	60	4
b - Practical	Posting to the physiology or Pathology (practical)		
1.	(Practical)	90	3
C. Generic Elective.(Any One)			
a.- **Theory**			
1.	------	------	------
b - **Practical**			
1.	------	------	------
	Total	525	25

BSc. Perfusion technology SEMESTER V			
Sr. Number	**Content**	**No. Hours**	**Credits.**
A. CORE SUBJECT			
a - Theory			
1) Paper I	Applied Perfusion Technology – I (i)	75	5
2)Paper II	Applied Perfusion Technology – II (i)	75	5
3)Paper III	Recent Advances – III (i)	75	5
b – Practical			
1)Paper I	Applied Perfusion Technology – I (i)	90	3
2)Paper II	Applied Perfusion Technology – II (i)	120	4
3)Paper III	Recent Advances – III (i)	90	3
B. Posting to departments (ANY ONE)			
a - Theory			
1.	------	------	------
2.	------		
b - Practical			
1.	------	------	------
2.	------		
C. Generic Elective.(Any One)			
a.- **Theory**			
1.	------	------	------
b - **Practical**			
1.	------	------	------
	Total	525	25

BSc. Perfusion technology SEMESTER VI			
Sr. Number	**Content**	**No. Hours**	**Credits.**
A. CORE SUBJECT			
a - Theory			
1) Paper I	Applied Perfusion Technology – I (ii)	45	3
2)Paper II	Applied Perfusion Technology – II (ii)	45	4
3)Paper III	Recent Advances – III (ii)	60	4
b – Practical			
1)Paper I	Applied Perfusion Technology – I (ii)	30	2
2)Paper II	Applied Perfusion Technology – II (ii)	90	3
3)Paper III	Recent Advances – III (ii)	60	2
B. Posting to departments (ANY ONE)			
a - Theory			
1.	Posting to the Medicine and surgery (Lecture)	60	4
b - Practical .			
1.	Posting to the Medicine and surgery to hospital wards (Practical)	120	4
C. Generic Elective.(Any One)			
a.- **Theory**			
1.	--------	-----	---
b - **Practical**			
1.	------	------	------
	Total	555	26

Syllabus / course content : I – first year (First and Second semester)

1st Year: Assessment System & Syllabus

Sr. No	Paper	Subject	Subject Code	Theory			Practical			Total Marks
				IA	Final	Total	IA	Final	Total	
1	Paper – I	Applied Anatomy & Other Applied Basics		30	60	90	30	80	110	200
2	Paper – II	Applied Physiology		30	60	90	30	80	110	200
3	Paper – III	Applied Biochemistry		30	60	90	30	80	110	200

A)Paper – I

Applied Anatomy & Other Applied Basics

Sr. No.	Topics (Theory and Practical)
	Section A
1	Location, size, surface features, venous area, septum and atrial appendage.
2	Right atrium structural features, venous area, septum and appendage.
3	Left atrium structural features venous area, septum and appendage.
4	Right ventricle structural features inflow and outflow characteristics.
5	Left ventricle structural features inflow and outflow characteristics.
6	Valves location, structure and functions of each valve.
7	Blood supply of Heart in brief: Coronary arteries.
8	Innovation: Sympathetic and parasympathetic sensory.
9	Mediastinum and its divisions
10	Great vessels
11	Major Arteries and their branches
12	Major veins and their tributaries
13	Concepts of coronal, sagital and oblique sections
14	Cross sectional Anatomy of Heart
	Section B
15	Details Anatomy & 3 system
	A)Cardio thorax
	B)Respiratory System
	C)Renal System
16	Introductory Anatomy & other systems
17	Histology of Myocardium

B) Paper – II Applied Physiology

PHYSIOLOGY OF CARDIOVASCULAR SYSTEM –

To be attended along with MBBS undergraduate class. The practical consists of daily posting in CTU where all aspects are taught and reinforced hands on.

