MGM INSTITUTE OF HEALTH SCIENCES

(Deemed to be University u/s 3 of UGC Act, 1956)
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Curriculum for

B.Sc. Perfusion Technology

Amended upto BOM -55/2018, Dated 27/11/2018

Amended History

1. Approved as per BOM - 23/2012, Item No. 4, Dated 30/3/2012.
2. As Amended in BOM - 43/2015 [Resolution No. 3.3(d)], Dated 06/11/2015.
3. As Amended in BOM - 48/2017 [Resolution No.5.11], Dated 24/01/2017.
4. As Amended in BOM -51/2017, [Resolution No.1.3.14.3], [Resolution No.1.3.14.4] Dated 28/08/2017.
5. As Amended in BOM -55/2018, [Resolution No. 4.13], Dated 27/11/2018.

Curriculum for

B.Sc. (Perfusion Technology)

IN PURSUIT OF EXCELLENCE

MGM INSTITUTE OF HEALTH SCIENCES

(Deemed University Established u/s 3 of UGC Act,1956)

Navi Mumbai-410 209

www.mgmuhs.com

OUTLINE OF COURSE CURRICULUM

B.Sc. (Perfusion Technology)

1. Subject and hours of teaching for Theory and Practical: The number of hours of teaching theory and practical, subject wise in first year, second year and third year are given below.

2. Main and Subsidiary subjects are common in first year for all the B.Sc. courses.

First Year

Main Subjects (First Year)

Sr no	Paper	Subjects	Teaching hours			University examination marks(Only Theory)	Internal assessment marks	Total marks
			Theory	Pracs.	Total			
1	Paper I	Anatomy	35 hrs	25 hrs	60 hrs	80 marks	20 marks	100 marks
2.	Paper II					80 marks ↓	20 marks ↓	100 marks
	Section A	Physiology	45 hrs	15 hrs	60 hrs.	40 marks	10 marks	
	Section B	Biochemistry	40 hrs	20 hrs	60 hrs.	40 marks	10 marks	
3	Paper III					80 marks ↓	20 marks ↓	100 marks
	Section A	Pathology	42 hrs	18 hrs	60 hrs.	40 marks	10 marks	
	Section B	Microbiology	48 hrs	12 hrs	60 hrs	40 marks	10 marks	
Total:-								300 marks

Subsidiary subject(First Year)

Sr. no.	Subjects	Teaching hours			University examination Marks	Internal assessment marks	Total marks
		Theory	Pracs	Total			
1	*English	60 hrs	-	60 hrs	-	-	-

- **No Practical examination in any subject in I year.**
- **The candidates are required to get acquainted with English subject, but there will be no university examination. The colleges are required to conduct examination and maintain records.**

Second Year

Main Subjects(Second Year)

Sr no	Paper	Subjects	Teaching hours			University examination (Theory)	University examination (Prac.)	Internal assessment marks	Total marks
			Theory	Pracs	Total				
1	Paper I	Applied Pharmacology	31 hrs	6 hrs	37 hrs	80 marks	-	20(T) marks	100 marks
1	Paper II	Applied Anatomy	40 hrs	15 hrs	55 hrs	80 marks	40 marks (30Prac+ 10Viva)	30 marks 20(T)+ 10(P)	150 marks
2.	Paper III	Applied Physiology & Biochemistry	50 hrs	25 hrs	75 hrs	80 marks	40 marks (30Prac+ 10Viva)	30 marks 20(T)+ 10(P)	150 marks
4	Paper IV	Perfusion Technology- Part I	100 hrs	100 hrs	200 hrs	80 marks	40 marks (30Prac+ 10Viva)	30 marks 20(T)+ 10(P)	150 marks
Total:-									600 marks

Subsidiary Subjects(Second Year)

Sr. no.	Subjects	Teaching hours			University examination Marks	Internal assessment marks	Total marks
		Theory	Pracs	Total			
1	*Research & Biostatistics	20	-	20 hrs	-	-	-
2	*Computer application & Database Management	20	-	20 hrs	-	-	-

* Students will undergo clinical posting in relevant department for hands on training and should maintain log book to be certified by the faculty.

* Subsidiary Subjects - University examinations will not be conducted for these subjects.

Third Year

Main Subjects(Third Year)

Sr. no	Paper	Subjects	Teaching hours			University examination Theory)	University examination (Prac.)	Internal assessment marks	To ma
			Theory	Pracs	Total				
1	Paper I	Perfusion Technology-Clinical	50 hrs	50 hrs	100 hrs	80 marks	40 marks (30Prac+ 10Viva)	30 marks 20(T)+ 10(P)	150 ma
2.	Paper II	Perfusion Technology-Applied	50 hrs	50 hrs	100 hrs	80 marks	40 marks (30Prac+ 10Viva)	30 marks 20(T)+ 10(P)	150 ma
3	Paper III	Perfusion Technology-Advanced	50 hrs	50 hrs	100 hrs	80 marks	40 marks (30Prac+ 10Viva)	30 marks 20(T)+ 10(P)	150 ma
Total:-									45(ma

First Year Common Syllabus

B.Sc. (Perfusion Technology)

Paper-I

Anatomy

Placement:-First Year

Theory-35 Hours
Practical-25 Hours

Course description

Unit	Syllabus	Lecture (Hrs)	Demo (Hrs)
1	Introduction to Anatomy • Terminology	1	1
2	Skeletal System • Classification of bones • Parts of developing long bone • Classification of joints • Appendicular skeleton • Axial skeleton	 1 1 1 1	 1 1 1 1
3	Muscular system • Types • Muscle groups and movements • Upper limb, lower limb • Neck, back, abdomen	 1 1	 1 1 1
4	Joints • Shoulder • Hip • Knee • Movements and muscle groups producing movements at other joints	 1 1 1 1	 1 1 1 1
5	Respiratory system • Nose • Bronchial tree • Thoracic cage and diaphragm • Lung , Bronchopulmonary segments • Mediastinum	 1 1 1	 1 1 1 1
6	Circulatory system • Types of blood vessels • Heart • Circulation- Systemic and Pulmonary	 1 1 1	 1

