

**REVISED ORDINANCE GOVERNING REGULATIONS  
AND CURRICULUM OF  
B.Sc. ANAESTHESIA 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 Shanthi 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

4<sup>th</sup> T Block, Jayanagar, Bengaluru – 560 041

Ref: ACA/DCD/AHS/B.Sc.Anaes/362(a)/2019-20

Date: 28/08/2019

**NOTIFICATION**

Sub: Revised Ordinance pertaining to Regulation and Curriculum of B.Sc. Anaesthesia 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 B. Sc. Anaesthesia 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.

# REGULATIONS & CURRICULUM FOR BACHELOR OF B.Sc. ANAESTHESIA TECHNOLOGY -2019

## 1. Eligibility for admission:

A candidate seeking admission to the BSc. Anaesthesia Technology shall have studied English as one of the principal subject during the tenure of the course and shall have passed:

1. Two year Pre-University examination or equivalent as recognized by Rajiv Gandhi University of Health Sciences with, Physics, Chemistry and Biology as subjects of study.

OR

2. Pre-Degree course from a recognized University considered as equivalent by RGUHS, (Two years after ten years of schooling) with Physics, Chemistry and Biology as subjects of study.

OR

3. Any equivalent examination recognized by the Rajiv Gandhi University of Health Sciences, Bangalore for the above purpose with Physics, Chemistry and Biology as subjects of study.

OR

4. The vocational higher secondary education course conducted by Vocational Higher Secondary Education, Government of Kerala with five subjects including Physics, Chemistry, Biology and English in addition to vocational subjects conducted is considered equivalent to plus TWO examinations of Government of Karnataka Pre University Course.

OR

5. Candidates with two years diploma from a recognized Government Board in Anaesthesia Technology shall have passed class 12 [10+2] with Physics, Chemistry and Biology, as subjects or candidates with 3 years diploma from a recognized Government Board in Anaesthesia Technology should have studied Physics, Biology and Chemistry as subjects during the tenure of the course.

6. Lateral entry to second year of B.Sc.Anaesthesia Technology for candidates who have passed diploma program from the Government Boards and recognized by RGUHS, fulfilling the conditions specified above under Sl. No. 5 and these students are eligible to take admission on lateral entry system only in the same subject studied at diploma level from the academic year 2008-09 vide RGUHS Notification no. AUTH/AHS/317/2008-09 dated:01.08.2008.

**Note:**

- a. The candidate shall have passed individually in each of the subjects.
- b. Candidates who have completed diploma or vocational course through Correspondence shall not be eligible for any of the courses mentioned above.

**2. Duration of the course:**

Duration shall be for a period of four years including one year of Internship.

**3. Medium of instruction:**

The medium of instruction and examination shall be in English.

**4. Scheme of examination:**

There shall be three examinations one each at the end of 1 st, 2nd and 3rd year.

## **5. 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. 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 subjects either in theory or practical in the first appearance will not be eligible to appear for the University Examination in that subject

## **6. Internal Assessment (IA):**

### 1st Year B.Sc Anaesthesia Technology

Theory - 20 marks

Practicals - 10 marks\*. [Lab work- 06 marks and Record-04 marks] 2nd &

### 3rd year B.Sc Anaesthesia Technology

Theory – 20 Marks

Practicals – 20 Marks

There shall be a minimum of two periodical tests preferably one in each term in theory and practical of each subject in an academic year. The average marks of the two tests will be calculated and reduced to 20. The marks of IA shall be communicated to the University at least 15 days before the commencement of the University examination. The University shall have access to the records of such periodical tests. The marks of the internal assessment must be displayed on the notice board of the respective colleges within a fortnight from the date test is held. If a candidate is absent for any one of the tests due to genuine and satisfactory reasons, such a candidate may be given a re-test within a fortnight.

\* There shall be no University Practical Examination in First year.

## **7. Subject and hours of teaching for Theory and Practicals**

The number of hours of teaching theory and practical, subject wise in first year, second year and third year are shown in Table-I, Table-II and Table-III

Main and Subsidiary subjects are common in first year for all the courses in Allied Health Science.

The number of hours for teaching theory and practical for main subjects in first, Second and Third year are shown in Table-I, II and III.

**Table - I Distribution of Teaching Hours in First Year Subjects  
Main Subjects**

Sl. No.	Subject	Theory No. of Hours	Practical No. of Hours	Total No. of Hours
1.	Human Anatomy	70	20	90
2.	Physiology	70	20	90
3.	Biochemistry	70	20	90
4.	Pathology-[Clinical pathology, Hematology & Blood -Banking	70	20	90
5.	Microbiology	70	20	90
	<b>Total</b>	<b>350</b>	<b>100</b>	<b>450</b>

The classes in main and subsidiary subjects are to be held from Monday to Thursday. On Fridays and Saturdays students shall work in hospitals in the respective specialty or department chosen by them

**Subsidiary Subjects:**

English	25 Hours
Kannada	25 Hours
Health-Care	40 Hours
Hospital posting	470 Hours

Friday 9am-1pm and 2pm-4-30pm  
Saturday 9am - 1pm

**Table - II Distribution of Teaching Hours in Second Year Subjects  
Main Subjects**

Sl. No.	Subject	Theory No. of Hours	Practical No. of Hours	Clinical Posting	Total No. of Hours
1.	Medicine relevant to Anesthesia Technology	50	--	--	50

2.	Section A Applied Pathology Section B Applied Microbiology	30 30	30 30	--	120
3.	Applied Pharmacology	50	--	--	50
4.	Introduction to Anesthesia Technology	80	100	650	830
	<b>Total</b>	<b>240</b>	<b>160</b>	<b>650</b>	<b>1050</b>

**Subsidiary Subjects:**

Sociology	20 Hours
Constitution of India	10 Hours
Environmental Science & Health	10 Hours

**Table - III Distribution of Teaching Hours in Third Year Subjects  
Main Subjects**

Sl. No.	Subject	Theory No. of Hours	Practical No. of Hours	Clinical Posting	Total No. of Hours
1.	Anaesthesia Technology - Clinical	50	50	250	350
2.	Anaesthesia Technology - Applied	50	50	250	350
3.	Anaesthesia Technology - Advanced	50	50	250	350
4.	<b>Total</b>	<b>150</b>	<b>150</b>	<b>750</b>	<b>1050</b>

**Subsidiary Subjects:**

Ethics, Database Management



	50
Hours Research & Biostatistics	
	20
Hours	
Computer application	10 Hours

**3. Schedule of Examination:**

The university shall conduct two examinations annually at an interval of not less than 4 to 6 months as notified by the university from time to time. A candidate who satisfies the requirement of attendance, progress and conduct as stipulated by the university shall be eligible to appear for the university examination. Certificate to that effect shall be produced from the Head of the institution along with the application for examination and the prescribed fee.

**4. Scheme of Examination:**

There shall be three examinations, one each at the end of I, II and III year. The examination for both main and subsidiary subjects for all courses in Allied Health Sciences shall be common in the first year. Distribution of Subjects and marks for First Year, Second year & Third year University theory and practical Examinations are shown in the Table - IV, V & VI.

### **First year examination:**

The University examination for 1st year shall consist of only theory examination and there shall be no University Practical Examination.

---

### **Second & Third year examination:**

The University examination for 2nd and 3rd year shall consist of Written Examination & Practical.

### **Written Examinations consists of**

04 papers in the  
2nd Year 03 papers  
in the 3rd Year.

### **Practical examination:**

Two practical examinations, at the end 2nd Year and one practical examination at the end of the 3rd year.

**TABLE-IV**  
**Distribution of Subjects and marks for First Year University theory Examination**

A	Main Subjects*	Written Paper		I .A Theory	Total
		Durati on	Marks	Marks	Marks
1.	Basic Anatomy [Including Histology]	3 hours	80	20	100
2.	Physiology	3 hours	80	20	100
3.	Biochemistry	3 hours	80	20	100
4.	Pathology	3 hours	80	20	100
5.	Microbiology	3hours	80	20	100
	Subsidiary				Total

	Subject**				
1.	English	3 hours	80	20	100
2.	Kannada	3 hours	80	20	100
3.	Health Care	3 hours	80	20	100

Note \* I A = Internal

Assessment Main Subjects shall

have University Examination.

There Shall be no University Practical Examination.

\*\* Subsidiary subjects: Examination

for subsidiary subjects shall be

conducted by respective colleges.

**TABLE - V**  
**Distribution of Subjects and marks for Second Year Examination.**

Paper	Subjects	Theory				Practicals			
		Theory	Viva voca a	I.A	Sub Total	Prac ticals	I.A	Sub Total	Grand Total
i	Section A- Applied Pathology Section B Applied Microbiology	50  50	30	20	150	40	10	50	200

	y								
ii	Introduction to Anesthesia Technology ****	100	30	20	150	40	10	50	200
iii	Applied Pharmacology	80	-	20	100	No Practical			100
iv	Medicine relevant to technology					No Practical			100

**Distribution of Subsidiary Subjects and marks for Second Year Examination**

B	Subsidiary Subject**	Duration	Marks	I.A. Theory Marks	Total Marks
1.	Sociology	3 hours	80	20	100
2.	Constitution of India	3 hours	80	20	100
3.	Environmental Science & Health	3 hours	80	20	100

\*\* Subsidiary subjects: Examination for subsidiary subjects shall be conducted by respective colleges.

**TABLE - VI**  
**Distribution of Subjects and marks for Third Year Examination.**

Paper	Subjects	Theory				Practicals			
		Theory	Viva voca	I.A	Sub Total	Practicals	I.A	Sub Total	Grand Total
i	Anaesthesia Technology-Clinical	100	30	20	150	120 (40+40+40)	30 (40+40+40)	150	600
ii	Anaesthesia Technology-Applied	100	30	20	150				
iii	Anaesthesia Technology-Advanced	100	30	20	150				

\*\* Practicals-One common practical for all the three papers with equal weight age of marks i.e. 40 practical mark and 10 I.A. marks for each paper.

**Distribution of Subsidiary Subjects and marks for Third Year Examination**

B	Subsidiary Subject**	Duration	Marks	I.A. Theory Marks	Total Marks
1	Ethics, Database Management	3 hours	80	20	100
2	Research & Biostatistics	3 hours	80	20	100
3	Computer application	3 hours	80	20	100

\*\* Subsidiary subjects: Examination for subsidiary subjects shall be

conducted by respective colleges

## **5. Pass criteria**

### **5.1. First year examination.**

- a. **Main Subjects:** A candidate is declared to have passed in a subject, if he/she secures, 50% of marks in University Theory exam and internal assessment added together.
  
- b. **Subsidiary Subjects:** The minimum prescribed marks for a pass in subsidiary subject shall be 35% of the maximum marks prescribed for a subject. The marks obtained in the subsidiary subjects shall be communicated to the University before the Commencement of the University examination.

## **5.2. Second and Third year Examination**

- a. **Main Subjects:** A candidate is declared to have passed the Examination in a subject if he/she secures 50% of the marks in theory and 50% in practical separately. For a pass in theory, a candidate has to secure a minimum of 40% marks in the University conducted written examination, and 50% in aggregate in the University conducted written examination, internal assessment and Viva-Voce added together and for pass in Practical, a candidate has to secure a minimum of 40% marks in the university conducted Practical/Clinical examination and 50% in aggregate i.e. University conducted Practical/Clinical and Internal Assessment.

