SHRI
DHARMASTHALA
MANJUNATHESHWARA
UNIVERSITY

ORDINANCE GOVERNING
B.SC. IN ALLIED HEALTH SCIENCES
B. Sc. ANAESTHESIA TECHNOLOGY
2020-21

SHRI DHARMASTHALA MANJUNATHESHWARA UNIVERSITY
(A State Private University established under the Shri Dharmasthala Manjunatheshwara University
Act No 19 of 2018 of Government of Karnataka and Notification No. ED 261 URC 2018 dated 19th December 2018)

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|| Om Shri Manjunathaya Namaha ||

Shree Kshethra Dharmasthala

Edition Year : 2020-21

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THE LOGO

Poojya Dr D. Veerendra Heggade, Hon'ble Chancellor of the University, while searching for an appropriate Logo for the University, saw a photograph picked from Temple Architecture showing Wings of a Bird, sculpted in Indian style and wanted it to be incorporated in the logo for the University, as the Wings symbolize 'Spreading of Knowledge beyond Boundaries'. Further it was felt that the Central theme of the logo should be 'Rudra' (The Linga) with wings on each side. In this way, the logo of the University was conceptualized.

Hence:

1. The central part represents **Rudra** who Demolishes Darkness.
2. The Three **horizontal lines on The Linga** stand for Samyak Darshan (Right Belief), Samyak Gyan (Right Knowledge) and Samyak Charitra (Right Conduct).
3. The **Wings** symbolize spreading of Knowledge across the boundaries.
4. Base line **"Truth Liberates"** highlights the Purpose of Education: to liberate oneself unconditionally. It shows that it is not discipline, nor knowledge nor the efforts to freedom that liberate but Truth is what liberates you from all your conditioning and ignorance.

The overall significance of Shri Dharmasthala Manjunatheshwara University's Logo is:

Darkness of ignorance is destroyed by the flow of knowledge to bring Liberty to everyone, by realizing the truth. And, it should spread globally without the boundaries as hindrance.

SHRI
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UNIVERSITY

TRUTH LIBERATES

VISION

Shri Dharmasthala Manjunatheshwara University will set the highest standards of teaching and learning by awakening the intelligence of the students and nurturing the creativity hidden in them by creating an environment where the ancient wisdom blends with modern science, to transform them into whole human beings to face the challenges.

MISSION

- To ensure that the journey of education is inspiring, pleasant and enjoyable.
- Attract the best of teachers and students.
- Achieve high principles of trust, love and spirituality in the students.
- Create a collaborative, diverse and exclusive community.
- Transform the student of today to be a leader of tomorrow and a better human being.
- Produce passionate teachers.
- Evolve innovative teaching techniques.
- Create a peaceful environment.
- Prepare the student to face the social challenges.
- Create a University of which the Nation is proud of.
- Be an effective partner in Nation Building.
- Create an Eco-friendly University.
- Create a University based on the principles of beauty, love and justice.

||Om Shanti! Om Shanti! Om Shanti||

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SDMU/Notif-123/2020/178

Date: 19.09.2020

NOTIFICATION

Ordinance Governing the Curricula of B.Sc. in Anesthesia Technology - 2020

Ref:
1. Minutes of the 3rd Meeting of the Board of Studies Medical Allied Sciences held on 4th July 2020
2. Minutes of the 3rd Meeting of the Academic Council held on 3rd August 2020

In exercise of the powers conferred under Statutes 1.4 (Powers and functions - Para ix & x), 1.8 (Powers and functions - Para i) of Shri Dharmasthala Manjunatheshwara University, the Academic Council is pleased to approve and notify the Ordinance governing the Curricula of **B.Sc. in Anesthesia Technology – 2020.**

The ordinance shall be effective for the students joining the courses during the academic year 2020-21 and onwards.

Lt Col U. S. Dinesh (Retd)
REGISTRAR
REGISTRAR,
Shri Dharmasthala Manjunatheshwara University, Dharwad

To: 1. The Principal, SDM College of Medical Sciences & Hospital
2. Coordinator - Medical Allied Sciences, SDM College of Medical Sciences & Hospital, Dharwad

Copy for kind information to:
1. Hon'ble Vice Chancellor - Shri Dharmasthala Manjunatheshwara University
2. Pro Vice Chancellor (Academics) - Shri Dharmasthala Manjunatheshwara University
3. Controller of Examinations - Shri Dharmasthala Manjunatheshwara University
4. Office of the Registrar
5. University Office for Records File & Website

Shri Dharmasthala Manjunatheshwara University ★ DHARWAD

B. Sc. ANAESTHESIA TECHNOLOGY COURSE

PREAMBLE

The B.Sc. Anaesthesia Technology Course is a 4 years degree program aimed at training students in the technological aspects of Anaesthesia care with a good scientific foundation. These students will be in a position to competently assist the Anaesthesiologists & the Surgeons, especially in high tech Anaesthesia techniques & surgical theaters. They will be in much demand both within the country and abroad as Anaesthesia Technologists. With advanced training in the latest technologies in Anaesthesia specialty, these graduates will play an important
role in determining the quality of health care provided.

OBJECTIVE

The objective is to impart the basic Anaesthesia knowledge, technical skills and its application in the health care delivery system.

1. Eligibility for admission:

A candidate seeking admission to the Bachelor of Science Degree Courses in the Allied Health Sciences course, shall have studied English as one of the principal subject during the tenure of the course.

a. Two year Pre-University examination or equivalent as recognized by Pre University Board or equivalent authority with, Physics, Chemistry and Biology as principal subjects of study.