	• Major branches from Arch of Aorta • Major Veins	1	1
7	Digestive system • Mouth, Tongue, • Pharynx, Oesophagus, • Salivary glands • Stomach, Small and Large Intestine • Liver, Spleen, Pancreas, Gall Bladder	 1 1 1 1	 ½ ½ 1 2
8	Excretory system • Kidney, Ureter • Bladder, Urethra • Skin	 1 1 1	 1 1
9	Reproductive system • Male- Testis, Spermatic Cord • Female- Ovaries, FT, Uterus	 1 1	 ½ ½
10	Lymphatic system • Tonsil • Lymph node groups- Cervical, Axillary, Inguinal	 1 1	
11	Endocrine system • Thyroid, Parathyroid • Adrenal, Pitutary	 1 1	
12	Nervous system • Neuron • Parts of nervous system • Brain, spinal cord, brain stem • Cranial and peripheral nerves	 1 1 1	
13	Sensory system • Eye and Ear	 1	
	Total Hours = 60 hrs.	**35 hrs**	**25 hrs**

First Year

Paper-II
Section-A
PHYSIOLOGY

Placement:-First Year

Theory-45 Hours
Practical-15 Hours

Theory:-

Blood:

Composition, properties and functions of Blood.
Haemopoiesis
Haemogram (RBC, WBC, Platelet count, Hb Concentrations)
Blood Groups - ABO and RH grouping
Coagulations & Anticoagulants
Anaemias: Causes, effects & treatment.
Body Fluid: Compartments, Composition.
Immunity – Lymphoid tissue

5 Hrs

Cardio vascular system

Functions of Cardiovascular System
Structures of CVS & Functions.
Functional Anatomy of Heart & their functions, Cardiac cycle.
Junctional tissues of heart & their functions.
Cardiac output
E C G Blood pressure Heart Rate.

7 Hrs

Digestive system

Functions of Digestive system.
Functional Anatomy of Digestive System
Composition and functions of all Digestive juices.
Movements of Digestive System (Intestine).
Digestion & Absorption of Carbohydrate, Proteins & Fats.

4 Hrs

Respiratory System

Functions of Respiratory system
Functional (Physiological) Anatomy of Respiratory System.
Mechanism of respiration.

5 Hrs

Lung Volumes & capacities.
Transport of Respiratory Gases.
Regulation of Respiration

Nervous system
Functions of Nervous system.
Neuron – Conduction of Impulses, factors affecting. 9 Hrs
Synapse- transmission.
Receptors Reflexes
Ascending tracts
Desending tracts.
Functions of various parts of the Brain.
Cerebro Spinal Fluid (CSF): Composition , functions & Circulation.
Lumbar Puncture.
Autonomic Nervous System (ANS): Functions.

Special senses
Vision. Structure of Eye, functions of different parts.
Refractive errors of Eye and correction.
Visual Pathway.
Colour vision & tests for colour Blindness.
Hearing: Structure and function of ear. 3 Hrs
mechanism of Hearing.
Tests for Hearing (Deafness)

Muscle nerve physiology
Types of Muscle.
Structure of skeletal Muscle, sarcomere.
Neuromuscular junction& Transmission. 3 Hrs
Excitation & contraction coupling(Mechanism of contraction)

SKIN
Structure and function.
Body temperature. 1 Hrs
Fever.
Regulation of Temperature

Excretory System
Excretory organs
Kidneys: Functions.
Nephron, 4 Hrs
Juxta Glomerular Apparatus
Renal circulation.
Mechanism of Urine formation
Mechanism of Urine Formation.

Micturition., Cystomatrogram.
Diuretics.
Artificial Kidney.

Reproductive systems
Structure & Functions of Reproductive system.
Male Reproductive System:spermatogenesis, Testosterone.
Female reproductive system: Ovulation, Menstrual cycle.
Ogenesis, Tests for Ovulation
Oestrogen & Progesterone9 4 Hrs
Pregnancy test
Parturition. Contraceptives.
Lactation : Composition of Milk
Advantages of breast Feeding.

PRACTICALS

15 hours

Study of Microscope and its use	
Collection of Blood and study of Haemocytometer	1 Hrs
Haemoglobinometry	2 Hrs
White Blood Cell count	2 Hrs
Red Blood Cell count	2 Hrs
Determination of Blood Groups	1 Hrs
Leishman's staining and Differential WBC Count	2 Hrs
Determination of Bleeding Time. {	1 Hrs
Determination of Clotting Time.	
Pulse & Blood Pressure Recording	2 Hrs
Auscultation for Heart Sounds	
Artificial Respiration –Demonstration	
Spirometry-Demonstration	2 Hrs

First Year

Paper-II

Section-B

BIOCHEMISTRY

Placement:-First Year

Theory-40 Hours
Practical-20 Hours

No.	Syllabus	Lect. Hrs.
1	Introduction and scope of biochemistry	1
2	**Chemistry of carbohydrates, proteins, lipids and nucleic acid** I)Carbohydrates : Structure, properties, chemical reactions and functions. Amino acid : Essential and nonessential amino acids with structure and function. iii) Proteins: Definition, Classification, Structure of Proteins, Denaturation of Proteins, Primary, Secondary Tertiary and Quaternary (overview) iv) Lipids: Classification and properties. Introduction, Simple Lipids, Compound Lipids, Derived Lipids, Essential Fatty Acids. v) Nucleic acid : Structure of purine and pyrimidine bases, nucleotides and nucleosides. DNA and RNA : structure and properties.	2 1 2 2
3	Elementary knowledge of enzymes: Classification, mechanism of enzyme action, Enzyme inhibition, enzyme specificity. Role of coenzymes	3
4	Brief concept of biological oxidation: Electron transport chain. inhibitors and uncouplers briefly.	2
5	Outline of digestion, absorption and metabolism of carbohydrate, proteins and fats. i)Carbohydrate metabolism:-Glycolysis, TCA cycle, Glycogen metabolism Regulation of blood Glucose Concentration, Diabetes Mellitus, Glycosuria. ii) Proteins: General amino acid reactions. Transamination, decarboxylation, deamination. Urea cycle. iii) Lipid metabolism: Cholesterol metabolism, Ketone bodies formation and breakdown iv) Nucleic acid metabolism : Purine catabolism	2 3 2 2 1
6	Importance of some minerals- sodium, potassium, calcium, phosphorous, iron, copper, chloride, fluoride.	2
7	Nutritional aspects of carbohydrates, fats, proteins, balanced diet.	1