In the third year a candidate is declared to have passed only if he/she passes all the three theory papers and one practical examination in a single attempt failing which where in the candidate fails in one or more theory papers and or practical examination he/she will have to reappear for all the 3 theory papers and the practical examination in the subsequent attempt.

- b. **Subsidiary Subjects:** The minimum prescribed marks for a pass in subsidiary subject shall be 35% of the maximum marks prescribed for a subject. The marks obtained in the subsidiary subjects shall be communicated to the University before the commencement of the University examination.
-

## **6. Carryoverbenefit**

### **12.1 First year examination:**

A candidate who fails in any two of the five main subjects of first year shall be permitted to carry over those subjects to second year. However, he/se must pass the carry over subjects before appearing for second year examination; otherwise he/she shall not permitted to proceed to third year.

### **12.2. Second year examination.**

A candidate is permitted to carry over any one main subject to the third year but shall pass this subject before appearing for the third year examination

## **7. Declaration of Class**

- a. A candidate having appeared in all the subjects in the same examination and passed that examination in the first attempt and secures 75% of marks or more of grand total marks prescribed will be declared to have passed the examination with Distinction.
- b. A candidate having appeared in all subjects in the same examination and passed that examination in the first attempt and secures 60% of marks or more but less than 75% of grand total marks prescribed will be declared to have passed the examination in First Class.
- c. A candidate having appeared in all the subjects in the same examination and passed that examination in the first attempt and secures 50% of marks or more but less than 60% of grand total marks prescribed will be declared to have passed the examination in Second Class.
- d. A candidate passing the university examination in more than one attempt shall be placed in Pass class irrespective of the percentage of marks secured by him/her in the examination.
- e. The marks obtained by a candidate in the subsidiary subjects shall not be considered for award of Class or Rank.

[Please note fraction of marks should not be rounded off clauses (a),



(b) and (c)]

**8. Eligibility for the award of Degree:**

A candidate shall have passed in all the subjects of first, second and third year to be eligible for award of degree and completed one year of internship with pass criteria in outgoing clinical assessment exams.

---

## Distribution of Type of Questions and Marks for Various Subjects

### THEORY

SUBJECTS HAVING MAXIMUM MARKS = 100		
TYPE OF QUESTION	NUMBER OF QUESTIONS	MARKS FOR EACH QUESTION
ESSAY TYPE	3 (2x10)	10
SHORT ESSAY TYPE	12 (10 × 5)	5
SHORT ANSWER TYPE	12 (10 × 3)	3

SUBJECTS HAVING MAXIMUM MARKS = 80		
TYPE OF QUESTION	NUMBER OF QUESTIONS	MARKS FOR EACH QUESTION
ESSAY TYPE	3 (2x10)	10
SHORT ESSAY TYPE	8 (6 × 5)	5
SHORT ANSWER TYPE	12 (10 × 3)	3

SUBJECTS HAVING MAXIMUM MARKS = 60		
TYPE OF QUESTION	NUMBER OF QUESTIONS	MARKS FOR EACH QUESTION
ESSAY TYPE	3 (2x10)	10
SHORT ESSAY TYPE	7 (5 × 5)	5
SHORT ANSWER TYPE	7 (5 × 3)	3

SUBJECTS HAVING MAXIMUM MARKS = 50		
TYPE OF QUESTION	NUMBER OF QUESTIONS	MARKS FOR EACH QUESTION
ESSAY TYPE	3 (2x10)	10
SHORT ESSAY TYPE	5 (3 × 5)	5
SHORT ANSWER TYPE	7 (5 × 3)	3

---



## **I year - B.Sc. Anaesthesia Technology**

### **Main Subjects**

#### **ANATOMY**

**Theory: 70hrs**

**Practical's: 20hrs**

#### **Chapter 1**

##### **Introduction:**

##### **Theory:**

- Definition of anatomy and its divisions
- Terms of location, positions and planes
- Epithelium-definition, classification, describe with examples, function
- Glands- classification, describe serous, mucous & mixed glands with examples
- Basic tissues – classification with examples

##### **Practical:**

- Histology of types of epithelium
- Histology of serous, mucous & mixed salivary gland

#### **Chapter 2**

##### **Connective tissue:**

##### **Theory:**

- Cartilage – types with example & histology theory
- Bone – Classification, names of bone cells, parts of long bone, microscopy of compact
- bone, names of all bones, vertebral column, intervertebral disc, fontanelles of fetal skull

- Joints – Classification of joints with examples, synovial joint (in detail for radiology)
- Muscular system: Classification of muscular tissue & histology
- Names of muscles of the body

**Practical:**

- Histology of the 3 types of cartilage
- Histology of compact bone (TS & LS)
- Histology of skeletal (TS & LS) & cardiac muscle
- Demo of all bones showing parts, radiographs of normal bones & joints
- Demonstration of important muscles of the body

**3. Cardiovascular system:**

**Theory:**

- Heart-size, location, chambers, exterior & interior, pericardium
- Blood supply of heart
- Systemic & pulmonary circulation
- Branches of aorta, common carotid artery, subclavian artery, axillary artery, brachial artery, superficial palmar arch, femoral artery, internal iliac artery
- Inferior vena cava, portal vein, portosystemic anastomosis, Great saphenous vein, Dural venous sinuses
- Lymphatic system- cisterna chyli & thoracic duct, Histology of lymphatic tissues, Names of regional lymphatics, axillary and inguinal lymph nodes in brief

**Practical:**

- Demonstration of heart and vessels in the body
- Histology of large artery & vein, medium sized artery & vein
- Histology of lymph node, spleen, tonsil & thymus

- Radiology: Normal chest radiograph showing heart shadows

#### **4. Gastro-intestinal system**

##### **Theory:**

- Parts of GIT: Oral cavity (lip, tongue (with histology), tonsil, dentition, pharynx, salivary glands, Waldeyer's ring), Oesophagus, stomach, small and large intestine, liver, gall bladder, pancreas, spleen, peritoneum & reflections

##### **Practical:**

- Demonstration of parts of GIT
- Radiographs of abdomen

#### **5. Respiratory system**

- Parts of RS: nose, nasal cavity, larynx, trachea, lungs, bronchopulmonary segments, diaphragm
- Histology of trachea, lung and pleura
- Names of paranasal air sinuses

##### **Practical:**

- Demonstration of parts of respiratory system.
- Normal radiographs of chest, X-ray paranasal sinuses
- Histology of lung and trachea

#### **6. Urinary system**

##### **Theory:**

- Kidney, ureter, urinary bladder, male and female urethra
- Histology of kidney, ureter and urinary bladder

##### **Practical:**

- Demonstration of parts of urinary system
- Histology of kidney, ureter, urinary bladder
- Radiographs of abdomen-IVP, retrograde cystogram

#### **7. Reproductive system**

##### **Theory:**

- Parts of male reproductive system, testis, vas deferens, epididymis, prostate (gross & histology)

- Parts of female reproductive system, uterus, fallopian tubes, ovary (gross & histology)
- Mammary gland – gross

**Practical:**

- Demonstration of section of male and female pelvis with organs in situ
- Histology of testis, vas deferens, epididymis, prostate, uterus, fallopian tubes, ovary
- Radiographs of pelvis – hysterosalpingogram

**8. Endocrine glands**

**Theory:**

- Names of all endocrine glands in detail on pituitary gland, thyroid gland & suprarenal gland – (gross & histology)

**Practical:**

- Demonstration of the glands
- Histology of pituitary, thyroid, parathyroid, suprarenal glands

**9. Nervous system**

**Theory:**

- Neuron & Classification of NS
- Cerebrum, cerebellum, midbrain, pons, medulla oblongata, spinal cord with spinal nerve

(gross & histology) Meninges, Ventricles & cerebrospinal fluid,  
Names of basal nuclei

- Blood supply of brain
- Cranial nerves
- Sympathetic trunk & names of parasympathetic ganglia

**Practical:**

- Histology of peripheral nerve & optic nerve
- Demonstration of all plexuses and nerves in the body
- Demonstration of all part of brain
- Histology of cerebrum, cerebellum, spinal cord

**10. Sensory organs****Theory:**

- Skin: Skin-histology & Appendages of skin
- Eye: Parts of eye & lacrimal apparatus, Extra-ocular muscles & nerve supply
- Ear: parts of ear- external, middle and inner ear and contents

**Practical:**

- Histology of thin and thick skin
- Demonstration and histology of eyeball
- Histology of cornea & retina

**11. Embryology:****Theory:**

- Spermatogenesis & oogenesis
- Ovulation, fertilization
- Fetal circulation
- Placenta

**INTERNAL ASSESSMENT**

Theory-average of 2 exams conducted	20
Practicals: record and lab work*	10

\*There shall be no university practical examination and internal assessment marks secured in Practical's need not be sent to the university.



## SCHEME OF EXAMINATION THEORY

There shall be one theory paper of three hours duration carrying 80 marks. Distribution of type of questions and marks for Anatomy shall be as given under.

SUBJECTS HAVING MAXIMUM MARKS= 80 (for first year B.Sc)		
Type of Questions	NO. of questions	Marks for Each Questions
Essay Type	3 (2 x 10)	10
Short Essay Type	8 (6 x 5)	05
Short Answer Type	12 (10 x 3)	03

### Distribution of Marks for University Theory and Practical Exam

Theory				Practicals			Grand total
Theory	Viva Voce	IA	Sub Total	Practicals	IA	Sub Total	
80	-	20	100	*			100

### REFERENCE BOOKS:

1. William Davis (P) understanding Human Anatomy and Physiology – McGraw Hill
2. Chaurasia- A Text Book of Anatomy
3. T. S. Ranganathan- A Text Book of Human Anatomy
4. Fattana, Human Anatomy (Description and applied)- Saunder's & C P Prism Publishers, Bangalore
5. ESTER. M. Grishcimer- Physiology & Anatomy with Practical Considerations, J. P. Lippin Cott. Philadelphia
6. Bhatnagar- Essentials of Human Embryology- Revised Edition. Orient Blackswan Pvt. Ltd.