OR

b. Any equivalent examination recognized by the SDM University for the above purpose with Physics, Chemistry and Biology as principal subjects of study.

OR

c. Candidates with two years diploma from a recognized Government Board in a subject for which the candidate desires to enrol, in the respective Allied Health Sciences course mentioned shall have passed plus 12 [10+2] with Physics, Chemistry and Biology, as principal subjects.

d. Lateral entry to second year for allied health science courses for candidates who have passed diploma program from the Government Boards and recognized by SDM University, fulfilling the conditions specified above.

Note:

a. The candidate shall have passed individually in each of the principal subjects.
b. Candidates who have completed diploma or vocational course through.

Correspondence shall not be eligible for any of the courses mentioned above.

2. **Intake: 10 seats**

3. **Duration of the course:**
   Duration shall be for a period of **four years including one year of Internship.**

4. **Medium of instruction:**
   The medium of instruction and examination shall be in **English**.

5. **Attendance**
   Every candidate should have attended **at least 80% and 35% IA marks** 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.

Internal Assessment (IA): Theory - 30marks, Practical – 20marks

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 SDM 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 college 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.

Distribution of Teaching Hours in First Year Subjects

	Subject	Theory	Practical	Total
1	Anatomy	70	20	90
2	Physiology	70	20	90
3	Biochemistry	70	20	90
4	Pathology	70	20	90
5	Microbiology	70	20	90
	Total	**350**	**100**	**450**

Subsidiary Subjects:

Sl No	Subject	Teaching hours
1	Computer basics	20
2	English and Communication Skills	20
3	Health care	20
4	Basic Science with Skill Development Training and Hospital Procedure and Records	40

Distribution of Teaching Hours in Second Year Subjects:

Sl. No	Theory	Theory	Practical	Clinical postings	Total
1	Applied Pharmacology	50	-		50
2	Applied Pathology + Applied Microbiology	30+30	30+30		120
3	Basics of Anaesthesia	50	30		80
4	Applied Technology in Anaesthesia	80	70	650	800
	Total	**240**	**160**	**650**	**1050**

Subsidiary Subjects:

Sl No	Subject	Teaching hours
1	Indian constitution	20
2	Sociology	20
3	Environment science and health	20
4	Clinical psychology	20

Distribution of Teaching Hours in Third Year Subjects:

Sl. No.	Subject	Theory	Practical	Clinical Posting	Total
1	Applied Anaesthesia Technology	40	40	200	280
2	Regional anaesthesia Technology	30	30	150	210
3	Anaesthesia for patients with medical disorders/Clinical Anaesthesia	40	40	200	280
4	Advanced Anaesthesia Technology	40	40	200	280
	Total	**150**	**150**	**750**	**1050**

Subsidiary Subjects:

Sl No	Subject	Teaching hours
1	Research methodology	20
2	Biostatistics	20

I YEAR BSc ANAESTHESIA TECHNOLOGY

SUBJECT: ANATOMY **Total teaching hours 70+20 = 90 hours**

Theory: 70 hours

Practicals: 20 hours

Teaching Hours

S N	Topic	Theory (Hours)	Practicals (Hours)
1	**Introduction:** Definition of anatomy and its divisions Terms of location, positions and planes Epithelium-definition, classification, describe with examples, functions Glands- classification, describe serous, mucous & mixed glands with examples Basic tissues – classification with examples **Practicals:** Histology of types of epithelium Histology of serous, mucous & mixed salivary glands	6	2
2	**Connective tissue:** 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 foetal skull Joints - Classification of joints with examples, synovial joint Muscular system: Classification of muscular tissue & histology Names of muscles of the body **Practicals:** 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	8	3

3	**Cardiovascular system:** 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, Porto systemic 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 **Practicals:** 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	10	2
4	**Gastro-intestinal system** 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 **Practicals:** Demonstration of parts of GIT Radiographs of abdomen	8	2
5	**Respiratory system** Parts of RS: nose, nasal cavity, larynx, trachea, lungs, pleura bronchopulmonary segments, diaphragm Histology of trachea and lung Names of paranasal air sinuses **Practicals:** Demonstration of parts of respiratory system. Normal radiographs of chest, X-ray paranasal sinuses Histology of lung and trachea	8	2

6	**Urinary system:** Kidney, ureter, urinary bladder, male and female urethra Histology of kidney, ureter and urinary bladder **Practicals:** Demonstration of parts of urinary system Histology of kidney, ureter, urinary bladder Radiographs of abdomen-IVP, retrograde cystourethrogram	6	2
7	**Reproductive system:** 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 **Practicals:** 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	2
8	**Endocrine glands:** Names of all endocrine glands Pituitary gland, thyroid Gland, Parathyroid gland, pancreas & suprarenal gland in detail – (gross & histology) **Practicals:** Demonstration of endocrine glands Histology of pituitary, thyroid, parathyroid, pancreas, suprarenal glands	4	1
9	**Nervous system:** Neurons, neuroglial cells & Classification of Nervous system Cerebrum, cerebellum, midbrain, pons, medulla oblongata, spinal cord with spinal nerves Meninges, Ventricles & cerebrospinal fluid, Names of basal nuclei Blood supply of brain Cranial nerves Sympathetic trunk & names of parasympathetic ganglia	8	2