8	Introduction to medical lab technology: General introduction Role of medical lab technologists, and responsibility, safety measures and first aid. Cleaning and care of general laboratory glassware and equipment. Elementary knowledge of analytical biochemistry. Principles, functions and uses of balances, centrifuge machines, colorimeters.	4
9	Collection and recording of biological specimens, separation of serum plasma preservation and disposal of biological samples/materials.	2
10	Standard solutions: Various std. solutions used , their preparation ; storage of chemicals .	2
11	Units of measurements: S.I units: Definitions, conversions; Measurement of volume : Strength , Normality ,Molarity, Molality Definitions:Mole, molar and normal solutions (preparation, Standardization), pH (Definition ,Pka value, Example, importance of Henderson-Hasselbalch equation); Buffer solutions(Definition, preparation of important solutions), pH indicators (pH papers, universal & other indicators); pH measurement :different methods (pH paper, pH meter, principle of pH meter, structure, working and maintenance.	4
	Practical and demonstration: Cleaning of glassware Preparation of various solutions Maintenance of laboratory, quality control, and first aid Single pan balance, pH- meter Handling of colorimeters Operation and maintenance Distillation of water. Serum electrolytes Na.K.Cl. Demonstration of semi automated / fully automated blood analyzers. Blood gas analyzer, Elisa reader. Demonstration of disposal of laboratory waste product and infected material. Quality Control Five demonstrations on carbohydrate, lipid & Protein metabolism & immunochemistry	20
	Total Theory & Practical hrs.	**60 hrs.**

First Year

Paper-III
Section-A

PATHOLOGY

Placement:-First Year

Theory-42 Hours
Practical-18 Hours

Sr. No.	Topic	No. of lectures	Number of Practical	Tot
1	Introduction to Pathology	01	--	01
2	Working and maintenance of instruments	02	03	05
3	General principles of Histopathology techniques collection, fixation, processing & routine staining	05	03	08
4	General principles of Cytopathology techniques collection, fixation, processing & routine staining	05	02	07
5	General principles of Haematology techniques collection, fixation, processing, routine staining, Haemoglobin, TLC, DLC, Peripheral smear, automatic cell counter	05	03	08
6	General principles of Clinical Pathology techniques sample collection, processing for routine test, normal urine & urine examination	05	03	08
7	General principles of Blood Bank techniques antigen, antibody, ABO & Rh system	05	03	08
8	General principles of Autopsy & Museum	02	01	03
9	General Pathology including introduction to inflammation, circulatory disturbances & neoplasia	05	--	05
10	Systemic pathology basis and morphology of common disorders like anemia, leukemia, AIDS, TB, Hepatitis & malaria	05	--	05
11	Maintenance and medico legal importance of records and specimens	02	--	02
	Total	**42+18**		**60 hr**

First Year

Paper-III
Section-B

Microbiology

Placement:-First Year

Theory-48 Hours
Practical-12 Hours

Unit	Syllabus	Lecture (Hrs)	Demo (Hrs)
1	Concepts and Principles of Microbiology		
	• Historical Perspective, Koch's Postulates	1	
	• Importance of Microbiology	1	
	•Microscopy	1	
	•Classification of Microbes	1	
2	General Characters of Microbes		
	• Morphology, staining methods	1	1
	•Bacterial growth & nutrition	1	
	•Culture media and culture methods +ABS	2	1
	• Collection of specimen, transport and processing		1
	•Antimicrobial mechanism and action	1	
3	Sterilization and Disinfection		
	•Concept of sterilization, Disinfection asepsis	1	
	• Physical methods of Sterilization	1	
	• Chemical methods (Disinfection)	1	1
	• OT Sterlization	1	
	•Biological waste disposal	1	
4	Infection and Infection Control		
	• Infection, Sources, portal of entry and exit	1	
	• Standard (Universal) safety Precautions	1	
	• Hospital acquired infections	1	
	• Hospital Infection control Programme	1	
5	Immunity		
	• Types Classification	1	
	• Antigen, Antibody – Definition and types	1	1
	• Ag-Ab reactions – Types and examples	1	
	• Hypersensitivity - Definition and classification	1	
	• Immunoprophylaris – Types of vaccines, cold chain	1	
	• Immunization Schedule	1	

6	Systemic Bacteriology (Morphology, diseases caused, specimen collection & lists of laboratory tests) • Introduction • Gram Positive Cocci • Gram Negative Cocci • Enterobacteraecea • Imp Gram Negative-Organism • Mycobacteria • Anaerobic bacteria •Spirochaetes • Zoonotic diseases	1 1 1 1 1 1 1 1 1 1	 1 1 1
7	Mycology •Introduction, Classification, outline of lab diagnosis List of Fungi causing: • Superficial Mycoses • Deep mycoses • opportunistic fungi	1 1 1 1	1
8	Virology • Introduction, General Properties, outline of lab diagnosis • DNA & RNA Viruses-Classification, diseases caused • HIV Virus • Hepatitis Virus	1 1 1 1	1
9	Parasitology – morphology, life cycle & outline of lab diagnosis • Introduction, Classification • Protozoa- E. histolytica • Malarial Parasite General properties, classification, list of diseases caused by: • Cestodes and Trematodes • Intestinal Nematodes • Tissue Nematodes • Vectors	1 1 1 1 1 1 1 	1 1
Total:-60 hrs.		**48 hrs**	**12 hrs**

First Year

Subsidiary Subjects

ENGLISH

Placement:-First Year Theory-60 Hours

Course description : The course is designed to enable students to enhance ability to comprehend spoken and written English (and use English) required for effective communication in their professional work. Students will practice their skills in verbal and written English during clinical and classroom experience.

Specific objectives: At the end of the course the students are able to:

1) Develop good vocabulary skills for effective communication.
2) Effectively communicates with patients while rendering care.
3) Understands methods of writing and drafting letters in English.
4) Develop ability to read understand and express meaningfully, the prescribed text.
5) Plans and writes nursing process and records effectively.
6) Develops skills in listening.