### PHYSIOLOGY

Theory 70 hours

Practical 20hours

#### 1. General Physiology

Introduction to cell physiology, transport across cell membrane  
Homeostasis, Body Fluid compartment & measurement

## **2. Blood**

**Introduction - composition and function of blood**

**Plasma. proteins, types and functions**

**Red blood cells - erythropoiesis, stages of differentiation, factors affecting it, function, normal count, physiological variation.**

**Hemoglobin- function, concentration, types & methods of Hb estimation, fate of hemoglobin**

**Jaundice-types Anaemia,-types**

**ESR, PCV, osmotic fragility & blood indices**

**WBC- morphology, production, functions, normal count, differential count, variation, variation Immunity (in brief)**

**Platelets- origin, morphology, normal count, function-Platelet plug ,bleeding disorder**

**Haemostasis - definition, normal haemostasis, clotting factors, mechanism of clotting, anticoagulants disorders of clotting factors.**

**Blood group-ABO & Rh system, Rh incompatibility blood typing ,cross matching, hazards of mismatched blood transfusion**

**RES, spleen and lymph**

### **3. Nerve-Muscle**

Neuron structure, types, neuroglia-types, nerve fibre classification, properties of nerve fibres, RMP, action potential, wallerian degeneration

NMJ, blockers, Myasthenia gravis

Classification of muscle, structure of skeletal muscle, sarcomere, contractile proteins

Excitation contraction coupling, mechanism of muscle contraction, types of contraction

Motor unit, fatigue, rigor mortis Smooth muscle

### **4. Respiratory system**

Physiological anatomy of respiratory system, muscles of respiration, respiratory & non respiratory functions of lungs, dead space

Mechanics of breathing, intrapulmonary & pleural pressures

Compliance, Surfactant, Hyaline membrane disease

Lung volumes and capacities

Respiratory membrane, transport of O<sub>2</sub> & CO<sub>2</sub>

Chemical regulation of respiration

Neural regulation of respiration

Hypoxia, Acclimatization,

Dysbarism. Artificial respiration

Definition-Periodic breathing, dyspnoea, apnoea, asphyxia,, cyanosis

### **5. Cardiovascular system**

Introduction to CVS & general principles of circulation

Properties of Cardiac muscle

Cardiac cycle, heart sounds, Pulse

Cardiac output, factors and measurement

Heart rate

BP-factors, measurement, Short term regulation

Intermediate and long term regulation of BP

ECG uses and significance, .normal waveform, heart block

Coronary circulation, Cutaneous circulation-Triple response

Shock

Effects of exercise on CVS and Respiratory system

## **6. Renal system, Skin and body temperature**

Kidneys- functions, structure of nephron, type, juxtaglomerular apparatus-structure and function, non-excretory functions of kidney  
Glomerular filtration rate (GFR)- Definition ,normal value, factors affecting GFR

Tubular reabsorption - sites, substance reabsorbed, mechanisms of reabsorption

Tubular secretion- sites, substance secreted, mechanisms of reabsorption

Counter current mechanism of concentration of urine

Obligatory and Facultative reabsorption of water

Micturition reflex, Diuretics

Artificial kidney, renal function tests-clearance tests

Skin -structure and function, body temperature measurement, physiological variation,

Regulation of body Temperature by physical, chemical and nervous mechanisms-Role of Hypothalamus

Hypothermia and fever

## **7. Digestive system**

Physiological anatomy, Enteric nervous system & functions of GIT

Saliva- composition, regulation, disorder.

Deglutition- stages & disorders

Stomach-functions, composition and regulation of gastric juice

Gastric motility, MMC, vomiting reflex.

Pancreas- function, composition and regulation of pancreatic juice

Liver & gall bladder-functions, bile- composition, secretion and regulation

Small intestine- Succus entericus-composition, functions & movements

Large intestine- functions, movements and defecation reflex

Digestion & absorption of Carbohydrates, fats and proteins

## **8. Endocrine system**

Classification of Endocrine glands & their hormones & properties-chemistry and receptor, feedback mechanisms of hormone regulation.

Anterior pituitary hormones- secretion, functions , disorders

Posterior pituitary hormones- secretion , functions , disorders

Thyroid hormones- secretion, functions, disorders

Parathyroid hormones- secretion, functions, disorders

Calcium homeostasis & disorders

**Pancreatic hormones, -Insulin and Glucagon- . secretion, functions, disorders**

**Adrenal cortex- Glucocorticoids & Mineralocorticoids, Androgen - secretion, functions, disorders**

**Adrenal medulla- secretion, functions, disorders Thymus & Pineal gland**

## **9. Reproductive system**

**Introduction to reproductive system, sex differentiation & Puberty**

**Male reproductive system, functions of testosterone &**

**Spermatogenesis**

**Female reproductive system, functions of Estrogen, Progesterone, Oogenesis**

**Ovulation & Menstrual cycle**

**Physiological changes during pregnancy, pregnancy tests, parturition & lactation**

**Male & Female contraceptive methods**

## **10. Central nervous system**

**Introduction to CNS, Sensory receptors classification, properties**

**Synapse– classification, properties**

**Sensory pathways: Anterior spino thalamic tract and Posterior column pathway**

**Lateral spino thalamic tract, Types of pain, Referred pain, Thalamus; nuclei and function**

**Classification of reflexes, Monosynaptic reflex- Stretch reflex , muscle spindle ,inverse stretch reflex. Polysynaptic reflex-Withdrawal reflex**

**Motor pathways : Pyramidal pathway and functions, UMNL, LMNL**

**Cerebral cortex (Sensory and motor)-functions, Medulla and Pons-functions**

**Cerebellum –functions, disorders**

**Basal ganglia-functions, disorders**

**Hypothalamus and Limbic system-functions**

**CSF, lumbar puncture**

**Sleep, EEG,**

**Autonomic Nervous System - Sympathetic and parasympathetic distribution and functions**

## **11. Special senses**

**Vision –Functional anatomy of eye, visual pathway, lesion**

**Refractive errors, color vision**

**Audition – Physiological anatomy of ear, Mechanism of hearing, auditory pathway, deafness**

**Olfaction –modalities, receptor, function, abnormalities**

**Gustation-modalities, receptor, function, taste pathway, abnormalities**

.

**Practicals**

**Blood pressure Recording**

**Auscultation for Heart Sounds**

**Artificial Respiration**

**Determination of vital capacity**

## INTERNAL ASSESSMENT

Theory-average of 2 exams conducted	20
Practicals: record and lab work*	10

\*There shall be no university practical examination and internal assessment marks secured in Practicals need not be sent to the university.

## SCHEME OF EXAMINATION THEORY

There shall be one theory paper of three hours duration carrying 80 marks. Distribution of type of questions and marks for Physiology shall be as given under.

SUBJECTS HAVING MAXIMUM MARKS= 80 (for first year B.Sc)		
Type of Questions	NO. of questions	Marks for Each Questions
Essay Type	3 (2 x 10)	10
Short Essay Type	8 (6 x 5)	05
Short Answer Type	12 (10 x 3)	03

## Distribution of Marks for University Theory and Practical Exam

Theory				Practicals			Grand total
Theory	Viva Voce	IA	Sub Total	Practicals	IA	Sub Total	
80	-	20	100	*			100

## REFERENCE BOOKS:

Guyton (Arthur) Text Book of Physiology. Latest Ed. Prism Publishers  
Chatterjee (CC) Human Physiology Latest Ed. Vol. 1, Medical Allied Agency

Choudhari (Sujith K) Concise Medical Physiology Latest Ed. New Central Book

Ganong (William F) Review of Medical Physiology. Latest Ed. Appleton

## **BIOCHEMISTRY**

**No. Theory classes: 70 hours**

**No. Practical classes: 20 hours**

### **1. Carbohydrate Chemistry [3 hours]**

- **Classification (Definition/ examples for each class)**
- **Monosaccharides (classification depending upon number of carbon atoms and functional group with examples)**
- **Disaccharides (Sucrose/ lactose/ maltose and their composition)**
- **Polysaccharides :**
  - a) **Homopolysaccharides (Structure of starch and glycogen)**
  - b) **Heteropolysaccharides (Functions )**

### **2. Lipid Chemistry [3 hours]**

- **Definition of lipids**
- **Functions of lipids in the body**
- **Classification of lipids (subclasses with examples)**
- **Definition and Classification of fatty acids**
- **Essential fatty acids**
- **Phospholipids and their importance**

### **3. Amino-acid and Protein Chemistry [3 hours]**

- **General structure of D and L amino acids**



- Amino acids; Definition and Classification of amino acids with examples.
- Peptides; definition & Biologically important peptides
- Classification of Proteins based on composition, functions and shape (with examples)
- Functions of amino acids and Proteins

#### **4. Nucleotide and Nucleic acid Chemistry [ 3 hours]**

- Nucleosides & Nucleotides
- Nucleic acid Definition & types
- Composition & functions of DNA & RNA
- Structure of DNA (Watson and Crick model)
- Structure of tRNA, & functions of tRNA, rRNA, mRNA
- Difference between DNA and RNA

#### **5. Enzymes [5 hours]**

- Definition & Classification of Enzymes with example
- Definitions of Active site, Cofactor (Coenzyme, Activator),
- Proenzyme; Definition and examples (Pepsin & trypsin)

#### **6. Digestion and Absorption [ 3 Hours]**

- General characteristics of digestion and absorption,
- Digestion and absorption of carbohydrates, proteins and lipids.

#### **7. Carbohydrate Metabolism [ 5 Hours]**

- **Glycolysis ; Aerobic, Anaerobic, Definition , Site and subcellular site , Steps with all the enzymes and coenzymes at each step , mention the regulatory enzymes , Energetics,**
- **Citric acid cycle; Pyruvate dehydrogenase complex (reaction and coenzymes) , Site and subcellular site , Reactions with all the enzymes and coenzymes ,Regulatory enzymes , Energetics**
- **Significance of HMP Shunt pathway.**
- **Hyperglycemic and hypoglycemic hormones**
- **Blood Glucose Regulation.**
- **Diabetes mellitus (definition, classification, signs and symptoms)**
- **Glycogen metabolism and gluconeogenesis**

#### **8. Lipid Metabolism [ 4 Hours]**

- **Introduction to lipid metabolism, Lipolysis**
- **Beta oxidation of fatty acids ; Definition ,Site and subcellular site , Activation of palmitic acid , Transport of activated palmitic acid into mitochondria , Reactions , Energetics.**
- **Name the different ketone bodies . Note on ketosis**

#### **9. Amino acid and Protein Metabolism [ 3 Hours]**

- **Introduction, transamination, deamination, Fate of ammonia, transport of ammonia,**
- **Urea cycle.**

#### **10. Vitamins [5 Hours]**

- **Definition and classification.**

- RDA, sources, coenzyme forms, biochemical functions and disorders for the following water soluble vitamins: Thiamine, Niacin, Pyridoxine, Cobalamine, Folic acid, Ascorbic acid
- RDA, sources, coenzyme forms, biochemical functions and deficiency disorders for the following fat soluble vitamins; A and vitamin D

### **11. Mineral Metabolism [3 Hours]**

- Name the macro/ microminerals
- Iron: Sources ,RDA, Functions and Disorders of deficiency and excess
- Calcium and phosphorus: Sources ,RDA, functions, normal serum levels and hormones reulating their levels

### **12. Nutrition [6 hours]**

- Balanced diet (Definition)
- Caloric value ; Definition , Caloric values of carbohydrates, proteins and fats
- Total daily caloric requirements of an adult male and female,
- RDA (Definition, standard values for nutrients)
- Basal metabolic rate(BMR) ; Definition , Magnitude of BMR in men and women, Factors affecting BMR
- Thermic effect/ SDA of food (Definition, values for major macronutrients)
- **Carbohydrates ;. Daily dietary requirement. 2. Dietary fibers (Definition, functions, importance and their daily requirements)**

- **Proteins ;. Daily requirement, Biological value. a. Definition b. Protein used as a standard for this, Protein sources with high and low biological value , Mutual supplementation of proteins (Definition, examples).**
- **Fats ; Daily requirement , Essential fatty acids (Definition, functions, daily requirement and deficiency manifestations) , Saturated and unsaturated fatty acids (Definition, sources, examples).**
- **Malnutrition**

### **13. Renal Function Tests [ 2 hours]**

- Name the different tests to assess the kidney functions
- Explain Creatinine clearance & Inulin clearance
- Urinary acidification test

### **14. Radioactive Isotopes [1 hour]**

- Definition, clinical applications
- Biological effects of radiations

### **15. Clinical Biochemistry [ 5 hours ]**

**A. Definitions of acid, base, pH and pKa [1 hour]**

**B. Buffers • Definition [2 hours]**

- Henderson Hasselbalch equation,
- Principal buffer systems in the ECF ICF and urine
- Bicarbonate and phosphate buffer systems (pKa value, normal ratio of base/acid in the plasma)
- Acidosis & Alkalosis (Definition, classification, causes and biochemical findings)

**C. Normal serum levels and condition where they are altered [2 hour]**

- Glucose, Protein, urea, uric acid, and creatinine
- Bilirubin, cholesterol
- Serum Electrolytes

**16. Fundamental Chemistry (1 hour)**

- Valency, Molecular weight & Equivalent weight of elements and compounds. Normality, Molarity, Molality.