	Practicals: Histology of peripheral nerve & optic nerve Demonstration of all plexuses and nerves in the body Demonstration of all parts of brain		
10	**Sensory organs:** Skin: Skin-histology & Appendages of skin Eye: Parts of eye & lacrimal apparatus, Extra-ocular muscles Ear: parts of ear- external, middle and inner ear and contents **Practicals:** Demonstration of contents of orbit, and parts of eyeball Demonstration of parts of ear Histology of thin and thick skin Histology of cornea & retina	4	2
	Total	70	20

TEXT BOOKS RECOMMENDED (LATEST EDITIONS)

1. Text book of Anatomy & Physiology for nurses – P. R. Asha Lata & G Deepa, 3rd edition
2. Inderbir Singh's Text book of Human Histology with color atlas and Practical Guide, 2016
3. B.D. Chaurasia's Handbook of General Anatomy, 6th edition, edited by Krishna Garg, CBS Publishers and Distributors, New Delhi
4. B. D. Chaurasia's Human Anatomy, volume1, 2, 3, 4, 8th edition, edited by Krishna Garg, CBS Publishers and Distributors, New Delhi
5. Textbook of Clinical Embryology, Vishram Singh, Elsevier 2nd edition

SCHEME OF EXAMINATION:

Marks distribution:

Paper	Subjects	Theory		*Practical/Viva		Total
		UE	IA	UE	IA	
1	**Anatomy**	70	20	-	10	100

*There shall be NO University practical examination in Anatomy

Marks Distribution: Total - 70 marks

- Long essay: 2 Questions X 10 marks each = 20 marks (answer 2 out of 3 questions)
- Short essay: 6 Questions X 5 marks each = 30 marks (answer 6 out of 8 questions)
- Short answer:10 Questions X 2 marks each = 20 marks (answer all questions)

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PHYSIOLOGY

Theory: 70hours

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.

Haemoglobin- function, concentration, types & methods of Hb estimation, fate of haemoglobin

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 O2 & CO2
Chemical regulation of respiration Neural regulation of respiration Hypoxia, Acclamatization, 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 of 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

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:
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 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

Practical's: Only Demonstration

Blood pressure Recording

Auscultation for Heart Sounds

Pulmonary Function Tests

Testing for Autonomic Function

CNS Examination including tests motor and sensory assessment without reflexes

Question Paper pattern Maximum Marks= 70 (for first year B. Sc)			
Type of questions	**No. of questions**	**Marks for each question**	**Total Marks**
Essay type	3 (2x10)	10	20
Short Essay Type	8 (6x5)	05	30
Short Answer Type	12(10x2)	02	20
	Total		70

Distribution of Marks for University Theory and Practical Exam					
Theory				Practical	Grand Total
Theory	Viva Voce	IA	Total	-	
70	-	30	100	-	100

There will be no university practical examination

REFERENCE BOOKS:

AK Jain for B.Sc Paramedical Students
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

SUBJECT - BIOCHEMISTRY

Course - First year B.Sc Anaesthesia

Teaching hours:

Theory: 70 hours

Practical: 20 hours

THEORY: 70 hours

1. Carbohydrate Chemistry: Definition, classification with examples, Composition, sources, functions of Monosaccharides, Disaccharides, Polysaccharides and Glycosaminoglycans.

2. Lipid Chemistry: Definition, classification of lipids and Fatty acids. Essential fatty acids- Definition, example, functions, deficiency features & Significance. Functions of Cholesterol, Phospholipids and their importance.

3. Amino-acid Chemistry: Definition, Classification based on side chain properties, nutritional requirement, Peptide bonds, biologically important peptides. Protein chemistry: Definition, Classification based on chemical nature and solubility, Functions of proteins Structure and functions of Collagen, Elastin. Plasma proteins and Immunoglobulins – types and functions.

4. Enzymes: Definition, Classification with examples. Factors effecting enzyme activity, Mechanism of enzyme action in brief. Active site, Coenzyme, Proenzyme and Isoenzyme with examples. Diagnostic enzymology (clinical significance of enzymes and isoenzymes - CK, CK-MB, LDH, AST, ALT, ALP)

5. Nucleotide and Nucleic Acid Chemistry: Nucleosides and Nucleotide composition with examples. Nucleic acid: DNA and RNA - chemistry, types and functions

6. ATP formation: Fundamentals of Biological oxidative reactions.

7. Carbohydrate Metabolism: Digestion and absorption, Pathway and significance of Glycolysis – Aerobic, Anaerobic. Pathway and energetics of Citric acid cycle. Gluconeogenesis in brief. Glycogen metabolism – Pathway and glycogen storage disorders. HMP shunt pathway and significance. Regulation of blood glucose level. Diabetes mellitus: Definition, classification, signs and symptoms, diagnosis.

8. Lipid Metabolism: Digestion and absorption, Lipolysis, pathway and energetics of β-oxidation of fatty acids. Ketone body metabolism: Ketone body formation (ketogenesis), utilization (ketolysis), ketosis. Lipoproteins - Types and functions. Dyslipidemia, Atherosclerosis, CAD, fatty liver.

9. Amino acid and Protein Metabolism: Digestion and absorption, Catabolism of amino acids - Transamination, deamination, Fate of ammonia, transport of ammonia, Urea cycle. Specialized products formed from amino acids - glycine, arginine, methionine, phenylalanine, tyrosine trptophan.