Unit	Hours	Theory	Hours	Exercises
I	7 Hrs	□ Review of Grammer □ Remedial study of grammer □ Building Vocabulary □ Lexical sets	3 Hrs	• Use of Dictionary and Grammer • Practice appropriate words and expression • Revising parts of speech Pairs of confused words, synonyms & Antonyms • Lexical sets & collocations

				• Using appropriate words and expressions.
II	20 Hrs	☐ Read and comprehend prescribed course books ☐ Skimming & Scanning ☐ Reading in sense groups ☐ Reading between the lines	07 Hrs	• Reading • Summarizing • Comprehension
III	5 Hrs	☐ Various forms of composition Letter writing ☐ Note making & Note takings ☐ Precis writings ☐ Anecdotal records ☐ Diary writing ☐ Reports on health problem ☐ Resume/CV ☐ Notices, Agenda,minutes ☐ Telegram ☐ Essay	5 Hrs	• Letter writing • Note making & Note takings • Precis writings • Anecdotal records • Diary writing • Reports on health problem • Resume/CV • Notices, Agenda, minutes, telegram, essay • Discussion on written reports/documents
IV	3 Hrs	☐ Spoken English Phonetics, **Public speaking** ☐ Oral report ☐ Group Discussion Debate ☐ Telephonic Conversation Conversational skills	3 Hrs	• Debate • Participating in Seminar, Panel discussion, Symposium • Telephonic Conversion Conversation in different situations,

		(Formal, Neutral & informal situation)		• Practice in public speaking
V	5 Hrs	□ Listening Comprehension Media, audio, video, speeches etc.	2 Hrs	• Listening to audio, video tapes and identify the key points, accent & information pattern.

Bibliography:

1. Living English Grammer & Composition Tickoo M.L. & Subramaniam A. E, Oriental Longman, New Delhi.
2. English for practical purposes Valke, Thorat patil & Merchant, Macmillan Publication, New Delhi.
3. Enriching your competence in English, by Thorat, Valke, Orient Publication, Pune
4. English Grammer & Composition Wren & Martin, S. Chand Publications-2005, Delhi.
5. Selva Rose, Carrier English for Nurses, Ist edition-1999, published by Orient Longman Pvt. Ltd.-1997, Chennai.

Common exam pattern for all 1st year B.Sc. courses.

Main Subjects:

Paper I: Anatomy

Theory pattern: University Examination

Time: Duration: 3hrs.

Total Marks: 80 marks.

Distribution of Marks.

Question type	No. of questions	Questions to be answered	Question X marks	Total marks
Long essays	3	2	2x10 mks	20 marks
Short essays	8	6	6x 5 mks	30 marks
Short answers	12	10	10x 3 mks	30 marks
				Total= 80 marks

Paper II: Physiology (Section A) and Biochemistry (Section B)

Theory pattern:

Time: Duration: 3hrs.

Total Marks: 80marks.(Section A: 40 marks + Section B: 40 marks)

Distribution of marks

Paper II, Section A: Physiology.

Question type	No. of questions	Questions to be answered	Question X marks	Marks
Long essays	2	1	1x10 mks	10 marks
Short essays	5	3	3 x 5 mks	15 marks
Short answers	7	5	5x 3 mks	15 marks
				Total= 40 marks

Paper II, Section B: Biochemistry.

Question type	No. of questions	Questions to be answered	Question X marks	Marks
Long essays	2	1	1x10 mks	10 marks
Short essays	5	3	3 x 5 mks	15 marks
Short answers	7	5	5x 3 mks	15 marks
				Total= 40 marks

Paper III: Pathology (Section A) and Microbiology(Section B)

Theory pattern.

Time: Duration: 3hrs.

Total Marks: 80 marks: (Section A: 40 marks + Section B: 40 marks)

Distribution of marks

Paper III, Section A: Pathology

Question type	No. of questions	Questions to be answered	Question X marks	Marks
Long essays	2	1	1x10 mks	10 marks
Short essays	5	3	3 x 5 mks	15 marks
Short answers	7	5	5x 3 mks	15 marks
				Total= 40 marks

Paper III, Section B: Microbiology

Question type	No. of questions	Questions to be answered	Question X marks	Marks
Long essays	2	1	1x10 mks	10 marks
Short essays	5	3	3 x 5 mks	15 marks
Short answers	7	5	5x 3 mks	15 marks
				Total= 40 marks

Second Year

II Year (Perfusion Technology)

Main Subjects

Paper I

Applied Pharmacology

Placement: Second Year

Theory= 31 Hours
Practical=6 Hours

(Mode of action, adverse effects, dose, route of administration and uses of the drugs under the following systems)

1. **General Pharmacology: (2 hrs)**
   a. Pharmacokinetics
   b. Pharmacodynamics

2. **Cardiovascular System: (5 hrs)**
   a. Antianginal
   b. Diuretics
   c. Drugs for CCF
   d. Antihypertensives
   e. Shock

3. **Central Nervous System: (5 hrs)**
   a. Sedatives and Hypnotics
   b. General anaesthetics
   c. Local anaesthetics
   d. NSAIDS
   e. Opioids

4. **Endocrine System: (3 hrs)**
    a. Insulin and Oral Hypoglycemic agents
    b. Corticosteriods

5. **Chemotherapy : (5 hrs)**
    a. Penicillins
    b. Cephalosporins
    c. Aminoglycosides
    d. Tertracycline
    e. Chloramphenicol
    f. Antitubercular agents

6. **Respiratory System: (2 hrs)**
    a. Mucokinetics & Mucolytics
    b. Antiasthmatic agents

7. **Gastrointestinal System (2 hrs)**
    a. Drugs for peptic ulcer
    b. Antiemetics

8. **Blood : (2 hrs)**
    a. Anticoagulants
    b. Thrombolytics
    c. Antiplatelet

9. **Miscellaneous: (5 hrs)**
    a. Neuromuscular blockers
    b. Antihistaminics
    c. IV fluids
    d. Electrolyte supplements
    e. Cardioplegic drugs
    f. New drugs in Perfusion Technology

Practicals: (6 hrs)

- Experimental Pharmacology
- Prescription Writing
- Different formulations
- Routes of Drug Administration-Oral
- Routes of Drug Administration-Parenteral
- Routes of Drug Administration-Topical

Second Year

Paper II

Applied Anatomy

Placement: Second Year

Theory= 40 Hours
Practical=15 Hours

Theory Classes

1. Cardiovascular System
   - Embryology of Heart
   - Gross structure of Heart chambers & valves
   - Conduction system of Heart
   - Anatomy of coronary arteries, and veins
   - Anatomy of aorta, SVC, IVC. Pulmonary arteries & pulmonary veins
   - Histology of heart muscle
2. Respiratory system
   - Anatomy of Upper Respiratory Tract (Nose, Nasopharynx, Oropharynx, Larynx, Trachea, Bronchi)
   - Anatomy of Lungs
   - Diaphragm
   - Anatomy of thorax
   - Histology of Lungs
3. Renal System
   - Anatomy of kidneys, ureters Bladder and urethra.
   - Histology of Kidneys.
4. Nervous System
   - General organization of Nervous System.
   - Anatomy of Brain
   - Anatomy of spinal cord
   - Blood supply & Brain & spinal cord