**17. Solutions: Definition, use, classification where appropriate, preparation and storage (5 hours)**

- Stock and working solutions.
- Molar and Normal solutions of compounds and acids. (NaCl, NaOH, HCl, H<sub>2</sub>SO<sub>4</sub>, H<sub>3</sub>PO<sub>4</sub>, CH<sub>3</sub>COOH etc.,)
- Preparation of percent solutions – w/w, v/v w/v (solids, liquids and acids), Conversion of a percent solution into a molar solution
- Saturated and supersaturated solutions
- Standard solutions. Technique for preparation of standard solutions and Storage. E.g: glucose, albumin etc.
- Dilutions- Diluting Normal , Molar and percent solutions. Preparing working standard from stock standard.
- Part dilutions: Specimen dilutions. Serial dilutions. Reagent dilution. Dilution factors

**ASSIGNMENT TOPICS**

**1. Units of measurement**

- 2. Hazards - Physical, Chemical, Biological**
- 3. Arterial blood gas analysis**
- 4. Responsibilities of Health care personnel**
- 5. Biomedical waste management**

**Total theory hours = 70**

**PRACTICAL DEMONSTRATION [20 hours]**

- Color Reactions of Carbohydrates & amino acids.
- Precipitation Reactions of proteins
- Colorimetry
- Estimation of Blood glucose Folin Wu and enzymatic method
- Estimation of Urea by DAM method

**INTERNAL ASSESSMENT**

Theory-average of 2 exams conducted      20  
Practicals: record and lab work\*            10

\*There shall be no university practical examination and internal assessment marks secured in Practicals need not be sent to the university.

**SCHEME OF EXAMINATION THEORY**

There shall be one theory paper of three hours duration carrying 80 marks. Distribution of type of questions and marks for Biochemistry I shall be as given under.

<b>SUBJECTS HAVING MAXIMUM MARKS= 80 (for first year B.Sc)</b>		
<b>Type of Questions</b>	<b>NO. of questions</b>	<b>Marks for Each Questions</b>
<b>Essay Type</b>	<b>3 (2 x 10)</b>	<b>10</b>
<b>Short Essay Type</b>	<b>8 (6 x 5)</b>	<b>05</b>
<b>Short Answer Type</b>	<b>12 (10 x 3)</b>	<b>03</b>

**Distribution of Marks for University Theory and Practical Exam**

<b>Theory</b>				<b>Practicals</b>			<b>Grand total</b>
<b>Theory</b>	<b>Viva Voce</b>	<b>IA</b>	<b>Sub Total</b>	<b>Practicals</b>	<b>IA</b>	<b>Sub Total</b>	
<b>80</b>	<b>-</b>	<b>20</b>	<b>100</b>	<b>*</b>			<b>100</b>



## **Text Book References**

- **Biochemistry – 3<sup>rd</sup> revised edition by U Sathyanarayana & U Chakrapani**
- **Textbook of Medical Biochemistry-6<sup>th</sup> Edition by MN Chatterjea & Rana Shinde**
- **Textbook of Medical Laboratory technology 2<sup>nd</sup> edition by Godkar and Godkar.**
- **Biochemistry-3<sup>rd</sup> edition by Pankaja Naik**
- **Medical Laboratory technology 6<sup>th</sup> edition by Ramnik Sood.**
- **Manipal Manual of Clinical Biochemistry for medical laboratory and M.Sc., students-3<sup>rd</sup> edition by Shivananda Nayak B**
- **Varley's Practical Clinical Biochemistry, 4<sup>th</sup>, 5<sup>th</sup> and 6<sup>th</sup> editions**

# **PATHOLOGY**

## **Clinical Pathology, Hematology and Blood Banking**

**Theory-70 hours**

**Practicals-20 hours**

### **I. Clinical Pathology- Theory**

- Introduction to clinical pathology
- Collection , transport, preservation and processing of various clinical specimens
- Urine examination- collection and preservation, Physical, chemical and microscopic examination for abnormal constituents
- Examination of Body fluids
- Examination of Cerebrospinal fluid (CSF)
- Sputum examination
- Examination of feces

### **II. Hematology – Theory**

- Introduction to hematology
- Normal constituents of Blood, their structure and functions
- Collection of Blood samples
- Various anticoagulants used in Hematology
- Hemoglobin estimation, different methods and normal values
- Packed cell volume
- Erythrocyte sedimentation rate
- Normal Haemostasis
- Bleeding time. Clotting time, prothrombin time, Activated partial Thromboplastin time

### **III. Blood Bank- Theory**

- Introduction blood banking
- Blood group system
- Collection and processing of blood for transfusion
- Compatibility testing
- Blood transfusion reactions

#### **IV General Pathology:**

##### **1. Cell injury:**

- a. Definition, causes.
- b. Cellular adaptations – Hypertrophy, hyperplasia, atrophy and metaplasia.
- c. Types of cell injury – Reversible and irreversible; morphology of reversible injury.
- d. Necrosis – Definition and patterns of tissue necrosis.
- e. Intracellular accumulations – Lipids, cholesterol, proteins, glycogen and pigments; examples.
- f. Pathologic calcification – Types and examples.

##### **• 2. Inflammation:**

- a. Definition and signs of inflammation.
- b. Types – Acute and chronic inflammation.
- c. Acute inflammation – Causes, morphological patterns and outcome.
- d. Chronic inflammation – Causes, morphology and examples.
- e. Regeneration and repair – Mechanism of cutaneous wound healing.
- f. Factors affecting wound healing.

##### **• 3. Hemodynamic disorders:**

- a. Edema – Definition, pathogenesis and types: Renal, cardiac, pulmonary and cerebral.

- b. Difference between transudate and exudate.
  - c. Shock – Definition, types of shock with examples: Hypovolemic, cardiogenic and septic shock, stages of shock: Nonprogressive, progressive and irreversible.
  - d. Thrombosis – Definition, mechanism of thrombus formation (Virchow’s triad) and fate of thrombus.
  - e. Embolism – Definition and types: Thromboembolism, fat, air and amniotic fluid embolism.
  - f. Infarction – Definition and examples.
- **4. Immune system:**
    - a. Autoimmune diseases – General features, enumerate systemic and organ specific autoimmune diseases.
    - b. Systemic lupus erythematosus – Manifestations and diagnosis.
- **5. Neoplasia:**
    - a. Definition and nomenclature of tumors.
    - b. Differences between benign and malignant neoplasms.
    - c. Enumerate modes of carcinogenesis: Genes, physical, chemical and microbial agents of carcinogenesis.
    - d. Modes of spread of tumors.
    - e. Clinical aspects of neoplasia.
    - f. Grading and staging of cancers.
    - g. Laboratory diagnosis of cancer.

## Practicals

1. Urine analysis- Physical, Chemical, Microscopic
2. Blood grouping and Rh typing
3. Hb estimation , packed cell volume (PCV), Erythrocyte Sedimentation rate (ESR)
4. Bleeding time and Clotting time

## INTERNAL ASSESSMENT

Theory-average of 2 exams conducted	20
Practicals: record and lab work*	10

\*There shall be no university practical examination and internal assessment marks secured in Practical's need not be sent to the university.

## SCHEME OF EXAMINATION THEORY

There shall be one theory paper of three hours duration carrying 80 marks. Distribution of type of questions and marks for Pathology I shall be as given under.

SUBJECTS HAVING MAXIMUM MARKS= 80 (for first year B.Sc)		
Type of Questions	NO. of questions	Marks for Each Questions
Essay Type	3 (2 x 10)	10
Short Essay Type	8 (6 x 5)	05
Short Answer Type	12 (10 x 3)	03

## Distribution of Marks for University Theory and Practical Exam

Theory				Practicals			Grand total
Theory	Viva	IA	Sub	Practicals	IA	Sub Total	

	<b>Voce</b>		<b>Total</b>				
<b>80</b>	-	<b>20</b>	<b>100</b>	*			<b>100</b>

**REFERENCE BOOKS:**

1. **Culling Histopathology techniques**
2. **Bancroft Histopathology techniques**
3. **Koss- Cytology**
4. **Winifred Diagnostic cytopathology**
5. **Orell Cytopathology**
6. **Todd and Sanford- clinical diagnosis by Laboratory Medicine**
7. **Dacie and Lewis- Practical Hematology**
8. **Ramnik SOOD. Lab technology, Methods and interpretation, 4 th edition JP Bros New Delhi, 1996**
9. **Sathish Guptha , Short text book of Medical laboratory techniques for technicians**
10. **Sachdev K N. Clinical Pathology and Bacteriology, 8 th edi JP Bros, New Delhi, 1996**

## **MICROBIOLOGY**

Theory: 70 Hours

Practicals: 20 Hours

### **Microbiology**

#### **1. Introduction**

**(6 hrs)**

History of Microbiology,

Classification of microorganisms,

Microscope (Different types and uses)

Morphology of bacterial cell.

#### **2. Growth and nutrition**

**(6 hrs)**

Growth and Nutrition

Multiplication of bacteria,

Culture media and Culture methods.

#### **3. Sterilization and disinfection**

**(6 hrs)**

Principles and use of equipments of sterilization,

Chemicals used in disinfection

#### **4. Biomedical waste management principle and practice**

#### **5. Immunology**

**(8 hrs)**

Immunity (Innate and Acquired immunity)

Antigen (Definition, types, factors of antigenicity)

Antibody (Properties, Structures Classes of immunoglobulins)

List Antigen antibody reactions.

Vaccines

Immunization schedule

## **6. Infection**

**(5hrs)**

Definition, types and mode of transmission

Hospital infections – causative agents, mode of transmission and prophylaxis

Antimicrobial susceptibility testing

## **7. Systematic bacteriology**

**(15 hrs)**

Disease caused and lab diagnosis of medically important bacteria.