10. Vitamins: Definition, classification according to solubility, Individual vitamins (Water soluble & fat soluble) - Sources, Coenzyme forms, functions, RDA, digestion, absorption and transport, deficiency and toxicity of A, D, C in detail, function and deficiency features of E, K, B-complex vitamins.

11. Minerals: Micro and macro minerals, Sources, RDA, Digestion, absorption, transport, excretion, functions, disorders of Individual minerals - Calcium, Phosphorous, Iron in detail; Functions and deficiency features of Copper, Zinc, Selenium, Iodine, Na, K, Cl.

12. Nutrition: Calorific values of foodstuffs Respiratory quotient Basal metabolic rate: Definition, Normal values, Factors affecting BMR. Special dynamic action of food. Balanced Diet: Definition, Components, Recommended dietary allowances. Role of carbohydrates in diet: Digestible carbohydrates and dietary fibers. Role of lipids in diet: Saturated and unsaturated fatty acids, PUFA, Essential fatty acids. Role of proteins in diet: Quality of proteins - Biological value, net protein utilization. Nutritional aspects of proteins- essential and non-essential amino acids. Nitrogen balance. Nutritional disorders – protein Energy Malnutrition.

13. Radioactive Isotopes: Definition, clinical applications, Biological effects of radiations.

14. Acid base balance: Definitions of acid, base, pH and pKa, Henderson Hasselbalch equation. Buffers - Buffer systems in the ECF/ ICF and urine. Bicarbonate and phosphate buffer systems (pKa value, normal ratio of base/acid in the plasma) Role of kidneys in acid base balance. Acidosis & Alkalosis: Types, causes and biochemical findings.

15. Biophysical chemistry Valency, Molecular weight and Equivalent weight of elements and compounds. Definition of Normality, Molarity, Molality with formula.

16. Solutions: Definition, use, classification, preparation and storage of solutions/reagents. Molar and Normal solutions of compounds and acids. 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 and Storage. Dilutions- Diluting Normal, Molar and percent solutions.
    Part dilutions: Specimen dilutions, Serial dilutions, Reagent dilution, Dilution factors. Stock and working solutions. Preparing working standard from stock standard.

17. Clinical Biochemistry: Reference values of biochemical analytes measured in serum/blood and their clinical significance. Renal Function Tests - Serum Urea, Creatinine, Clearance tests, plasma and urine osmolarity. Liver Function Tests - Bilirubin, Total protein, albumin, Enzymes (AST, ALT, ALP, GGT), Lipid Profile - Total Cholesterol, Triglycerides, LDL, HDL. Thyroid profile - TSH, T3, T4, fT3, fT4. Arterial blood gas analysis, Blood gas analyzer (Principle & Applications). Electrolyte analysis, electrolyte analyzer (Principle & Applications)

18. Biomedical waste disposal

PRACTICAL: 20hours

1. General Reactions of Carbohydrates
2. General Reactions of Proteins/Amino Acids
3. Analysis of Normal and Abnormal Urine
4. Colorimetry/Spectrophotometry/Autoanalyzer
5. Estimation of Blood glucose by enzymatic method (GOD-POD method)
6. Estimation of Urea
7. Estimation of Creatinine
8. POCT instruments/Devices

SCHEME OF EXAMINATION

Theory - 100 marks
University exam - 70 marks
Internal assessment - 30 marks
NO university practical exam
There shall be one theory paper of three hours duration carrying 70 marks.

Distribution of type of questions and marks for Biochemistry:

Biochemistry Theory Paper Course - First year B. Sc Anesthesia Maximum marks = 70 marks			
Type of Questions	**No. of questions**	**Marks for Each Questions**	**Total Marks**
Long Essay (answer any 3)	3 (2 x 10)	10	20
Short Essay (answer any 6)	8 (6 x 5)	05	30
Short Answer (answer all)	10 (10 x 2)	02	20
	Total		70

Internal Assessment:

Internal Assessment Marks (Theory): 30

Minimum Two IA should be conducted. Candidate should score minimum 50% average IA marks to get eligibility to appear for final university examination.

*There shall be no university practical examination and hence practical internal assessment marks need not be sent to the university.

Text Book References - Latest editions

1. Vasudevan, Sreekumari -Text book of Biochemistry,Latest Ed
2. Biochemistry –U Sathyanarayana & U Chakrapani
3. Biochemistry - by Pankaja Naik
4. Godkar – Text book of Medical Laboratory Technology
5. Medical Laboratory technology by Ramnik Sood
6. Manipal Manual of Clinical Biochemistry for medical laboratory and M.Sc., students - by Shivananda Nayak B
7. Clinical chemistry - Marshall, William J.;Bangert, Stephen K.

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GENERAL PATHOLOGY

Clinical Pathology, Hematology and Blood Banking

Theory-70 hours

Practicals-20 hours

I. 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.

II. 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)

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 Practical

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

Question Paper pattern Maximum Marks= 70 (for first year B.Sc)

Type of questions	No. of questions	Marks for each question	Total Marks
Essay type	3 (2x10)	10	20
Short Essay Type	8 (6x5)	05	30
Short Answer Type	12(10x2)	02	20
	Total		70

Distribution of Marks for University Theory and Practical Exam					
Theory				**Practicals**	**Grand Total**
Theory	**Viva Voce**	**IA**	**Total**	**-**	
70	-	30	100	-	100

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 edition JP Bros, New Delhi, 1996

MICROBIOLOGY

Theory: 70 Hrs. + Practical: 20 Hrs: Total teaching hours 90

Objective: This course introduces the principles of Microbiology with emphasis on applied aspects of Microbiology of infectious diseases particularly in the following areas

- Principles & practice of sterilization methods
- Collection and transport of specimens for routine microbiological investigations
- Interpretation of commonly done bacteriological and serological investigations
- Control of Hospital infections & Biomedical waste management
- Immunization schedule

Theory - 70 hours

1**. Morphology** **4 hours**

Classification of the microorganisms: size, shape and structure of bacteria. Use of microscope in the study of bacteria

2. Growth and nutrition **4 hours**

Nutrition, growth and multiplications of bacteria, use of culture media in diagnostic bacteriology.