Sr. No.	Topics Theory
1	Introduction to CVS physiology
2	Functions of CVS and blood circulation ; Tissue perfusion and microcirculation
3	Cardiac output definition, measurements, regulation and control
4	Stroke volume, Arterial pressure and its regulation
5	Peripheral resistance, Venous return, Heart rate
6	Cardiac cycle with special reference to waveforms of pressure tracing
7	Heart as a pump physical characteristics of atria, ventricles and valves
8	Mechanism of contraction
9	Description and organization of pacemaker and conduction system
10	Specialized conduction tissues, Sinus node, Inter nodal tracts
11	Atrioventricular node, His bundle, Bundle branches
12	Nodal electricity
13	Nervous control of heart rate
14	Cardiovascular regulatory mechanism.
15	Vasodilation, Auto regulation (myogenic theory)
16	Baro and chemo receptors
17	Physics of ventilation- principles of elasticity compliance and airway resistance.
18	Mechanism and regulation of respiration, Principles of gaseous exchange
19	Pulmonary function studies, lung volumes and capacities by use of spirometry
20	Brief concept of artificial ventilation
21	Components of blood-their normal values and function
22	Blood groups and briefly procedures involved in blood transfusion
23	Briefly coagulation factors and coagulation cascade
24	Renal Physiology Renal function tests
25	Routine biochemical investigations
26	Cardiac profiles – biochemical markers of myocardial infarction, basic principles, evaluation and application
27	Basic principles and estimation blood gas and PH
28	Basic principles and estimation of electrolytes
29	Transport across cell wall
30	Action Potential
31	ECG Introductory level

C) **Paper – III Applied Biochemistry**

1. Introduction to Medical lab Technology:

(a)Role of Medical lab Technologist (b) Ethics, Responsibility (c) Safety measures

(d)First aid (e) Cleaning and care of general laboratory glass ware and equipment

2. Introduction to Apparatus- Chemical Balance: Different types. Principles and applications.

3. Units of Measurements: Concepts of Molecular weight, Atomic weight, Normality, Molarity, Standards Atomic structure, Valence, Acids, Bases, Salts & indicators

4. Concepts of pH: Concepts of Acid Base reaction and hydrogen ion concentration. Definition Of pH buffer & pH meter

5. Chemistry of Carbohydrates:

a. Definition, Classification and biological importance.

b. Monosaccharides, Oligosaccharides, Disaccharides & Polysaccharides:

6**. Chemistry of Lipids**:

a. Definition, Classification and biological importance.

b. Simple lipids. Triacylglycerol and waxes composition and functions.

C. Compound lipids : Phospholipids, Sphingolipids, Glycolipid and Lipoproteins : Composition and functions.

d. Derived lipids Fatty acids-saturated & unsaturated. Steroids and their properties.

7. Chemistry of Proteins:

a. Amino acids Classification. Properties, side chains of amino acids.

b. Protein: Definitions, Classifications and functions.

c. Peptides Biologically active peptides

d. Overview of Structural organization of proteins.

e. Denaturation of proteins and denaturating agents

8. Chemistry of Nucleic acids:

a) DNA Structure and function

b) RNA Types, Structure (only t RNA) and Functions.

II- Second year (Third and Fourth semester)

2nd Year : Assessment System & Syllabus

Sr. No	Paper	Subject	Subject Code	Theory			Practical			Total Marks
				IA	Final	Total	IA	Final	Total	
1	Paper – I	Applied Pathology & Pharmacology-I		30	60	90	30	80	110	200
2	Paper – II	Perfusion Technology,		30	60	90	30	80	110	200
3	Paper – III	Basic Sciences and microbiology		30	60	90	30	80	110	200

Paper – I

Applied pathology & pharmacology

Sr. No.	Topics Theory
	Pathology
	CARDIOVASCULAR SYSTEM
1	Atherosclerosis – Definition, risk factors, briefly pathogenesis and morphology, clinical significance and prevention
2	Hypertension – Definition, types and briefly pathogenesis and amd effects pf Hypertension
3	Pathophysiology of heart failure
4	Ischaemic heart diseases – definition, types. Briefly pathophysiology,pathology and complication
5	Valvular heart diseases – cause, pathology and complication
6	Congenital heart diseases briefly about pathogenesis and basic effects
7	Rheumatic fever & rheumatic cardiac disease
	HAEMATOLOGY
1	Anaemia – definition, morphological types and diagnosis of anemia brief concept about haemolytic anaemia and polycythaemia.
2	Leukocyte disorders – briefly leukaemia, leukocytosis, agranulocytosis etc.
3	Bleeding disorders – definition, classification, causes and effects of important types of bleeding disorders. Briefly various laboratory tests used to diagnose bleeding disorders.
	RESPIRATORY SYSTEM
1	Pulmonary congestion and edema
2	Pleural effusion – causes, effects and diagnosis
	RENAL SYSTEM
1	Clinical manifestation of renal disease Briefly causes, mechanism, effects and laboratory diagnosis of acute renal failure and chronic renal failure. Briefly glomerulonephritis and pyelonephritis
2	Brief concept about obstructive uropathy.