(Staphylococcus, Streptococcus, Gonococcus, Echerichia coli, Klebsiella, Proteus Salmonella, Shigella, Vibrio, Pseudomonas, Mycobacteria, Treponema, )

**(No need of classification, antigenic structure, virulence mechanism)**

## **8. Parasitology**

**(10hrs)**

Introduction to Parasitology

List of medically important parasites and diseases

(E.histolytica, Plasmodium, Ascaris, Ancylostoma, W.bancrofti, Tape worm )

Lab diagnosis of parasitic infections

## **9. Virology**

**(10 hrs)**

Introduction to virology



List of medically important viruses and diseases

HIV,

Hepatitis,

Rabies,

Polio,

Arboviruses (Chikungunya, Dengue, KFD,)

Lab diagnosis of viral infections

## **9. Mycology**

**(9 hrs)**

Introduction to Mycology

List of medically important fungi and diseases

(Candidiasis, Cryptococcosis, Dermatophytes, Aspergillosis and Mucor mycosis)

Lab diagnosis of fungal infections

## **10. Automated techniques**

## **PRACTICALS**

**(20hrs)**

Compound Microscope

Demonstration and sterilization of equipments

Demonstration of commonly used culture media and media with growth

Antibiotic susceptibility test

Demonstration of common serological tests –widal, VDRL,

Grams stain, Acid fast staining

Stool exam for Helminthic ova

## INTERNAL ASSESSMENT

Theory-average of 2 exams conducted	20
Practicals: record and lab work*	10

\*There shall be no university practical examination and internal assessment marks secured in Practical's need not be sent to the university.

## SCHEME OF EXAMINATION THEORY

There shall be one theory paper of three hours duration carrying 80 marks. Distribution of type of questions and marks for Microbiology I shall be as given under.

SUBJECTS HAVING MAXIMUM MARKS= 80 (for first year B.Sc)		
Type of Questions	NO. of questions	Marks for Each Questions
Essay Type	3 (2 x 10)	10
Short Essay Type	8 (6 x 5)	05
Short Answer Type	12 (10 x 3)	03

## Distribution of Marks for University Theory and Practical Exam

Theory				Practicals			Grand total
Theory	Viva Voce	IA	Sub Total	Practicals	IA	Sub Total	
80	-	20	100	*			100

## Reference Books-

1. Ananthanarayana & Panikar Medical Microbiology- University Press
2. Robert Cruickshank- Medical Microbiology- The Practice of Medical Microbiology
3. Chatterjee- Parasitology- Interpretation to Clinical Medicine
4. Rippon- Medical Mycology
5. Emmons- Medical Mycology
6. Basic Laboratory methods in Parasitology, J P Bros, New Delhi

7. **Basic Laboratory procedures in clinical bacteriology, J P Bros, New Delhi**
8. **Medical Parasitology- Ajit Damle**
9. **Introduction to medical microbiology- Ananthanarayana- Orient Longman Pvt. Ltd**

## **SUBSIDIARY SUBJECTS**

### **ENGLISH**

#### **COURSE OUTLINE**

**COURSE DESCRIPTION:** This course is designed to help the student acquire a good command and comprehension of the English language through individual papers and conferences.

#### **BEHAVIOURAL OBJECTIVES:**

The student at the end of training is able to

1. Read and comprehend English language
2. Speak and write grammatically correct English
3. Appreciates the value of English literature in personal and professional life.

#### **UNIT - I: INTRODUCTION:**

Study Techniques

Organisation of effective note taking and logical processes of analysis and synthesis

Use of the dictionary

Enlargement of vocabulary

Effective diction

#### **UNIT - II: APPLIED GRAMMAR:**

Correct usage

The structure of sentences

The structure of paragraphs

Enlargements of Vocabulary

#### **UNIT - III: WRITTEN COMPOSITION:**

Precise writing and summarizing

Writing of bibliography

Enlargement of Vocabulary

#### **UNIT - IV: READING AND COMPREHENSION:**

Review of selected materials and express oneself in one's words.

Enlargement of Vocabulary.

#### **UNIT - V: THE STUDY OF THE VARIOUS FORMS OF COMPOSITION:**

Paragraph, Essay, Letter, Summary, Practice in writing

#### **UNIT - VI: VERBAL COMMUNICATION:**

Discussions and summarization, Debates, Oral reports, use in teaching

Scheme of Examination

Written (Theory): Maximum Marks: –80 marks.

No Practical or Viva voce examination

**This is a subsidiary subject, examination to be conducted by respective colleges. Marks required for a pass is 35%**

## **REFERENCE**

- 1. English Grammar Collins, Birmingham University, International Language Data Base, Rupa & Co. 1993**
- 2. Wren and Martin - Grammar and Composition, 1989, Chanda & Co, Delhi**
- 3. Letters for all Occasions. A S Myers. Pub - Harper Perennial**
- 4. Spoken English V. Shasikumar and P V Dhanija. Pub. By: Tata Mcgraw Hill, New Delhi**
- 5. Journalism Made Simple D Wainwright**
- 6. Writers Basic Bookself Series, Writers Digest series**
- 7. Interviewing by Joan Clayton Platkon**
- 8. Penguin Book of Interviews.**

## **HEALTH CARE**

**Teaching Hours : 40**

### **Introduction to Health**

Definition of Health, Determinants of Health, Health Indicators of India, Health Team

Concept.

National Health Policy

National Health Programmes ( Briefly Objectives and scope)

Population of India and Family welfare programme in India

### **Introduction to Nursing**

What is Nursing ? Nursing principles. Inter-Personnel relationships. Bandaging : Basic

turns; Bandaging extremities; Triangular Bandages and their application.

Nursing Position, Bed making, prone, lateral, dorsal, dorsal recumbent, Fowler's

positions, comfort measures, Aids and rest and sleep.

Lifting And Transporting Patients: Lifting patients up in the bed.

Transferring from bed

to wheel chair. Transferring from bed to stretcher.

Bed Side Management: Giving and taking Bed pan, Urinal : Observation of stools, urine.

Observation of sputum, Understand use and care of catheters, enema giving.

Methods of Giving Nourishment: Feeding, Tube feeding, drips, transfusion

Care of Rubber Goods

Recording of body temperature, respiration and pulse,

Simple aseptic technique, sterilization and disinfection.

Surgical Dressing: Observation of dressing procedures

### **First Aid :**

Syllabus as for Certificate Course of Red Cross Society of St. John's Ambulance Brigade.

### **Reference Books:**

1. Preventive and Social Medicine by J.Park
  2. Text Book of P & SM by Park and Park
  3. Counseling & Communicate skills for medical and health, Bayne-Orient Longman Pvt. Ltd.
-

### **Scheme of Examination**

**Written (Theory): Maximum Marks: –80 marks.**

**No Practical or Viva voce examination**

**This is a subsidiary subject, examination to be conducted by respective colleges. Marks**

**required for a pass is 35%**

## Second Year B.Sc Anaesthesia

### Technology

### Main Subjects

### APPLIED PHARMACOLOGY

- General concepts about pharmacodynamic and Pharmacokinetic Principles involved in drug activity.
- I. **Autonomic nerves system.**
- Anatomy & functional organisation.
  - List of drugs acting an ANS including dose, route of administration, indications, contra indications and adverse effects.
- II. **Cardiovascular drugs-Enumerate the mode of action, side effects And therapeutic uses of the following drugs.**
- a. **Antihypertensives**
- Beta Adrenergic antagonists
  - Alpha Adrenergic antagonists
  - Peripheral Vasodilators
  - Calcium channel blockers
- b. **Antiarrhythmic drugs**
- c. **Cardiac glycosides**
- d. **Sympathetic and nonsympathetic inotropic agents.**
- e. **Coronary vasodilators.**
- f. **Antianginal and anti failure agents**
- g. **Lipid lowering & anti atherosclerotic drugs.**
- h. **Drugs used in Haemostais - anticoagulants Thrombolytics and antithrombolytics.**
- i. **Cardioplegic drugs- History, Principles and types of cardioplagia.**
- j. **Primary solutions - History, principles & types.**
- k. **Drugs used in the treatment of shock.**
- III. **Anaesthetic agents.**
- Definition of general and local anaesthetics.
  - Classification of general anaesthetics.
  - Pharmacokinetics and Pharmacodynamics of inhaled anaesthetic agents.
  - Intravenous general anaesthetic agents.
  - Local anaesthetics - classification mechanism of action, duration of action and methods to prolong the duration of action. Preparation, dose and routes of administration.



#### **IV. Analgesics**

- Definition and classification
- Routes of administration, dose, frequency of administration, Side effects and management of non opioid and opioid analgesics

#### **V. Antihistamines and antiemetics-**

- Classification, Mechanism of action, adverse effects, Preparations, dose & routes & administration.
-

## **VI. CNS stimulants and depressants**

- Alcohol
- Sedatives, hypnotics and narcotics
- CNS stimulants
- Neuromuscular blocking agents and muscle relaxants.

## **VII. Pharmacological protection of organs**

during CPB **VIII. Inhalational gases and**

**emergency drugs.**

## **IX. Pharmacotherapy of respiratory disorders**

- Introduction - Modulators of bronchial smooth muscle tone and pulmonary vascular smooth muscle tone
- Pharmacotherapy of bronchial asthma
- Pharmacotherapy of cough
- Mucokinetic and mucolytic agents
- Use of bland aerosols in respiratory care.

**X. Corticosteroids** - Classification, mechanism of action, adverse effects and complications. Preparation, dose and routes of administration.

## **XI. Diuretics**

- Renal physiology
- Side of action of diuretics
- Adverse effects
- Preparations, dose and routes of administration.

## **XII. Chemotherapy of infections**

- Definition
- Classification and mechanism of action of antimicrobial agents
- Combination of antimicrobial agents
- Chemoprophylaxis.
- Classification, spectrum of activity, dose, routes of administration and adverse effects of penicillin, cephalosporins, aminoglycosides, tetracyclines, chloramphenicol, antitubercular drugs.

## **XIII. Miscellaneous.**

- IV fluids- various preparations and their usage.
- Electrolyte supplements

- Immunosuppressive agents
- New drugs included in perfusion technology.
- Drugs used in metabolic and electrolyte imbalance.

**PRACTICALS:**

1. Preparation and prescription of drugs of relevance.
-

2. Experimental pharmacology directed to show the effects of commonly used drugs of relevance and interpretation of few charts.

### **Scheme of**

### **Examination Theory**

There shall be one theory paper of three hours duration carrying 80 marks. Distribution of type of questions and marks for applied Pharmacology shall be as given under.