Second Year

Paper III

Applied Physiology & Biochemistry

Placement: Second Year

Theory=50 Hours
Practical= 25 Hours

1. Physiology of cardiovascular System
   - Mechanism of cardiac contraction
   - Cardiac cycle
   - Stroke volume & cardiac output
   - Regulatory mechanism of cardiac output,
   - Normal pressures in all chambers of the heart & great vessels, methods of measurement and description of wave forces of pressure tracings.
   - Physiology of coronary circulation & its autoregulation.
   - Cardiovascular responses to Exercise, Posture & Valsalva maneavre
   - Basics of Electrocardiogram (ECG)
   - Physiology of conduction system of Heart.
2. Respiratory System
   - Physiology of upper Respiratory Tract
   - Mechanics of Breathing
   - Alveolar Gas Exchange
   - Regulation of Respiration
   - Pulmonary Function Tests and their interpretation
   - Arterial Blood Gas analysis and its interpretation.
   - Brief concepts of Artificial Ventilation.
3. Hematology
   - Blood components, their normal values and functions.
   - Blood Groups
   - Physiology of coagulation
4. Renal System
   - Renal physiology – Introduction
   - Renal Circulation & Glomerular Filtration
   - Tubular Function
   - Renal Function tests.
5. Nervous System

- Functions of brain & spinal cord
- Physiological basis of consciousness & sleep
- Auto regulation of cerebral circulation
- Autonomic nervous system

6. Biochemistry
   - Collection of samples (blood, urine and other body fluids) for lab investigation
   - Principles of electrolyte estimation, and their normal values.
   - Principles of Arterial Blood Gas Analysis and their normal values.
   - Liver Function Tests
   - Renal Function Tests
   - Thyroid Profile
   - Cardiac Profile- Biochemical makers, basic principles & evaluation
   - Blood Lipid profile & its interpretation
   - Blood sugar profile and its interpretation

Second Year

Paper IV

Perfusion Technology –Part I

Placement: Second Year

Theory=100 Hours
Practical=100 Hours

1. Basics of Diagnostic Techniques in cardiovascular Diseases
   a. Chest X-ray
   - Normal x-ray chest (PA, AP, Lat views)
   - Identifications of some common conditions:
     Cardiomegaly
     Pneumothorax
     Pleural effusion
   b. ECG:
   - Identification of P,Q,R,S & T waves & PR, QT, ST segments in a normal ECG
   - Interpretation of abnormal ECG in following conditions
     • Myocardial ischaemia
     •Mycardial infarction
     •Atrial arrhythmias
     •Ventricular arrhythmias
     •Heart block
   c. Echocardiography:
     •Principles of TTE, TEE.
     •Intra operative TEE
   d. Angiography:
     • Technique
     •Coronary Angiography
     • Right & Left Heart catheterization
     •Basics of Angiographic anatomy of Heart (Chambers, valves, coronaries)
2. History of cardiac surgery

3. History of Perfusion Technology
4. Heart Lung Machine
5. Theory of Blood Pumps & various types of pumps used (Roller, centrifugal, pulsatile, nonpulsatile)
6. Physiology of Extra corporeal Circulation
7. Oxygenators used in perfusion and principles of extra corporeal gas exchange
8. Hazards of extracorporeal circulation
9. Various devices used in extra corporeal circulation (Filters, bubble traps, temperature probes, Heat exchangers, haemofilters etc)
10. Connection of vascular system with Extracorporeal circulation
11. Hemodynamic of Arterial flow, venous drainage, cardioplegia delivery, suction and ve
12. Principles of weaning the patient off CPB
13. Basic physics of Medical gases (oxygen, Carbon Dioxide)
14. Monitoring during CPB
    - Haemodynamic Monitoring
    - Haemostatic Monitoring
15. Handling & use of blood and Blood products
16. Drugs used during perfusion.
17. Principles of maintaining Asepsis during CPB
18. Principles of Myocardial Preservation during cardiac surgery
    - Cardioplegia
    - Hypothermia
19. Introduction to deep hypothermia and circulatory arrest.

Second Year

Subsidiary Subjects:-

1. RESEARCH AND BIO STATISTICS

Placement: Second Year Theory= 20 Hours

Course Description:

Introduction to basic statistical concepts: methods of statistical analysis; and Interpretation of data

Behavioural Objectives:

Understands Statistical terms.

Possesses knowledge and skill in the use of basic statistical and research methodology.

Unit- I: Introduction

Meaning, definition, characteristics of statistics.

Importance of the study of statistics.

Branches of statistics.

Statistics and health science including nursing. 2 hrs

Parameters and estimates.

Descriptive and inferential statistics.

Variables and their types.

Measurement scales.

Unit- II: Tabulation of Data

Raw data, the array, frequency distribution.

Stem-leaf display 2 hrs

Basics principles of graphical representation.

Types of diagrams- histograms, frequency polygons, smooth frequency polygon, commulative frequency curve, ogive.

Unit- III: Measure of Central Tendency

Need for measures of central tendency

Definition and calculation of mean- ungrouped and grouped.

Trimmed mean

Meaning, interpretation and calculation of median ungrouped and grouped.

Meaning and calculation of median ungrouped and grouped. 4 hrs.

Meaning and calculation of mode.
Comparison of the mean, mode & median.
Guidelines for the use of various measures of central tendency.

Unit- IV: Measure of Variability

Need for measure of dispersion.
The range, the average deviation. 4 hrs
The variance and standard deviation.
Calculation of variance and standard deviation ungrouped and grouped.
Properties and uses of variance and SD

Unit- V: Measures of Skewness & Kurtosis

Needs for measure of skewness & Kurtosis
Karl pearson's co-efficient of skewness 1 hrs
Types of Kurtosis

Unit- VI: Sampling Techniques

Need for sampling-Criteria for good samples
Application of sampling in Community. 6 hrs
Procedures of sampling and sampling designs errors.
The normal distribution.
Sampling variation and tests of significance.
Student's t-test, chi-square test, z-test.