	Pharmacology
1	Terminology – Classification of drugs
2	Principles of drug administration and routes of administration,absorption, distribution, metabolism, excretion of drugs, factors influencingdrug action dosage and factors modifying it.
3	Drug allergy and toxicity, mechanism of drug action (various ways in which they act)
4	Cardiovascular drugs- (Only introduction, classification and action)
5	a. Antihypertensives example : beta adrenergic antagonists, alpha adrenergic antagonists etc.
6	Antiarrythmic drugs
7	Cardiac glycosides
8	Sympathetic and nonsympathetic inotropic agents
9	Coronary vasodilators
10	Antianginal and anti failure agents
11	Drugs used in haemostasis –anticoagulants
12	Thrombolytics and antithrombolytics
13	Cardioplegic drugs – history, principles and types of cardioplagia
14	Primary solutions – history, principles and types
15	Drugs used in the treatment of shock
16	Drugs acting on autonomous nervous system;
17	Introduction to following drugs (Only introduction, classification and action) Antihistamines and antiemetics – Analgesics Anaesthetic agents Bronchodialtors Diuretics
18	Endocrine Pharmacology: Thyroid hormones, glucocorticoids, anabolic steroids, calcitonin, insulin and oral hypoglycemic agents.
19	Pharmacological protection of organs during cardio pulmonary by pass
20	Inhalation gases, preparation, classification mechanism of action.
21	Pharmacodynamics
22	Pharmacokinetics: Haemodilution, hypothermia perfusion, acidbase status, sequestration and pharmacodynamics: Binding (to tissue, protein), age, tissue penetration, temp, acid base status, anaesthetic agents, specific drugs with CPB influence, properties, opiods, neuromuscular blocking drugs, calcium channel blockers, vasodilators, nitraters, beta- blockers, calcium entry blocking drugs in pulmonary bypass surgery.
23	Drugs used in cardiopulmonary bypass: premedication drugs used by anaesthesiologists example beta adrenergic blocking agents, calcium entry blocking drugs, antihypertensive drugs, anticholinergic drugs, sedative/hypnotics drugs etc.

B) Paper – II

Basics of Perfusion technology

Sr. No.	Topics
1	ECG – Normal electro cardio graph different waves, its significance, atrial arrhythmias, ventricular arrhythmias, heart blocks etc.
2	Angiography – coronary angio, peripheral angio, coronary- normal coronary and its branches, indications and limitations. Peripheral – cerebral, renal, limbs (upper and lower). Nuclear cardiology – thallium scan, indications, advantages and disadvantages.
3	Echo- trans thoracic echo, transesophageal echo, indications applications.
4	Laboratory investigations in relation to perfusion technology Hemoglobin, blood grouping, urine analysis, mini-renal etc.
5	History of cardiac surgery and perfusion Specific reference of Gibbon Lillehei, Carrel Pre cardio pulmonary bypass surgery Axygous flow principle Hypothermic / nonhypothermic non-cardio pulmonary surgery including gross's well technique and controlled cross circulation
6	Monitoring and instrumentation Concepts of monitoring- instrumentation technology of ECG machine, pressure transducers, syringe and peristaltic pumps, monitors, pulse oximeters, temperature probes and thermo regulatory monitoring, defibrillators and fibrillators, Piped and non- piped gas delivery systems and connections. Basic physics related to medically used gases.
7	Haemodynamic monitoring
8	Haemostatic monitoring
9	Haemotologic monitoring
10	Maintenance of oxygen, carbon dioxide and acid base status and their Monitoring
11	Neurological monitoring (SSPE, EEG and cerebral function monitor)
12	Aspetic technique