TYPE OF QUESTION	NUMBER OF QUESTIONS	MARKS	SUB-TOTAL
LONG ESSAY (LE)	3 (To attempt 2)	2 x 10	20
SHORT ESSAY (SE)	8 (To attempt 6)	6 x 5	30
SHORT ANSWER (SA)	12 (To Attempt 10)	10 x 3	30
TOTAL MARKS			80

### **NO PRACTICAL EXAMINATION**

#### **Recommended Books.**

1. R. S. Satoskar, S.D. Bhandarkar, S. S. Ainapure, Pharmacology and Pharmacotherapeutics, 18th Edition, single Volume, M/S Popular Prakashan, 350, Madan Mohan Marg, Tardeo, Bombay - 400 034.
  2. K.D. Tripathi, Essentials of Medical Pharmacology, V. Edition, M/s. Jaypee Brothers, Post Box, 7193, G-16, EMCA House, 23/23, Bansari Road, Daryaganj, New Delhi.
  3. Laurence and Bennet, Clinical Pharmacology, ELBS Edition, 9th Edition.
-

# **APPLIED PATHOLOGY**

## **I. CARDIOVASCULAR SYSTEM**

- Atherosclerosis- Definition, risk factors, briefly Pathogenesis & morphology, clinical significance and prevention.
- Hypertension- Definition, types and briefly Pathogenesis and effects of Hypertension.
- Aneurysms - Definition, classification, Pathology and complications.
- Pathophysiology of Heart failure.
- Cardiac hypertrophy - causes, Pathophysiology & Progression to Heart Failure.
- Ischaemic heart diseases- Definition, Types. Briefly Pathophysiology, Pathology & Complications of various types of IHD.
- Valvular Heart diseases- causes, Pathology & complication. Complications of artificial valves.
- Cardiomyopathy - Definition, Types, causes and significance.
- Pericardial effusion- causes, effects and diagnosis.
- Congenital heart diseases - Basic defect and effects of important types of congenital heart diseases.

## **II. HAEMATOLOGY**

- Anaemia - Definition, morphological types and diagnosis of anaemia. Brief concept about Haemolytic anaemia and polycythaemia.
- Leukocyte disorders- Briefly leukaemia, leukocytosis, agranulocytosis etc.,
- Bleeding disorders- Definition, classification, causes & effects of important types of bleeding disorders. Briefly various laboratory tests used to diagnose bleeding disorders.

## **III. RESPIRATORY SYSTEM**

- Chronic obstructive airway diseases - Definition and types. Briefly causes, Pathology and complications of each type of COPD.
- Briefly concept about obstructive versus restrictive pulmonary disease.
- Pneumoconiosis- Definition, types, Pathology and effects in brief.
- Pulmonary congestion and edema.
- Pleural effusion - causes, effects and diagnosis.

## **IV. RENAL SYSTEM**

- Clinical manifestations of renal diseases. Briefly causes, mechanism,

effects and laboratory diagnosis of ARF & CRS. Briefly  
Glomerulonephritis and Pyelonephritis.

- End stage renal disease - Definition, causes, effects and role of dialysis and renal transplantation in its management.
- Brief concept about obstructive uropathy.

## **PRACTICALS**

1. Description & diagnosis of the following gross specimens.
    - a. Atherosclerosis.
    - b. Aortic aneurysm.
    - c. Myocardial infraction.
-

- d. Emphysema
  - e. Chronic glomerulonephritis.
  - f. Chronic pyelonephritis.
2. Interpretation & diagnosis of the following charts.
    - a. hematology Chart - AML, CML, Hemophilia, neutrophilia, eosinophilia.
    - b. Urine Chart - ARF, CRF, Acute glomerulonephritis.

### Scheme of

### Examination Theory

There shall be one theory paper with 2 section of three hours duration carrying 50 marks. Distribution of type of questions and marks for Applied Pathology shall be as given under.

TYPE OF QUESTION	NUMBER OF QUESTIONS	MARKS	SUB-TOTAL
LONG ESSAY (LE)	3 (To attempt 2)	2 x 10	20
SHORT ESSAY (SE)	5 (To attempt 3)	3 x 5	15
SHORT ANSWER (SA)	7 (To Attempt 5)	5 x 3	15
TOTAL MARKS			50

### PRACTICAL EXAMINATION - Marks.

40

There will be a Combined Practical examination for Applied Pathology & Applied Microbiology.

Sl. No.	Tests	Marks
1.	Interpretation of Hematology Chart	05
2.	Interpretation of Urine Chart	05
3.	Estimation of Hemoglobin	05
4.	Estimation of Bleeding time & Clotting time	05
	Total	20

# **APPLIED MICROBIOLOGY**

## **THEORY - 40 HOURS**

1. **Health care associated infections and Antimicrobial resistance:** Infections that patients acquire during the course of receiving treatment for other conditions within a healthcare setting like Methicillin Resistant Staphylococcus aureus infections, Infections caused by Clostridium difficile, Vancomycin resistant enterococci etc. Catheter related blood stream infections, Ventilator associated pneumonia, Catheter Related urinary tract infections, Surveillance of emerging resistance and changing flora. The impact and cost attributed to Hospital Associated infection.

6 Hours

2. **Disease communicable to Healthcare workers in hospital set up and its preventive measure:** Occupationally acquired infections in healthcare professionals by respiratory route ( tuberculosis, varicella-zoster, respiratory syncytial virus etc ), blood borne transmission ( HIV, Hepatitis B, Hepatitis C, Cytomegalovirus, Ebola virus etc), or faecal route ( Salmonella, Hepatitis A etc), direct contact ( Herpes Simplex Virus etc). Preventive measures to combat the spread of these infections by monitoring and control.

6

Hours

3. **Microbiological surveillance and sampling:** Required to determine the frequency of potential bacterial pathogens including Streptococcus pneumoniae, Haemophilus influenzae, and Moraxella catarrhalis and also to assess the antimicrobial resistance.

Sampling: rinse technique, direct surface agar plating technique. 6 Hours

4. **Importance of sterilization:**
  - a. Disinfection of instruments used in patient care: Classification, different methods, advantages and disadvantages of the various methods.
  - b. Disinfection of the patient care unit
  - c. Infection control measures for ICU's

10 Hours

5. **Sterilization:**
  - a. Rooms: Gaseous sterilization, one atmosphere uniform glow discharge plasma (OAUGDP).



- b. **Equipments: classification of the instruments and appropriate methods of sterilization.**
  - c. **Central supply department: the four areas and the floor plan for instrument cleaning, high-level disinfecting and sterilizing areas.**  
**8 Hours**
6. **Preparation of materials for autoclaving: Packing of different types of materials, loading, holding time and unloading.** **4**  
**Hours**

### **PRACTICALS- 30 HOURS**

1. **Principles of autoclaving & quality control of Sterilization.**
  2. **Collection of specimen from outpatient units, inpatient units, minor operation theater and major operation theater for sterility testing**
-

3. The various methods employed for sterility testing.
4. Interpretation of results of sterility testing.
5. Disinfection of wards, OT and Laboratory.

### Scheme of

### Examination Theory

There shall be one theory paper with 2 section of three hours duration carrying 50 marks. Distribution of type of questions and marks for Applied Microbiology shall be as given under.

TYPE OF QUESTION	NUMBER OF QUESTIONS	MARKS	SUB-TOTAL
LONG ESSAY (LE)	3 (To attempt 2)	2 x 10	20
SHORT ESSAY (SE)	6 (To attempt 4)	4 x 5	20
SHORT ANSWER (SA)	7 (To Attempt 5)	5 x 2	10
<b>TOTAL MARKS</b>			<b>50</b>

### PRACTICAL EXAMINATION -

**40 Marks.**

There will be a Combined Practical examination for Applied Pathology & Applied Microbiology.

Sl. No.	Test s	Mark s
1.	Dry heat / Moist heat: Temperature recording charts interpretation	05
2.	Dry heat/Moist heat: Color change indicators interpretation	05
3.	Air sampling culture plates interpretation of Colony forming units based on air flow rate and sampling time	05
4.	Interpretation of Sterility of Hemodialysis water / Distilled water/Deionised water based on	05

	growth of colonies in BHI agar to be reported as X CFU/mL	
	<b>Total</b>	<b>20</b>

## MEDICINE RELEVANT TO ANAESTHESIA TECHNOLOGY

Diabetes Mellitus  
Hypertension  
Ischaemic heart disease  
Obesity  
Elderly patient  
Pregnancy  
Shock  
COPD  
Chronic renal failure  
Chronic liver disease/failure  
Anaemia  
Pediatric patient infant/  
neonate  
Epilepsy  
CVA

### Scheme of

### Examination Theory

There shall be one theory paper of three hours duration carrying 80 marks. Distribution of type of questions and marks for Medicine relevant to Anaesthesia Technology shall be as given under.

TYPE OF QUESTION	NUMBER OF QUESTIONS	MARKS	SUB-TOTAL
LONG ESSAY (LE)	3 (To attempt 2)	2 x 10	20
SHORT ESSAY (SE)	8 (To attempt 6)	6 x 5	30
SHORT ANSWER (SA)	12 (To Attempt 10)	10 x 3	30
TOTAL MARKS			80

### NO PRACTICAL EXAMINATION

# INTRODUCTION TO ANAESTHESIA TECHNOLOGY

## 1. Gas physics

- States of matter
- Temperature conversion
- Humidity
- Pressure measurement
- Gas flows and diffusion
- Gas laws
- Miscellaneous concepts such as density and specific gravity

## 2. Medical Gas Supply

- Compressed gas Cylinders
- Colour coding
- Cylinders and Cylinder valves
- Cylinder storage
- Diameter index safety system
- Medical gas pipeline system and station outlets
- Air compressors
- Oxygen concentrators
- Alarms and safety devices

## 3. Gas Administration Devices

- Simple oxygen administration devices
- Methods of controlling gas flow
- Reducing valves
- Flow meters
- Regulators
- Flow restrictors

## 4. Oxygen Therapy

- Definition
- Causes and responses to hypoxemia
- Clinical signs of hypoxemia
- Goals of oxygen therapy
- Evaluation of patients receiving oxygen therapy
- Hazards of oxygen therapy

## 5. Anaesthesia Machine

- Hanger and yoke system
- Cylinder pressure gauge, pin index

- Pressure regulator
  - Flow meter assembly
-

- Vaporizers - Types, hazards, maintenance, filling and draining.

## 6. Breathing System

- General considerations
- Classification and breathing system
- Mapleson system
- Jackson Rees system of Bain circuit
- Non breathing valves - Ambu valves
- Others

## 7. Gas Analysers, Pulse Oximeter, CO2 Monitor

- Gas analysis
- Types and care
- Transcutaneous oxygen monitors
- Pulse oximeters
- Capnographs

## 8. Manual Resuscitators

- Types of resuscitator bags
- Indications
- Hazards
- Methods of increasing oxygen delivery capabilities while using oxygen with resuscitator bags.

## 9. Artificial air ways (Oral and Nasal endotracheal tubes, tracheostomy tubes)

- Parts of airway and features
- Types, sizes and methods of insertion
- Indications for use
- Care of long term airways and complications
- Protocol for tracheostomy decannulation
- Face masks - Types, sizes and its usage.

## 10. Methods of cleaning and sterilization of anesthetic equipments.

## 11. History of Anesthesia

- Prehistoric (Ether) era
- Inhalational anesthetic era
- Regional anesthetic era
- Intravenous anesthetic era
- Modern anesthetic era

## **12. Minimum Standards for anaesthesia**

- Who should give anaesthesia
  - Ten golden rules of anaesthesia
  - Patient assessment and preparation
  - Checking the drugs and equipment
-



- Keeping the airway clear
- Be ready to control ventilation
- Monitor pulse

and BP Scheme of

## Examination

### Theory

There shall be one theory paper of three hours duration carrying 100 marks. Distribution of type of questions and marks for Introduction to Anaesthesia Technology shall be as given under.