3. Sterilisation and Disinfection **6 hours**

Principles and use of equipment's of sterilization namely Hot Air oven, Autoclave and serum inspissator. Pasteurization, Anti septic and disinfectants.

Antimicrobial sensitivity test

4. Immunology **10 hours**

Immunity Vaccines, Types of Vaccine and immunization schedule Principles and interpretation of commonly done serological tests namely Widal, VDRL, ASLO, CRP, RF & ELISA. Rapid tests for HIV and HbsAg (Technical details to be avoided)

5. Systematic Bacteriology **25 hours**

Morphology, cultivation, diseases caused , laboratory diagnosis including specimen collection of the following bacteria(the classification, antigenic structure and pathogenicity are not to be taught) Staphyloccci, Streptococci, Pneumococci, Gonococci, Menigococci, C. diphtheriae, Mycobacteria, Clostridia, Bacillus, Shigella, Salmonella, E. coli, Klebsiella, Proteus, Vibrio cholerae, Pseudomonas & Spirochetes

7. Mycology **4 hours**

Morphology, diseases caused and lab diagnosis of following fungi.
Candida, Cryptococcus, Dermatophytes, opportunistic fungi.

8. Virology **8 hours**

General properties of viruses, diseases caused lab diagnosis and prevention of following viruses, Herpes, Hepatitis, HIV, Rabies and Poliomyelitis.

9. Hospital infection Control **5 hours**

Causative agents, transmission methods, investigation, prevention and control

10. Biomedical waste management- Principles and practice **4 hours**

Practical 20 hours

Compound Microscope
Demonstration and sterlization of equipments - Hot Air oven, Autoclave, Bacterial filters.
Demonstration of commonly used culture media, Nutrient broth, Nutrient agar, Blood agar, Chocolate agar, Mac conkey medium, LJ media, Robertson Cooked meat media, Potassium tellurite media with growth, Mac with LF & NLF, NA with staph
Antibiotic susceptibility test
Demonstration of common serological tests - Widal, VRDL, ELISA.
Grams stain
Acid Fast staining
Visit to hospital for demonstration of Biomedical waste management.
Anaerobic culture methods

Internal Assessment

Theory - Average of two exams conducted – Marks 20
Practical's: Record & Lab work* - Marks - 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 70 marks. Distribution and type of questions and marks for Microbiology shall be as given under

TYPE OF QUESTION	NUMBER OF QUESTIONS	MARKS	SUB – TOTAL
LONG ESSAY(LE)	3 (To attempt 2)	2x10	20
SHORT ESSAY(SE)	8 (To attempt 6)	6x5	30
SHORT ANSWER (SA)	All are compulsory	10x2	20
TOTAL MARKS			70

NO PRACTICAL EXAMINATION

REFERENCE BOOKS

1. Essentials of Medical Microbiology Apurba Shankar Sastry 2nd ed
2. Textbook of Microbiology Ananthnarayan and Paniker's 11 ed
3. Essentials of Medical Microbiology Apurba Shankar Sastry 3rd ed
4. Roberty Cruckshank - Medical Microbiology - The Practice of Medical Microbiology
5. Rippon - Medical Mycology
6. Emmons - Medical mycology
7. Basic laboratory methods in Parasitology, 1st Ed, J P Bros, New Delhi
8. Basic laboratory procedures in clinical bacteriology, 1st Ed, J P Brothers, New Delhi

SUBSIDIARY SUBJECTS

1. Introduction to Computers
2. Definition: Input. Output & CPU
3. Input and output devices: types
4. Basis of computer system: Switching on & off, what is Bias? And computer generations
5. Keyboard practices
6. Definitions of terms: Desktop & Software
7. Computer systems: Hardware & software definitions
8. Windows operating system (win7, 8, 10 etc): Definition & Why, Calculator - Word pad - Short cuts - Start menu - Media player - Note pad - Win amp – Paint - Control panel
9. Microsoft word: Opening, saving, deleting, typing, print , Page border, spelling, table, grammar, margin, Clip art, BIU, word art, Colour text & background, Picture drawing using word
10. Excel: Formulas - Design charts- Format tables
11. PowerPoint: Designing a presentation - Inserting some animation with sound
12. Internet &its applications: Interconnection to HTML, E- mailing – Browsing - Chatting

II. ENGLISH AND COMMUNICATION SKILLS

Teaching Hours: 20

NGLISH

1. Functional English –Grammar: Components of a sentence – Verb - Transformation of sentences – Voice - Reported speech - Positive/ negative -Statement/ Interrogative - Subject verb agreement - Common errors – Exercises
2. Vocabulary: Synonyms and antonyms - Idioms and phrases – Similies - Words denoting assemblage
3. Writing skills: Note making – Summarizing - Report writing - Letter writing
   - Expansion of an idea
   - Comprehension
4. Reading: What is efficient and fast reading? - What is Awareness of existing reading habits - Tested techniques for improving speed - Improving concentration and comprehension through systematic study