Applied Perfusion Technology

Sr. No.	Topics Theory and practical
1	Introduction to extra-corporeal circulation.
2	Introduction to instruments used in extra-corporeal circulation.
3	Demonstration of instruments used in extra-corporeal circulation.
4	Physiology of extra-corporeal circulation Materials used in extracorporeal circuit
5	Principles of extracorporeal gas exchange.
6	Various types of oxygenators Bubble oxygenators Rotating spiral / cylinder / disc oxygenators Membrane oxygenators.
7	Theory of blood pump, ideal blood pump, pulsatile versus non- pulsatile flow, occlusive and non-occlusive pumps, various types of pumps – roller, bellow, sigmamotor, diaphragm, ventricular and centrifugal pumps.
8	Element of extracorporeal circulation / hazards of: a. Blood Failure b. Bubble trap c. Flow Meters d. Temperatures e. Heat exchanger f. Regulating devices
9	Connection of the vascular system with extracorporeal circulation: a) Arterial and venous cannulae, connection tubes and connectors vents, suckers, cardioplegia delivery system, venous drainage.
10	Haemodynamics of arterial return, venous drainage, cardioplegia delivery and venting.
11	Blood grouping, handling of blood products and their management blood components and their use.
12	Calculations a. Body Surface Area b. Flows c. Circulating Hb d. Oncotic Pressure e. Sheep Flow
13	Correction Formulas a. Electrolyte b. Gases

C) Paper– III

Basic Sciences and Microbiology

Sr. No.	Topics Theory and practical
	Section A
1	Introduction to Perfusion technology
2	Role and responsibilities of Perfusion Technician
3	General precautions in laboratory
4	Laboratory safety measures
5	Methods of collection of biological specimens
6	Preservation and disposal of biological specimens
7	Modes of transmission of diseases
8	Control and prevention of infections
	Section B
9	Medical ethics & the relevant medico legal aspects
10	Medico legal aspects & its relation to consumer protection act
11	Basics of Medical Statistics
12	Common statistical terms, Mean & SD.
13	Basics of computer application
14	Biomedical waste & its management
15	Electricity & Electro medical equipments & safe guards
16	Basics of electricity & functioning of electro medical equipments. Earthing & Care of apparatus. Static electricity.
17	Basic Principles of blood transfusion & Fluid therapy
18	Sterilization

- **Introduction to Medical Microbiology**: definition History Host-Microbe relationship,
- **Microscopy**: - introduction and history. types of microscopes

  (a)Light microscope

  (b) Dark ground Microscope

  (c)Fluorescent Microscope

  (d) Phase contrast Microscope

  (e) Electron microscope:

  - Principles and operational mechanisms of various types of microscopes

- **Sterilization**: Definition Types and principle of sterilization methods
- **Physical methods**- (a) Heat (dry heat, moist heat with special Reference to autoclave.

their care and maintenance.) (b) Radiation (c) Filtration, Efficiency testing to various sterilizers.

- **Chemical methods**
- **Antiseptics and disinfectants**: Definition, Types and properties. Mode of action- Uses of various disinfectants, Precautions while using the disinfectants Qualities of a good disinfectant, In-house preparation of alcoholic hand/skin disinfectants. Testing efficiency of various disinfectants
- Antibiotics and drug resistance
- Classification of Microbes
- Bacterial Ceil Growth and Nutrition
- Overview and mechanisms of Bacterial gene transfer.
- Ubiquity of microbes.

III) Third year (Semester V and VI)

3rd Year : Assessment System & Syllabus

Sr. No	Paper	Subject	Theory			Practical			Total Marks
			IA	Final	Total	IA	Final	Total	
1	Paper – I	Applied Perfusion Technology - I	30	60	90	30	80	110	200
2	Paper – II	Applied Perfusion Technology - II	30	60	90	30	80	110	200
3	Paper – III	Recent Advances – III	30	60	90	30	80	110	200

A) Paper – I
Applied Perfusion Technology-I

Sr. No.	Topics Theory and practical
1	Pharmacokinetics and pharmacodynamics of the drugs used in cardiopulmonary by pass
2	Physiology of pulsatile perfusion technology
3	Principles and methodology of cardiopulmonary bypass
4	Oxyginators : general considerations and principles
5	Heat exchangers : general considerations and principles and complications
6	Priming fluids:its principles and hemodilution
7	Blood cells trauma
8	Anticoagulation in bypass : its monitoring and complications