TYPE OF QUESTION	NUMBER OF QUESTIONS	MARKS	SUB-TOTAL
LONG ESSAY (LE)	3 (To attempt 2)	2 x 10	20
SHORT ESSAY (SE)	12 (To attempt 10)	10 x 5	50
SHORT ANSWER (SA)	12 (To Attempt 10)	10 x 3	30
TOTAL MARKS			100

**PRACTICAL EXAMINATION -**

**40 Marks.**

## **SUBSIDIARY SUBJECTS SOCIOLOGY**

**Teaching**

**Hours: 20**

**Course**

**Description**

This course will introduce student to the basic sociology concepts, principles and social process, social institutions [in relation to the individual, family and community and the various social factors affecting the family in rural and urban communities in India will be studied.

**Introduction:**

**Meaning - Definition and scope of sociology**

Its relation to Anthropology, Psychology, Social Psychology

Methods of Sociological investigations - Case study, social survey, questionnaire, interview and opinion poll methods.

Importance of its study with special reference to health care professionals

**Social Factors in Health and Disease:**

Meaning of social factors

Role of social factors in health and disease

**Socialization:**

**Meaning and nature of socialization**

Primary, Secondary and Anticipatory

socialization Agencies of

socialization

**Social Groups:**

1. Concepts of social groups, influence of formal and informal groups on health and sickness. The role of primary groups and secondary groups in the hospital and rehabilitation setup.

**Family:**

The family, meaning and definitions  
Functions of types of family

Changing family patterns

Influence of family on individual's health, family and nutrition, the effects of sickness in the family and psychosomatic disease and their importance to physiotherapy

**Community:**

Rural community: Meaning and features - Health hazards to rural communities, health hazards to tribal community.

---

Urban community - Meaning and features - Health hazards of urbanities

**Culture and Health:**

Concept of  
Health  
Concept of  
culture  
Culture and  
Health  
Culture and Health Disorders

**Social Change:**

Meaning of social  
changes Factors of  
social changes  
Human adaptation and social  
change Social change and  
stress  
Social change and deviance  
Social change and health programme  
The role of social planning in the improvement of health and  
rehabilitation

**Social Problems of disabled:**

Consequences of the following social problems in relation to sickness  
and disability remedies to prevent these problems  
Population  
explosion Poverty  
and unemployment  
Beggary  
Juvenile  
delinquency  
Prostitution  
Alcoholism  
Problems of women in employment

## **Social Security:**

Social Security and social legislation in relation to the disabled

## **Social Work:**

Meaning of Social Work

The role of a Medical Social Worker

---

# **INDIAN CONSTITUTION**

Prescribed for the First Year students of all degree classes

**Unit-I: Meaning of the term 'Constitution' making of the Indian Constitution 1946-1940.**

**Unit-II: The democratic institutions created by the constitution Bicameral system of Legislature at the Centre and in the States.**

**Unit-III: Fundamental Rights and Duties their content and significance.**

**Unit - IV: Directive Principles of States Policies the need to balance Fundamental Rights with Directive Principles.**

**Unit - V: Special Rights created in the Constitution for: Dalits, Backwards, Women and Children and the Religious and Linguistic Minorities.**

**Unit-VI: Doctrine of Separation of Powers legislative, Executive and Judicial and their functioning in India.**

**Unit - VII: The Election Commission and State Public**

**Service commissions. Unit - VIII: Method of amending the Constitution.**

**Unit - IX: Enforcing rights through Writs:**

**Unit - X: Constitution and Sustainable Development in India.**

## **Books:**

1. **J.C. Johari: The Constitution of India- A Politico-Legal Study- Sterling Publication, Pvt. Ltd. New Delhi.**
  2. **J. N. Pandey: Constitution Law of India, Allahbad, Central Law Agency, 1998.**
  3. **Granville Austin: The Indian Constitution - Corner Stone of a Nation- Oxford, New Delhi, 2000.**
-

## **ENVIRONMENT SCIENCE AND HEALTH**

### **Introduction to Environment and Health**

Sources, health hazards and control of environmental pollution  
Water The concept of safe and wholesome water.

The requirements of sanitary sources of water.

Understanding the methods of purification of water on small scale and large scale. Various biological standards, including WHO guidelines for third world countries.

Concept and methods for assessing quality of water.

Domestic refuse, sullage, human excreta and sewage their effects on environment and health, methods and issues related to their disposal.

Awareness of standards of housing and the effect of poor housing on health.

Role of arthropods in the causation of diseases, mode of transmission of arthropods borne diseases, methods of control

### **Recommended Books.**

1. Text Book of Environmental Studies for under graduate courses By Erach Bharucha Reprinted in 2006, Orient Longman Private Limited /Universities Press India Pvt. Ltd.
  2. English Kannada Encyclopedia Dictionary, Orient Longman PVT Ltd.
-

# Third Year B.Sc. ANAESTHESIA TECHNOLOGY

## Main Subjects

### Paper-I - Anaesthesia Technology - Clinical

1. **Pre operative preparation** Pre Anaesthetic Assessment History of present assessment Past history with emphasis on previous illness and surgery Personal history - Smoking, alcohol Physical examination - General and systemic
2. **Informed consent**
3. **Premedication: Aims**
  - a. Narcotics
  - b. Antihistamines
  - c. Antacids
  - d. Others - NTG
4. **Investigations**

Biochemistry - Blood, glucose, Urea, Creatinine  
Haematology - Haemogram, Prothrombin Time, Partial thromboplastin time, BT, CT  
Urine- Complete urine analysis  
ECG  
Chest X-ray  
ABG
5. **Criteria used for accepting the case for surgery**
6. **Equipment**

Checking the machine, laryngoscopes, tubes, airways etc. suction apparatus, oxygen Cylinder, anaesthetic drugs and emergency drugs.
7. **Monitoring system**



## 8. **Induction - Anaesthesia**

Endotracheal intubation, confirming the tube position and

securing the tube **Maintenance of anaesthesia**

**Fluid/Blood and electrolyte**

**balance Reversal from**

**anaesthesia - drugs used**

## 9. **Preparations**

a. **Identification**

b. **Consent**

---

- c. NPO
- d. Prosthesis
- e. Labresults
- f. Consultation
- g. Blood

**10. Testing Machine**

- a. Gas supply
- b. Flow meters
- c. O2 bypass
- d. Valves
- e. Vaporises

**11. Emergency Drugs**

- a. Atropine
- b. Epinephrine
- c. Isoprenaline
- d. Ephedrine
- e. Aminophylline
- f. Hydrocortizone
- g. Soda Bicarb
- h. Dopamine
- i. Norepinephrine
- j. Dobutamine

**12. I. V. Infusion**

- a. Site of cannulations
- b. Finding a vein
- c. Technique of venupuncture
- d. Special difficulty

**13. Protection of the Patient**

- a. The eyes
- b. The ears
- c. The skin
- d. The lips, tongue, teeth
- e. Veins, arteries
- f. Peripheral nerves

**14. Intubation**

- a. Choice of ETT
- b. Choice of Laryngoscope

- c. **Techniques of intubation**
  - d. **Complications**
  - e. **Difficult intubation**
-

## 15. Emergence, Termination and Recovery

1. Reversal
2. Oropharyngeal toilet
3. ET Suction
4. Deflation of the cuff
5. Removal of the tube
6. Transfer of the patient
7. In the recovery room
  - a. Patient identification
  - b. Diagnosis & Surgery
  - c. Type of anesthesia used
  - d. Fluid balance
  - e. BP
  - g. Any complications
  - h. Instructions about ventilation, vital signs
8. Problems in RR
  - a. B.P. hypo, hypertension
  - b. HR-Tachy, bradycardia
  - c. Pallor, cyanosis, dyspnea
  - d. Restlessness
  - e. Neurological- Seizures
  - f. Sweating

### Scheme of

### Examination

### Theory

There shall be one theory paper of three hours duration carrying 100 marks. Distribution of type of questions and marks for Paper-I - Anaesthesia Technology - Clinical shall be as given under.

TYPE OF QUESTION	NUMBER OF QUESTIONS	MARKS	SUB-TOTAL
LONG ESSAY (LE)	3 (To attempt 2)	2 x 10	20
SHORT ESSAY (SE)	12 (To attempt 10)	10 x 5	50
SHORT ANSWER (SA)	12 (To Attempt 10)	10 x 3	30
TOTAL MARKS			100

## **PRACTICAL EXAMINATION**

One common practical for all the three papers with equal weight age of marks i.e. 40 practical marks for each paper.

---

### **ANAESTHESIA TECHNOLOGY**

#### **Paper-II - Anaesthesia Technology - Applied**

History of anaesthesia  
in detail Methods of  
anaesthesia  
Inhalational  
Anaesthesia  
Minimum alveolar anaesthetic  
concentration Stages of ether  
anaesthesia  
Halothane  
Isoflurane  
Sevoflurane  
Nitrous  
oxide  
Narcotic  
drugs  
Opioids  
analgesics  
Morphine  
Pethidine  
Fentanyl  
Buprenorphine  
Tramadol  
Difficult  
intubation Muscle  
relaxants  
Neuromuscular  
blockers  
Suxamethorium  
Pancuronium

**Vecuronium**  
**Atracurium**  
**m**  
**Rocuronium**  
**m Reversal**  
**agents**  
**Intravenous**  
**anaesthetic agents**  
**Thiopentone**  
**Propofol**  
**Ketamine**  
**Intraoperative**  
**management Confirm**  
**the identity of the patient**  
**Transferring the**  
**patient**  
**Recovery room - setup, things needed**  
**expected problems Postoperative**  
**complications and management**  
**CPR**  
**Monitoring during anaesthesia**  
**and surgery Regional**  
**anaesthesia**  
**Spinal**  
**Anaesthesia**  
**Epidural**  
**Anaesthesia**  
**Nerve blocks**  
**Benzodiazapines**  
**nes**  
**henothazines**  
**Neuromuscular transmission**

---

**Nerve stimulators**  
**Reversal of neuromuscular blockage**  
**Drugs acting on sympathetic**  
**nervous system Adrenaline**  
**Noradrenaline**  
**Dopamine**  
**Dobutamine**  
**Milrinone**

Isoprenaline  
Local anaesthetic  
agents  
Lignocaine  
Bupivacaine  
Complications and accidents during anaesthesia

## **Complications:**

### **I. Related to equipment**

1. Hypoxemia
2. Hyercapnea
3. Increased airway pressure
4. Decreased airway pressure
5. Deep anesthesia
6. Thermal & electrical injuries
7. Monitoring instruments
8. Presenting anesthesia equipment complications
  - a. Being prepared with back up ventilation
  - b. Pre-use checkout
  - c. Maintenance
  - d. User education

### **II. Related to airway**

- a. Difficult intubations
- b. Airway Trauma

### **III. Cardiovascular System**

- a. Hypotension
- b. Hypertension
- c. Tachycardia
- d. Bradycardia
- e. Arrhythmias
- f. Ischemia & infarction

**Scheme of  
Examination Theory**

There shall be one theory paper of three hours duration carrying 100 marks. Distribution of type of questions and marks for Paper-II - Anaesthesia Technology Applied shall be as given under.