Unit- VII: Health Indicator

Importance of health Indicator
Indicators of population, morbidity, mortality, health services. 1 hrs
Calculation of rates, and rations of health.

Recommended Books

B.K. Mahajan & M. Gupta (1995) Text Book of Preventive & Social Medicine, 2002, 17th Edition Jaypee Brothers.

Second Year

2. Computer Application & Database Management

Placement: Second Year Theory= 20 Hours

The course enables the students to understand the fundamentals of computer and its applications.

Introduction to data processing:
Features of computers, Advantages of using computers. Getting data into/out of computers. Role of computers. What is Data processing? Application areas of computers involved in Data processing. Common activities in processing. Types of Data processing. Characteristics of information. What are Hardware and software?

Hardware Concepts:
Architecture of computers, Classification of computers, Concept of Damage. Types of storage devices. Characteristics of disks, tapes, Terminals, Printers, Network. Applications of networking concepts of PC System care, floppy care, Data care.
Concept of software.

Classification of software: System software. Application of software. Operating system. Computer system: Computer Virus. Precaution against viruses. Dealing with viruses. Computers in Medical electronics.
Basic Anatomy of Computers.
Principles of programming.
Computer application- principles in scientific research; work processing, medicine, libraries, museum, education, information system.
Data Processing
Computer in physical therapy- principles in EMG, Exercise testing equipment, Laser.

III Year Perfusion Technology

Main Subjects

Paper I

Perfusion Technology- Clinical

Placement: Third Year

Theory=50 Hours
Practical=50 Hours

1. Pharmacokinetics and Pharmacodynamics of Cardiopulmonary bypass.
2. Drugs (including anesthetic drugs) used in cardiopulmonary bypass
3. Conduct and monitoring of Cardiopulmonary bypass
4. Adequacy of perfusion-General considerations, specific aspects of perfusion, monitoring, othe concomitants which may affect its adequacy.
5. Pulsatile perfusion-Introduction, theory & physiology of pulsatile flow, hemodynamic, metab effects, Clinical use, hematological effects.
6. Cannulation techniques during cardaiopulmonary bypass
7. Termination of cardiopulmonary bypass- principles and methodology
8. Myocardial protection and cardioplegia- pretreatment of the Myocardium, cardioplegia, hypothermia, controlled reperfusion, myocardial protection for specific clinical problems, Complications of cardioplegia. Non cardioplegic methods during cardiac surgery on cardiopulmonary bypass.
9. Oxygenation-general consideration, bubble & membrane (including assessment and comparison of oxygenator function)
10. Heat exchangers-principles function of heat exchangers & their assessment. Complications re to heat exchange and their management.
11. Priming fluids and hemodilution.

Third Year

Paper II

Perfusion Technology- Applied

Placement: Third Year

Theory=50 Hours
Practical=50 Hours

1. Blood cell trauma- analysis of forces of fluid motion, effects of physical forces o blood cell, clinical effect. Complications of blood transfusion.
2. Anticoagulation on bypass, its monitoring, its reversal and complications. Heparinless bypass. Platelet aggregation and platelet dysfunction. Coagulopathies due to cardiopulmonary bypass and its management.
3. Inflammatory response to cardiopulmonary bypass & its clinical effects. Methods to minimize the same. Immune response, neuroendocrine, renal, metabolic splanchnic response, pulmonary response and electrolyte response to cardiopulmonary bypass.
4. Blood conservation hemofiltration & dialysis during cardiopulmonary bypass including modified ultra filtration reverse autologous priming and other methods.
5. Micro emboli- gaseous and particulate, filters used in cardiopulmonary bypass circuit.
6. Micro pore filtration during cardiopulmonary bypass
7. Counter pulsation techniques and assist devices.

Third Year

Paper III

Perfusion Technology- Advanced

Placement: Third year

Theory=50 Hours
Practical=50 Hours

1. Perfusion techniques for Paediatric cardiac surgery
2. ECMO-special perfusion techniques for special cardiac surgeries And medical conditions (including thoracic aortic surgeries deep hypothermia and circulatory arrest). Perfusion for non cardiac surgery, invasive cardiology and outside the operation suite.
3. Perfusion as a method of cardiopulmonary bypass.
4. Complications and safety during cardiopulmonary bypass-bypass Safety, organizational aspects, accidents, coagulpathies, mechanical And electrical failures, perfusion management, perfusion systems, safety for the perfusionist and surgical team management of perfusion accidents.
5. Minimally invasive surgery and the perfusionist.
6. Recent advances in perfusion techniques
7. Experimental perfusion.

Exam Pattern.

1. **Internal Exams: TWO in number.**

Theory exam

Exam	Time to conduct internal exams	Theory Marks	Practical Marks
1.Mid Term Exam	After 6 month from starting the course	40	20
2.Pre final Exam	Atleast 1 month prior to final university exam.	80	40
Total		**120**	**60**
Internal Assessment (to be scaled down from total of the two exams)		**Out of 20**	**Out of 10**

2. **University Exam: (exam at the end of each year)**

Final marks distribution

University Exam	Theory	Practical
University exam	80	40 (30Pra+10Viva)
Internal Assessment	20	10
Total Marks	**100**	**50**

Exam paper pattern Theory (Prefinal Exam)

Question type	No. of questions	Questions to be answered	Question X marks	Total marks
Long essays	3	2	2x10	20 marks
Short essays	8	6	6x 5	30 marks
Short answers	12	10	10x 3	30 marks
				Total= 80 marks

Exam paper pattern Theory (Midterm Exam)

Question type	No. of questions	Questions to be answered	Question X marks	Total marks
Long essays	2	1	1x10	10 marks
Short essays	4	3	3x 5	15 marks
Short answers	6	5	5x 3	15 marks
				Total= 40 marks

Heads for passing:-

1. Minimum 40% in the University paper of 80 marks and minimum 50% in the total 100 marks(8
   20 IA)
2. 75%: (out of 100 marks): Distinction.
3. 60%: out of 100 marks): First class.
4. 50% (out of 100 marks): Pass class
   A student can carry a backlog of 2 subjects in the first year but should pass the subjects in the n
   supplementary exam. In the second and third year, a backlog of only one subject is permitted.

Resolution passed in BOM – 48/2017, dated 24/01/2017

Item No. 5.11: BOS (Biomedical Sciences) dated 16.09.2016

m) To review the structure of Theory Exam Pattern of B.Sc. (Paramedical) Courses: It was decided to change the pattern of Theory exam pattern with more options in SAQ (10 marks) and LAQ's (20 marks) for 2nd and 3rd year. For first year question paper pattern will remain same.