COMMUNICATION

5. Introduction: Communication process - Elements of communication - Barriers of communication and how to overcome them.

6. Speaking: Importance of speaking efficiently - Voice culture - Preparation of speech - secrets of good delivery - Audience psychology handling - Presentation skills - Conference/Interview technique

7. Listening: Importance of listening - Self-awareness about listening -Action plan execution - Barriers in listening - Good and persuasive listening

8. Nonverbal Communication: Basics of nonverbal communication

9. Memory: What is memory, Brain- mind potential? - Systems for memorizing

   - Summary page
   - Building positive mental habits

10. Self-awareness: Self-image - Self talk – Relaxation - Personality development

III HEALTH CARE Teaching Hours: 20

1. 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

2. Introduction to 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.

3. 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.

IV. BASIC SCIENCE WITH SKILL DEVELOPMENT TRAINING AND HOSPITAL PROCEDURE AND RECORDS

Teaching Hours: 40

1. Basic science with skill development training
   - Medical ethics & the relevant medico legal aspects
   - Responsibilities & duties
   - Ethical behaviour & conduct
   - Medico-legal aspects and its relation to consumer protection act
   - Biomedical waste & Its management
   - Cardiopulmonary resuscitation- basic cardiac life support & advanced cardiac life support
   - Critical care nephrology - management of renal failure in ICU
   - Basic principles of blood transfusion & fluid therapy
   - Sterilization - material & methods
   - Biochemistry, Microbiology, Pathology & other related instrumentation: Basic principles of commonly used instruments, care & maintenance

2. Infection control

- The cycle of infection
- Infectious organisms
- The reservoir of infection
- The susceptible host Transmission of disease Practical asepsis
- Handling linen
- Disposal of contaminated waste
- Environmental asepsis
- Isolation technique
- The isolation patient in radiology dept.
- Precaution for the comprised patient Surgical asepsis

3. Medication and their administration (nursing classes)

- The role of the radiographer Medication information
- The topical route
- The oral route
- The parenteral route Preparation of injection
- The intravenous route Charting

4. Dealing with acute situations (emergency medicine classes)

Accident victims: Head injury/ Fractures/ Burns Life threatening emergencies: Respiratory arrests, Heart attacks and cardiac arrests, Shock Other emergencies - Epitaxis, Postural hypotension and vertigo Seizures, Diabetic coma and insulin reaction Asthma

5. CARDIOPULPONARY RESUSCITATION (C.P.R)

- Basics of CPR - How to give CPR? Precautiosn during CPR
- Basic cardiac life support & advanced cardiac life support

6. HOSPITAL PROCEDURE AND RECORDS

General idea about the role, importance and procedures of the following within the hospital set up -

- Medical records
- Medical photography
- Computer networking system
- Laboratory services
- Sample collection and transport
- Biomedical waste disposal

NOTE: No University Examination for Subsidiary Subjects.

Second Year B.Sc Anaesthesia Technology

SUBJECT: BASIC AND APPLIED PHARMACOLOGY

TEACHING HOURS: 50 hours

THEORY: Course content

SI. NO	TOPICS
TOPIC PH 1: GENERAL PHARMACOLOGY	
1	Introduction and sources of drugs, routes of drug administration
2	Pharmacokinetics - Absorption and bioavailability, distribution, biotransformation, excretion
3	Pharmacodynamics - Types and mechanism of drug action
4	Adverse drug reactions
SYSTEMIC PHARMACOLOGY	
TOPIC PH 2: DRUGS ACTING ON ANS	
5	Anatomy and functional organization - Introduction, neurotransmitters and mechanism of action
6	Cholinergic & anticholinergic drugs
7	Adrenergic & antiadrenergic drugs
8	Neuro muscular blocking agents and skeletal muscle relaxants
TOPIC PH 3: DRUGS ACTING ON CNS	
9	Sedative, hypnotics, alcohol
10	General anesthetics, inhalational gases and emergency drugs
11	Local anesthetics
12	Opioid and non-opioid analgesic drugs
13	Non-steroidal anti-inflammatory drugs & antihistaminics
TOPIC PH 4: DRUGS ACTING ON CVS	
14	Anti-hypertensives (beta adrenergic, alpha adrenergic, peripheral vasodilators, calcium channel blockers)
15	Anti-anginal drugs
16	Antiarrhythmic drugs & cardiac glycosides
17	Drugs used in treatment of shock, hypolipidemic drugs
TOPIC PH 5: DRUGS ACTING ON RENAL SYSTEM	

18	Renal physiology, diuretics & antidiuretics
	RESPIRATORY SYSTEM
19	Drugs used in bronchial asthma & cough (mucokinetic and mucolytic agents, use of bland aerosols in respiratory care)
TOPIC PH 6: BLOOD	
20	Drugs used in hemostasis - anticoagulants, thrombolytics and antithrombolytics
TOPIC PH 7: HORMONES AND DRUGS ACTING ON GIT	
21	Corticosteroids and anti-emetics
TOPIC PH 8: CHEMOTHERAPY	
22	**General chemotherapy** - Basic principles of chemotherapy
23	**Systematic chemotherapy -** Classification / examples, spectrum uses and adverse effects a) Antibacterial drugs: Sulphonamides, fluoroquinolones, beta-lactam antibiotics, tetracycline and chloramphenicol, macrolides, aminoglycosides, other: polymyxin, bacitracin b) Antifungal, Antiviral, Antitubercular, Antileprosy drugs in brief
TOPIC PH 9: MISCELLANEOUS TOPICS	
24	Immunosuppressive agents
25	Intravenous fluids - various preparations and their usages Electrolyte supplements
26	Cardioplegic drugs- History, Principles and types of cardioplegia
27	Primary solutions - History, principles & types
28	Pharmacological protection of organs during CPB
29	New drugs included in perfusion technology

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.