B) Paper – II

Applied Perfusion Technology-II

Sr. No.	Topics Theory and practical
1	Inflammatory response to cardiopulmonary bypass
2	Blood conservations and dialysis during cardiopulmonary bypass
3	Micro pore filters
4	Perfusion as a method of cardiopulmonary bypass
5	Complications and its management during cardiopulmonary bypass
6	Perfusionist in minimal invasive surgery

C) Paper – III Recent Advances

Sr. No.	Topics Theory and practical
1	Recent advances in perfusion technology
2	Cardiopulmonary resuscitation
3	Pediatric cardiac surgery*

* It is a highly skilled work and required advanced and elaborate training to be a paediatric perfusion technician

List of Suggested Books for reading

Subject / Topic	Author/ Editor
Anatomy	BD Chaurasia
Physiology	Chandhary
Biochemistry	Satyanarayana
Pathology	Hash Mohan
Phamacology	Tripathi
Microbiology	Anatnarayan
Perfusion technology	Gravlee Marce
Perfusion technology	Christina Vora
Bypass technology	Charles Reed
Management of Adult Cardiac Surgery	Bojar

Here will be University examination of 200 marks after each term.

- Theory ---100 marks.
- Practical's-- 100 marks..

Total : 200 marks

Internal assessment examination will be converted to of 20 marks theory and 20 marks practical and will be added in End semester examination.

End semester examination:

Question Paper Pattern:

Theory: 80 Marks
Answer all the questions.

I. Multiple Choice Question (MCQ) = 20 X 20 = 20
II. Essay question : 20 x1 =20
III. Long Answers(Answer 2 out of 3) = 2 X 10 = 20
IV. Short Answers (Answers 4 out of 6) = 4 x 5 = 20

Total = 80 Marks

Practical:

Oral Examination: 30 Marks

Practical Examination 50 Marks

Total Marks : 80.

Total exam marks for end semester are 100 marks theory and 100 marks practical.

1. Promotion and award ofgrades

A student shall be declared PASS and eligible for getting he/she secures at least 50% marks in that particular course including internal assessment..

2. Carry forward of marks

In case a student fails to secure the minimum 50% in any Theory or Practical course as specified ,then he/she shall reappear for the end semester examination of that course. However his/her marks of the Internal Assessment shall be carried over and he/she shall be entitled for grade obtained by him/her on passing.

3. Improvement of internal assessment

A student shall have the opportunity to improve his/her performance only once in the Sessional exam component of the internal assessment. The re-conduct of the Sessional exam shall be completed before the commencement of next end semester theory examinations.

Grading of performances

Letter grades and grade points allocations:

Based on the performances, each student shall be awarded a final letter grade at the end of the semester for each course. The letter grades and their corresponding grade points are given in table I

Table –I Letter grades and grade points equivalent to Percentage of marks and performances

Percentage of Marks Obtained	Letter Grade	Grade Point	Performance
90.00 – 100	O	10	Outstanding
80.00 – 89.99	A	9	Excellent
70.00 – 79.99	B	8	Good
60.00 – 69.99	C	7	Fair
50.00 – 59.99	D	6	Average
Less than 50	F	0	Fail
Absent	AB	0	Fail

A learner who remains absent for any end semester examination shall be assigned a letter grade of AB and a corresponding grade point of zero. He/she should reappear for the said evaluation/examination in due course.

17. The Semester grade point average (SGPA)

The performance of a student in a semester is indicated by a number called 'Semester Grade Point Average' (SGPA). The SGPA is the weighted average of the grade points obtained in all the courses by the student during the semester. For example, if a student takes five courses(Theory/Practical) in a semester with credits C1, C2, C3, C4 and C5 and the student's grade points in these courses are G1, G2, G3, G4 and G5, respectively, and then students' SGPA is equal to:

$$SGPA = \frac{C1G1 + C2G2 + C3G3 + C4G4 + C5G5}{C1 + C2 + C3 + C4 + C5}$$

The SGPA is calculated to two decimal points. It should be noted that, the SGPA for any semester shall take into consideration the F and ABS grade awarded in that semester. For example if a learner has a F or ABS grade in course 4, the SGPA shall then be computed as:

$$\mathbf{SGPA} = \frac{C_1G_1 + C_2G_2 + C_3G_3 + C_4 * \text{ZERO} + C_5G_5}{\mathbf{C_1 + C_2 + C_3 + C_4 + C_5}}$$