Resolution No. 5.11(m): Resolved to approve the change in the pattern of Theory exam of B.Sc. (Paramedical) Courses for 2nd and 3rd year [as per **Annexure-IX of BOM-48/2017**] while the first year question paper pattern will remain same, to be effective for batch entered in 2nd year/3rd year in Academic Year 2016-17 onwards.

ANNEXURE - IX

MAHATMA GANDHI MISSION
MEDICAL COLLEGE & HOSPITAL
Ph-27437668, 27437990, Fax 911-22-7420320

MGMMCH/Ophthal Dept./2016/ 26 Date: 16.09.2016

To,
The Director,
MGM School of Bio Medical Sciences,
Kamothe , Navi Mumbai

Sub: Changing format of B.Sc Optometry Question paper.

Respected Sir

We Faculty of Ophthalmology Department of MGM College Kamothe along with external examiner from by D.Y. Patil Medical college Nerul wish to bring Change in format of Question paper since the existing one is not approprite.

We all (Department of Ophthalmology as well as other Depts)who conduct paramedical courses feel that the question paper is very lengthy hence it is difficult to set question paper and check the Answer sheet.

We sincearlly request you to effect the changes.

Thanking you.

FOR

Professor & HOD
Department of Ophthalmology

Dr. Vaishnav Grore

16/9/16

(FINAL UNIVERSITY EXAMINATION- EXISTING THEORY EXAM PATTERN)

Question type	No. of questions	Questions to be answered	Question X marks	Total marks
Long essays	3	2	2x10	20 marks
Short essays	8	6	6x 5	30 marks
Short answers	12	10	10x 3	30 marks
				Total= 80 marks

Copy of [illegible]

MGM INSTITUTE OF HEALTH SCIENCES, NAVI MUMBAI
SECOND B.Sc. (Optometry Technology) UNIVERSITY EXAMINATION JULY-2015
Third Year

MGMH/KAM/OPH/2015

Subject : Community Eye Health & Eye Banking Date :

Total marks :80

INSTRUCTION :

1. Attempt all sections
2. Maximum Marks are indicated in the right
3. Illustrate the answer with suitable diagram wherever necessary
4. Please surrender your SWITCHED OFF cell phones at entry point into the examination Hall
5. Mobile phones , pagers ,bluetooth or any other such communication devices are not allowed in the examination premises and in the adjacent area

III Year

Q.1 Long Answer Question (Answer any Two) 2x10= 20marks

1. Vision 2020:Right to sight
2. National programme for control of blindness-I
3. Rehabilitation of visually handicapped

Q.2 Short Essay Question (Answer any Six) 6x5=30marks

1. Screening procedures in ophthalmology
2. School eye screning programme
3. Organisation of eye camp
4. Primary eye care
5. Enucleation
6. Preservation of donor cornea
7. Methods of publicity of eye donation
8. Contra-indication of eye donation

Q.3 Short Answer Question (Answer any 10) 10x3=30marks

1. Concepts of community ophthal
2. Visual acquity testing in school children
3. Pre- oprative instructions of cataract surgery
4. Post –operative instructions of cataract surgery
5. How to donate your eyes?
6. Public education regarding common eye diseases
7. Components of an eye back
8. Sac syringing
9. Methods to screen IOP
10. Presbyopic correction in an eye camp
11. Vitamin A prophyeaxis:Doses & schedule
12. Blanket therapy in trachoma.

(COPY OF NEW PROPOSED QUESTION PAPER FORMAT)

MGM INSTITUTE OF HEALTH SCIENCES, NAVI MUMBAI
SECOND B.Sc. (Optometry Technology) UNIVERSITY EXAMINATION JULY-2016
Third Year

MGMIH/KAM/OPH/2016 Date :

Total marks :80

Subject : Community Eye Health & Eye Banking

INSTRUCTION :

1. Attempt all sections
2. Maximum Marks are indicated in the right
3. Illustrate the answer with suitable diagram wherever necessary
4. Please surrender your SWITCHED OFF cell phones at entry point into the examination Hall
5. Mobile phones , pagers ,bluetooth or any other such communication devices are not allowed in the examination premises and in the adjacent area

III Year

Q.1 Long Answer Question (Answer any Two) 2x15=30 marks

1) Methods of Eye Preservation.
2) Rehabilitation of visually handicapped
3) National programme for control of blindness-I

Q.2 Short Essay Question (Answer any five) 5x10=50marks

1) Vision 2020:Right to sight
2) Eye Banking
3) Organisation of eye camp
4) Primary eye care
5) Evisceration
6) Preoperative workup for corneal transplant.
7) Methods of publicity of eye donation

(COPY OF NEW PROPOSED QUESTION PAPER FORMAT)

MGM INSTITUTE OF HEALTH SCIENCES, NAVI MUMBAI
SECOND B.Sc. (Optometry Technology) UNIVERSITY EXAMINATION JULY-2016
Third Year

MGMIH/KAM/OPH/2016 Date :
Total marks :80

Subject : Community Eye Health & Eye Banking

INSTRUCTION :

1. Attempt all sections
2. Maximum Marks are indicated in the right
3. Illustrate the answer with suitable diagram wherever necessary
4. Please surrender your SWITCHED OFF cell phones at entry point into the examination Hall
5. Mobile phones , pagers ,bluetooth or any other such communication devices are not allowed in the examination premises and in the adjacent area

III Year

Q.1 Long Answer Question (Answer any Two) **2x15=30 marks**

1) Methods of Eye Preservation.
2) Rehabilitation of visually handicapped
3) National programme for control of blindness-I

Q.2 Short Essay Question (Answer any five) **5x10=50marks**

1) Vision 2020:Right to sight
2) Eye Banking
3) Organisation of eye camp
4) Primary eye care
5) Evisceration
6) Preoperative workup for corneal transplant.
7) Methods of publicity of eye donation

C2 Dermatology Section (Marks 10)

Question 1 – long question (Marks 4)
Question 2 – Short answer question attempt any 2 (Marks 6)
a.
b.
c.

Resolution No. 3.3(f): Resolved to adopt the change in internal assessment pattern of Community Medicine **(Annexure-XI)** for the batch of Students entering into 2nd MBBS from August 2016 onwards.