---

TYPE OF QUESTION	NUMBER OF QUESTIONS	MARKS	SUB-TOTAL
LONG ESSAY (LE)	3 (To attempt 2)	2 x 10	20
SHORT ESSAY (SE)	12 (To attempt 10)	10 x 5	50
SHORT ANSWER (SA)	12 (To Attempt 10)	10 x 3	30
TOTAL MARKS			100

**PRACTICAL EXAMINATION**

One common practical for all the three papers with equal weight age of marks i.e. 40 practical marks for each paper.

**B.Sc ANAESTHESIA TECHNOLOGY**

**Paper - III - Anaesthesia Technology - Advanced**

Anaesthesia & co- existing diseases  
Ischaemic heart disease  
Hypertension  
Congestive cardiac failure  
Arrhythmia & heart blocks  
Chronic bronchitis & COPD  
Bronchial asthma  
Paediatric anaesthesia  
Liver disease and anaesthesia  
Renal disease and



anaesthesia Obesity  
and anaesthesia  
Diabetes mellitus and  
anaesthesia Thyroid  
disease and anaesthesia

### **Obstetric Anaesthesia:**

1. Epidural analgesia
2. Anaesthesia for LSCS
3. Special situations: pre-eclampsia

Anaesthesia for common  
surgical disorders Anaesthesia  
for special situations  
Shock, low cardiac output &  
cardiac arrest Pulmonary function  
tests & their significance  
Ventilators - types & methods of  
ventilation Humidification  
Aerosol therapy

---

### **Resuscitation of the Newborn**

1. Apgar scoring system
2. Use of drugs
3. Temperature control

### **Anaesthesia for Thoracic Surgery**

1. Use of double lumen tubes
2. Anaesthesia for bronchoscopy
3. Thymectomy

### **Anaesthesia for cardiac surgery**

1. Preparations & monitoring
  2. Heparin & Protamine
  3. Care & use of arterial & venous lines
  4. Maintenance of body temperature
- 
5. Anaesthesia for open heart surgery
  6. Transport to ICU

## **Scheme of**

### **Examination Theory**

There shall be one theory paper of three hours duration carrying 100 marks. Distribution of type of questions and marks for Paper-III - Anaesthesia Technology Advanced shall be as given under.

<b>TYPE OF QUESTION</b>	<b>NUMBER OF QUESTIONS</b>	<b>MARKS</b>	<b>SUB-TOTAL</b>
<b>LONG ESSAY (LE)</b>	<b>3 (To attempt 2)</b>	<b>2 x 10</b>	<b>20</b>
<b>SHORT ESSAY (SE)</b>	<b>12 (To attempt 10)</b>	<b>10 x 5</b>	<b>50</b>
<b>SHORT ANSWER (SA)</b>	<b>12 (To Attempt 10)</b>	<b>10 x 3</b>	<b>30</b>
<b>TOTAL MARKS</b>			<b>100</b>

## **PRACTICAL EXAMINATION**

One common practical for all the three papers with equal weight age of marks  
i.e. 40 practical marks for each paper

**Subsidiary Subjects**

**BIO STATISTICS**

**Time Allotted: 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. Parameters and estimates.

Descriptive and inferential statistics. Variables and their types.

Measurement scales

**Unit - II: Tabulation of Data**

Raw data, the array, frequency distribution. Basic principles of graphical representation.

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

Normal probability curve.

### **Unit - III : Measure of Central Tendency**

**Need for measures of central tendency**

**Definition and calculation of mean - ungrouped and grouped**

**Meaning, interpretation and calculation of median**

**ungrouped and grouped. Meaning and calculation of mode.**

**Comparison of the mean, and mode.**

**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. The variance  
and standard deviation.

Calculation of variance and standard deviation  
ungrouped and grouped. Properties and uses of  
variance and SO

---

### **Unit -V : Probability and Standard Distributions.**

Meaning of probability of standard distribution. The Binominal distribution.

The normal distribution.

Divergence from normality - skewness, kurtosis.

### **Unit - VI : Samling Techniques**

Need for sampling - Criteria for good samples. Application of sampling in Community.

Procedures of sampling and sampling designs errors. Sampling variation and tests of significance.

### **Unit - VII : Health Indicator**

Importance of health Indicator.

Indicators of population, morbidity, mortality, health services. 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.

---

## **BASICS IN COMPUTER APPLICATIONS**

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 concept 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. Precautions 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, Computers in physical therapy - principles in EMG, Exercise testing equipment, Laser.

## **Scheme of Examination for MEDICAL ELECTRONICS including COMPUTER APPLICATIONS**

One Written (Theory) paper: Maximum Marks: -80 marks.

**No Practical or Viva voce examination** \_\_\_\_\_

## **CLINICAL TRAINING**

### **Content and purpose**

The clinical component has been designed to complement the academic program and runs throughout the course. The placement have to be designed so that the students will be able to observe the practical application of the academic course wherever possible. Content can be tailored to meet either National or Local needs as is deemed to be most appropriate.

### **1st year: Introduction to the Hospital Setting The purpose of this phase is :**

- i. For the students to become familiar with some of the practical applications of the academic course
- ii. To introduce the wider hospital setting
- iii. To help the students to identify the various disciplines within a hospital, their role and the importance of cooperation.
- iv. To introduce patients in a clinical setting and begin to acquire basic communication skills.

### **2nd year : Skills Necessary to work in a Hospital**

To be completed very early in the training. The following procedures will be demonstrated to the students who will be expected to observe or participate as appropriate.

#### **General procedures to be observed when patients attend for appointment :**

- Lifting and moving techniques.
- Administration of bedpans, vomit bowls, etc.,
- Care and management of drugs in the hospital setting.

#### **Correct procedures when dealing with patients with infectious diseases**

- University precautions.

#### **Correct procedures when dealing with immuno-compromised patients :**

- Hygiene practices
- Simple dressings



- Sterile procedures
  - Oxygen administration
-

**Care of patients with :**

- Breathing difficulties
- Terminal illness
- Mental impairment
- Physical disability
- Special care of the geriatric and pediatric patient
- Stoma care
- Handling of patients with bone metastases
- Care of the patient following an anaesthetic
- Care of lines in the incubated patient
- Communication skills with patients and relatives
- Terminally ill and Hospice

**2nd & 3rd year : Skills Related to working in a department**

Introduction to the department. Time will be spent on each unit within the department. The purpose of this phase is to :

**In the department :**

- i. Familiarize the students with the different units within the department and the procedures carried out on each unit.
- ii. Enable the student to recognize and relate to the basic terminology introduced in the academic program.
- iii. Help to establish a sense of identity within the student group and to understand the role of the Technology in the management of various cases.
- iv. Introduce the students to the staff of the department.
- v. Help the student to understand team roles.
- vi. Familiarize the students with written QA programs within the department.

**Equipment's and Integration :**

- i. Begin to become competent in the manipulation of the equipment.
- ii. Be able to communicate effectively with patients.
- iii. Begin to integrate into the department as part in specific and multidisciplinary teams.

- iv. **Begin to empathize with patients and to appreciate their own feelings in the clinical situation.**
- v. **Being able to handle and achieve proficiency in mould room techniques.**

**Safety & Precautions in Practice :**

- i. **Identifying the functions of various equipment and safe handling.**
-

- ii. Identifying the functions on a control panel, indicating their purpose and safely using these when appropriate.
- iii. Safely using the accessory equipment in the correct context.
- iv. Correctly and safely using equipment related to patient immobilization.
- v. Demonstrating the correct procedure for various techniques

### **To Achieve Clinical Competence**

**The purpose of this phase is for the students to :**

- i. Demonstrate competence in the manipulation of equipment.
- ii. Demonstrate an ability to anticipate the physical and psychological needs of the patient and respond to them.
- iii. Demonstrate the ability to communicate with ease with other staff involved in the multidisciplinary treatment of the patient.
- iv. Increasingly participate as a team member in all aspects of the patient's management.
- v. Demonstrate competence in simulator procedures.
- vi. Acquire basic computer skills.
- vii. Participate in the development / revision of formal written quality assurance procedures / programme.
- viii. Set up a patient on their first visit.

**To achieve final competency substantial time will be spent :**

- i. Setting up multi field techniques under supervision.
- ii. Participating in the quality control procedures in the department in accordance with the protocols.
- iii. Simulating and localizing a target volume.
- iv. Discussing the role of local rules and outline those in place in the different departments.

### **Graded Responsibility (structured training schedule)**

**I year :** Theory classes, observation in treatment planning and treatment execution.

**II year :** Theory classes, participation in OPD, mould room techniques, treatment planning, treatment execution under the supervision of consultant, senior technologist, project work.

**III year :** Theory classes, participation in OPD, Treatment planning and execution under supervision of consultant & Senior Technologist.

Submission of Project Work, Mould Room Techniques, Quality Assurance.

**Rotation posting**

Students may be posted to other relevant departments or other centers with better and latest equipment's for a minimum period of 1 to 2 months, for completion of training in recent advance in the specialty. The student on completion of the training shall submit a report duly signed by the concerned department to the HOD.

---

## **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 sample checklist provided (Assessment forms).

**The learning outcomes to be assessed should include :**

- i. Personal Attitudes
- ii. Acquisition of knowledge
- iii. Clinical and operative skills
- iv. Teaching skills

**Candidate should be encouraged to participate in teaching activities, seminars and literature reviews.**

### **1. Periodic tests :**

The departments may conduct periodic tests (Internal Assessment), the tests may include written papers, practical with viva voce.

Work diary / Log, Personal Attitudes.

**The essential items are :**

- Caring attitudes
- Initiative
- Organizational ability
- Potential to cope with stressful situations and undertake responsibility
- Trustworthiness and reliability
- To understand and communicate intelligibly with patients and other
- To behave in manner which establishes professional relationships with patients and colleagues
- Ability to work in team
- A critical enquiring approach to the acquisition of knowledge the methods used mainly consist of observation. It is appreciated that these items require a degree subjective assessment by the guide, supervisors and peers.

### **3. 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 log book 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.

---

#### **4. Technical skills**

Day to day work : Skills on the machines should be assessed periodically. The assessment should include the candidates' sincerity and punctuality, analytical ability and communication skills.

Clinical and procedural skills : The candidate should be given graded responsibility to enable learning by apprenticeship. The performance is assessed by the guide by direct observation. Particulars are recorded by the student in the log book.

#### **5. Teaching Skills:**

##### **Book :**

Every candidate shall maintain a work diary and record his / her participation in the training programs conducted by the department such as practical, literature reviews, seminars, etc. Special mention may be made of the presentations, by the candidate as well as details of practical or laboratory procedures, if any conducted by the candidate.

#### **6. Records :**

Records, log books, project report and marks obtained in tests will be maintained by the Head of the Department and will be made available to the University as indicated. The record books maintained by the student should be submitted to the Head of the Department 6 months prior to completion of the course and the head of the department makes a certification of the of the academic progress an assessment of student performance throughout the said courses shall be made by the HOD.

The log book is a record of the important activities of the candidates during his training internal assessment should be based on the evaluation of the log book 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.

---