RECOMMENDED BOOKS (Latest editions)

1. Essentials of Medical Pharmacology KD Tripathi, Jaypee Publishers
2. Pharmacology & Pharmacotherapeutics, R.S. Satoskar, Nirmala N. Rege, Raakhi K. Tripathi, SD Bhandarkar by Elsevier

3. Textbook of Pharmacology for Paramedical Students by Pathania J.S. CBS Publishers
4. Pharmacology Essentials For Allied Health Jill Marquis, Jennifer Danielson and Skye Mc.Kennon, EMC Pardigm Publishers
5. Textbook of Pharmacology for Paramedical Students by Pathania J.S. CBS Publishers

SCHEME OF EXAMINATION:

Marks distribution:

Paper	**Subjects**	**Theory**		**Practical/Viva**		**Total**
		UE	**IA**	**UE**	**IA**	
3	Basic and Applied Pharmacology	80	20	-	-	100

***There shall be NO University practical examination in Pharmacology.**

Sl. NO.	**Questions**	**Questions asked**	**Questions to attempt**	**Marks**	**Max. Marks**	**Internal Assessment**	**Total Marks**
1	Long Essay Questions	**3**	**2**	**2 x 10**	**20**	**20**	**100**
2	Short Essay Questions	**7**	**6**	**6 x 5**	**30**		
3	Short Answer Questions	**10**	**10**	**10 x 3**	**30**		

Reference Books

1. Ananthanarayana & Panikar Medical Microbiology- University Press
2. Robert Cruckshank- 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

Paper 2

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.
- Ischemic 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.

No Practicals

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 Clostriduium difficle, 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, varicellazoster, respiratory synctial virus etc), blood borne transmission (HIV, Hepatitis B, Hepatitis C, Cytomegalovirus, Ebola virus etc), orofaecal 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.

Paper -3

INTRODUCTION TO ANAESTHESIA TECHNOLOGY

A. Physics applied to anesthesia

- ❖ Fundamental concept in systemic international units (SI units) of weight & volume only Kg.gm,mg,micro gram
- ❖ Temperature conversionfarenhiet& degree .
- ❖ Pressure measurements, pressure gauges and regulators
- ❖ Gas laws
- ❖ Miscellaneous concepts such as density and specific gravity

B. Medical gas supply, anaesthesia machine, cockpit drill of the machine:

a. Medical Gas supply

- Compressed Gas cylinders
- Colour coding and Different Sizes of Cylinders (Ex: A to E Cylinder)
- Cylinder valves, Pin index,
- Storage of Cylinders
- Recommendations for piping system
- Alarms and safety devices

b. Anaesthesia Machine –High Pressure, Intermediate Pressure, Low pressure.

* Boyles machine and work station - basic working principle
* Hanger and yoke system
* Cylinder pressure gauge
* Pressure regulator
* Flow meter assembly
* Vaporizers -types, hazards, filling and draining, maintenance
* Machine : Checking the machine (Cockpit drill), breathing circuits,CO_2 absorbents, vaporizers

C. Equipment –

* O2, N2O, Cylinder Suction apparatus, suction catheters

C. Breathing systems, face masks, airways and laryngoscopes, monitoring under Anaesthesia:

a. Breathing systems

* General considerations; humidity and heat
* Common components -connectors, adapters, reservoir bags
* Methods of humidification
* Classification of breathing system
* Mapleson system -A B C D E F
* Jackson Rees system
* Bain circuit
* Non rebreathing valves -ambu valves
* The components of circle system
* Soda lime, indicators

b. Face Masks and airway, laryngoscopes

* Types, sizes
* Endotracheal tubes -types and sizes
* Cuff system
* Fixing, deflating and inflating cuff
* Checking tube position
* Types of laryngoscopes- Macintosh, Millers, C-MAC, Fibreoptic bronchoscope

c. Monitoring

* ECG
* SPO2
* NIBP
* Temperature
* IBP
* CVP
* Etco2

Paper 4

APPLIED TECHNOLOGY IN ANAESTHESIA

A. Regional Anaesthesia:

1. Local anaesthetic agents used in regional anaesthesia: indications, contraindications, dosage, complications, route of administrations example lignocaine, bupivacaine etc

2. Regional anaesthesia: spinal anaesthesia in all age group of patients: indications, contraindications, commonly used local anaesthetics, adjuvants.
3. Epidural anaesthesia: epidural anaesthesia in all age group of patients: indications, contraindications, commonly used local anaesthetics, adjuvants.
4. Caudal Epidural in Children

B. Oxygen therapy (rationale for oxygen therapy, precautions, assessment of need and adequacy and therapy and the relevant devices)

1. Definition of hypoxemia, causes, clinical signs, treatment
2. Goals of oxygen therapy
3. Evaluation of patients receiving oxygen therapy
4. Hazards of oxygen therapy