Resolution No. 3.3(g): Resolved to start Certificate Course and Fellowship in Critical Care Medicine **(Annexure-XII)** at MGM Medical College, Navi Mumbai from academic year 2016-17. Therefore, Dean, MGM Medical College, Navi Mumbai is requested to work on the feasibility and other regulatory norms to start this course.

Resolution No. 3.3(h): Resolved to start Certificate Course and Fellowship in Sleep Medicine **(Annexure-XXVIII)** at MGM Medical College, Navi Mumbai from academic year 2016-17. Therefore, Dean, MGM Medical College, Navi Mumbai is requested to work on the feasibility and other regulatory norms to start this course.

Resolution No. 3.3(i): Resolved to approve the Examination pattern for MD in Immuno Haematology & Blood Transfusion **(Annexure-XIII)** with immediate effect.

3.4 Surgery and Allied :

Resolution No. 3.4(a): Resolved that :

(i) Topic of Polytrauma and its management be included in the Orthopedic UG syllabus in consultation with Surgery Department for the batch of Students entering into 3rd MBBS (Part-II) from February 2016 onwards.

(ii) Following Topics be excluded from the Orthopedic UG syllabus for the batch of Students entering into 3rd MBBS (Part-II) from February 2016 onwards :

a) Acute poliomyelitis

b) Fungal infection and Leprosy in orthopedic

c) Cerebral Palsy and rehabilitation

Resolution No. 3.2(d): Resolved to delete the topics OSPE, Mal absorption, PUO, Gastric Analysis in Practical of Pathology (UG) for the batch of Students entering into 2nd MBBS from the academic year 2016-17 onwards.

Resolution No. 3.2(e): Resolved to add following Demos for UG Students (Pathology)- Histogram & CBC for the batch of Students entering into 2nd MBBS from the academic year 2016-17 onwards.

Resolution No. 3.2(f): Resolved that 10% of Practical marks in Grand Viva for PG examination be alloted for Dissertation Viva with immediate effect.

keep in all PG courses MD/MS + AIIMS

3.3 **Medicine and Allied :**

Resolution No. 3.3(a): Resolved to include,

(i) Topics in Chest Medicine : ARDS, OSA and Pulmonary Thrambo-Embolism which should be covered in two lectures.

(ii) Care of Terminally ill patient under the heading of Geriatric Medicine.

For the batch of Students entering into 3rd MBBS (Part-I) from February 2016 onwards.

Resolution No. 3.3(b): Resolved to approve the changes in syllabus of MD Geriatric Medicine **(Annexure-IX)** with immediate effect.

Resolution No. 3.3(c): Resolved to approve the changes in syllabus of MD in Emergency Medicine **(Annexure-X)** with immediate effect.

Resolution No. 3.3(d): Resolved that the basic research methodology should be taught to UG and PG students for all courses as per their regulatory Council Norms.

keep in all UG & PG courses

Resolution No. 3.3(e): Resolved to accept the proposed pattern of redistribution of the marks in Dermatology and Psychiatry subjects in theory papers of Medicine subject at MBBS level for the batch of Students entering into 3rd MBBS (Part-II) from February 2016 onwards, as given below:

The change in Paper 2 section C should be as under:

Section C (Marks 10)

C1 Psychiatry Section (Marks 10)

Question 1 – long question (Marks 4)

Question 2- short answer question attempt any 2 (Marks 6)

a.

b.

c.

All B.Sc. paramedical courses of COPA

Resolution No. 1.3.14.4 of BOM-51/2017: Resolved to include Common lectures for General Pharmacology and ANS, for all Second year B.Sc. Paramedical courses. Further it was resolved to include and continue these topics in existing batch of 2016-17(2nd year B.Sc.) and henceforth. [Annexure-XXXII]

Annexure 5.4

Proposal put forward for common lectures for General Pharmacology and Autonomic Nervous System (ANS) was approved and will be implemented for batch 2016-17(2nd year BSc). The approved number of hours and topics are as per below:-

Course Name	No. of Hrs (General Pharmacology)	No of Hrs. (ANS)
CT, PT. DT, AT/OT, Optometry	6	5

Note:

1. Topics for General Pharmacology – Sources and routes, Pharmacokinetics, Pharmacodynamics, Adverse Drug reactions
2. Topics for ANS to be included in syllabus for all 5 courses – Cholinergic agonist, Anticholinergic, Adrenergic agonist, Alpha blockers, Beta blockers

Resolution No. 1.3.14.3 of BOM-51/2017: Resolved to approve the List of Textbooks for B.Sc. Paramedical Courses / M.Sc. Molecular Biology. [Annexure-XXXI]

Perfusion Technology		
Second Year		
Applied Pharmacology	Pharmacology for Physiotheray	Padmaja Uday Kumar
	Pharmacology for Nurses	Padmaja Uday Kumar
Applied Anatomy	Anatomy& Physiology	rose& wilson
Applied Physiology & Biochemistry	anatomy& Physiology	Singh
	Cardiovascular Physiology	AchillesJ. Papano Gil Wier
	Human anatomy	Chaurasia
Perfusion Technology-Part I	quick Review , Clinical Perfusion Book	Stephen Bhore
	Cardio pulmonary Bypass - Surgical and Clinical Orientation	Dr. Anil G. Tendolkar
Third Year		
Subject	**Book Name**	**Author**
Perfusion Technology-Clinical	Cardiovascular Nursing - Management for Positive Outcomes	Mary Lucila & Aleyamma Eapen
Perfusion Technology-Applied	Mechanical Ventillation - Clinical applications	Vijay Deshpande T.R. Chandrashekhar
Perfusion Technology-Advanced	Cardiopulmonary Bypass , Principles and Practices , 3rd Edition	Glenn, Richerd,Alfred Ross

Resolution No. 4.13 of BOM-55/2018: Resolved as follows:-

(i) Slow learners must be re-designated as potential learners.

(ii) Students scoring less than 35% marks in a particular subjects/course in the 1st formative exam are to be listed as potential learners. These learners must be constantly encouraged to perform better with the help of various remedial measures.

(iii) Students scoring more than 75% marks in a particular subjects/course in the 1st formative exam are to be listed as advanced learners. These learners must be constantly encouraged to participate in various scholarly activities.

MGM INSTITUTE OF HEALTH SCIENCES

(Deemed to be University u/s 3 of UGC Act, 1956)

Grade 'A' Accredited by NAAC

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