Cumulative Grade Point Average(CGPA)

The CGPA is calculated with the SGPA of all the VIII semesters to two decimal points and is indicated in final grade report card/final transcript showing the grades of all VIII semesters and their courses. The CGPA shall reflect the failed status in case of F grade(s),till the course(s) is/are passed. When the course(s)is/are passed by obtaining a pass grade on subsequent examination(s) the CGPA shall only reflect the new grade and not the fail grades earned earlier. The CGPA is calculated as:

$$CGPA = \frac{C1S1 + C2S2 + C3S3 + C4S4 + C5S5 + C6S6 + C7S7 + C8S8}{C1 + C2 + C3 + C4 + C5 + C6 + C7 + C8}$$

where C_1, C_2, $C_{3,\ldots}$ is the total number of credits for semester I,II,III,…. and S_1,S_2, $S_{3,\ldots}$is the SGPA of semester I,II,III,…. .

18. Declaration of class

The class shall be awarded on the basis of CGPA as follows:

First Class with Distinction= CGPA of. 7.50 and above

First Class= CGPA of 6.00 to7.49

Second Class= CGPA of 5.00 to5.99

19. Award of Ranks

Ranks and Medals shall be awarded on the basis of final CGPA.

20. Award of degree

Candidates who fulfill the requirements mentioned above shall be eligible for award of degree during the ensuing convocation.

Final Mark list Of University Examination

Sr.No.	Semester	Internal Assessment		End Semester Examination		Total	
		Theory 20 marks	Practical 20 marks	Theory 80 marks	Practical 80 marks	Theory 100 marks	Practical 100 marks
1	**Semester I**						
2	**Semester II**						
3	**Semester III**						
4	**Semester IV**						
5	**Semester V**						
6	**Semester VI**						

CBSC FOR B.Sc. Perfusion Technology

Program: B.Sc. Perfusion Technology **Department: KIMS** **Subject: B. Sc Perfusion Technology** **Scheme: CBCS**

Subject		Sem-I			Sem-II			Sem-III			Sem-IV			Sem-V			Sem-VI			Total		
		T	P	Total	T	P	Total	T	P	Total	T	P	Total	T	P	Total	T	P	Total	T	P	Total
Core-I	Hr	75	60	135	45	60	105	75	90	165	45	60	105	75	90	165	45	60	105	**360**	**420**	**780**
	Cr	5	2	7	3	2	5	5	3	8	3	2	5	5	3	8	3	2	5	**24**	**14**	**38**
Core-II	Hr	60	90	150	60	90	150	75	120	195	60	90	150	75	120	195	60	90	150	**390**	**600**	**990**
	Cr	4	3	7	4	3	7	5	4	9	4	3	7	5	4	9	4	3	7	**26**	**20**	**46**
Core-III	Hr	60	60	120	60	60	120	75	90	165	60	60	120	75	90	165	60	60	120	**390**	**420**	**810**
	Cr	4	2	6	4	2	6	5	3	8	4	2	6	5	3	8	4	2	6	**26**	**14**	**40**
Elective DSE/ AEC	Hr	-	-	-	60	90	150	-	-	-	60	90	150	-	-	-	60	120	180	**180**	**300**	**480**
	Cr	-	-	-	4	3	7	-	-	-	4	3	7	-	-	-	4	4	8	**12**	**10**	**22**
Generic Elective	Hr	30	90	120	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	**30**	**90**	**120**
	Cr	2	3	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	**2**	**3**	**5**
Grand Total	**Hr**	**225**	**300**	**525**	**225**	**300**	**525**	**225**	**300**	**525**	**225**	**300**	**525**	**225**	**300**	**525**	**225**	**330**	**555**	**1350**	**1830**	**3180**
	Cr	**15**	**10**	**25**	**15**	**10**	**25**	**15**	**10**	**25**	**15**	**10**	**25**	**15**	**10**	**25**	**15**	**11**	**26**	**90**	**61**	**151**

Generic Elective – Any One

1. Bioethics.
2. Biosafety

Discipline Specific Elective – Any One

Semester II- 1. Posting to the Pharmacology 2. Posting in to Microbiology

Semester IV- 1. Posting to the Physiology 2. Posting in to Pathology

Semester VI- 1. Posting in to Medicine 2. Posting in to Surgery