C. Humidification:

1. Goals of humidification,
2. Advantages of humidification,
3. Types of humidifiers
4. Possible causes of retention of secretions in airway and management

D. Aerosol therapy Nebulization

1. Definition,
2. Goals for aerosol therapy,
3. Hazards of aerosol therapy,
4. Assessment of aerosol therapy
5. Aerosol therapy in lung diseases

E. Manual Resuscitators

1. AMBU BAG
2. Indications
3. Methods of increasing oxygen delivery while using oxygen with resuscitator bags

F. Airway management with a use of gadgets

1. Types and sizes of oropharyngeal airways, indications and complications
2. Types and sizes of nasopharyngeal airways, indications and complications
3. Parts of airway and features and methods of insertion
4. Orotracheal intubation:
5. Types of orotracheal tubes, indications and complications
6. Nasotracheal intubation
7. Types of nasotracheal tubes, indications and complications

G. Sterilization of anaesthesia equipment

1. Cleaning of anaesthesia equipment-Circuits
2. Methods of autoclaving, boiling, pasteurization, gamma radiation, chemical sterilization etc.
3. Sterilization of syringes, needles, spinal and epidural sets, airways, magill forceps, laryngoscope etc.

H. Methods of anaesthesia

- Introduction to general anaesthesia and regional anaesthesia
- Stages of ether anaesthesia, intravenous anaesthetic agents uses and complications,
- Pre-medication: indication, type of drugs used for pre-medication, doses and side effects.

I. Pre operative preparation

- Pre anaesthetic assessment, History of present illness,
- Past history of anaesthesia, smoking, alcohol etc
- Personal history of the patient

J. General physical examination:

- Vital signs, general appearance, anemia, etc
- Systemic examination:
- Cardio vascular system, respiratory system, per abdominal, central nervous system etc
- Local examination examples: ulcers, swelling etc.

K. Investigations

- Hematology – complete haemogram,
- Urine – Complete urine analysis
- Biochemistry – blood glucose, urea, creatine
- Special investigations related to disease of the patient
- Electro cardio gram
- Chest X-ray
- Criteria used for accepting the case for anaesthesia
- Pre anaesthetic orders
- Checking the machine, laryngoscopes, tubes, airways etc.,

L. Intra operative management

- Confirm the identity of the patient
- Monitoring system (ASA standards)
- Induction – Drugs used during induction of anaesthesia
- Endotracheal intubation, confirming the tube position and securing the tube.
- Maintenance of anaesthesia
- To know the Fluids and blood when to administer
- Knowing the Reversal from anaesthesia
- Mode of Transferring the patient to Recovery room
- To know this facilities are available in postoperative care unit:
- Suction apparatus, oxygen resources, anaesthetic drugs and emergency drugs for resuscitation, etc.

- Consent from the patient for Anaesthesia Procedure, grave risk consent, consent for
- Mechanical ventilation.

Reference books:

1. Berry and Kohn's operating room technique.
   Author - Berrry, Edna Cornelia; Kohn, Mary Louise.
2. Ward's anesthetic equipment.
   Author – Ward, Crispian.
3. Clinical anaesthesiology.
   Author – Morgan, G. Edward; Mikhail, Maged: Murray. Michael.J.
4. Clinical anaesthesia.
   Author - Paul, Arun Kumar.
5. Drugs and equipment in anaesthetic practice.
   Author - Paul, Arun Kumar.

TEACHING HOURS: 80 hours

THEORY: Course content

Sl No	Subject	Teaching hours
1	Indian constitution	20
2	Sociology	20
3	Environment science and health	20
4	Clinical psychology	20

I. INDIAN CONSTITUTION Teaching Hours: 20

1. Meaning of the term 'Constitution' Making of the Indian Constitution 1946-1950
2. The democratic institutions created by the constitution Bicameral system of Legislature at the Centre and in the States.
3. Fundamental Rights and Duties their content and significance
4. Directive Principles of States Policies the need to balance Fundamental Rights with Directive Principles.
5. Special Rights created in the Constitution for: Dalits, Backwards, Women and Children and the Religious and Linguistic Minorities.

6. Doctrine of Separation of Powers legislative, Executive and Judicial and their functioning in India
7. The Election Commission and State Public Service commissions
8. Method of amending the Constitution
9. Enforcing rights through Writs:
10. Constitution and Sustainable Development in India

Reference 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.

II. 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.

1. 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

2. Social Factors in Health and Disease:

3. Socialization:

4. Social Groups:

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

5. 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

6. Community:

Ruralcommunity: 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 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

7. Social Security: Social Security and social legislation in relation to the disabled

8. Social Work: Meaning of Social Work, The role of a Medical Social Worker

Reference Books:

1. Sachdeva & Vidyabhushan, Introduction to the study of sociology

2. Indrani T.K., Text book of sociology for graduates nurses and Physiotherapy students, JP Brothers, New Delhi 10

III. ENVIRONMENT SCIENCE AND HEALTH Teaching hours: 20

1. Introduction to Environment and Health
2. Sources, health hazards and control of environmental pollution
3. Water
4. The concept of safe and wholesome water.
5. The requirements of sanitary sources of water.
6. 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.
7. Domestic refuse, sullage, human excreta and sewage their effects on environment and health, methods and issues related to their disposal.
8. Awareness of standards of housing and the effect of poor housing on health.
9. 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 gradute courses By Erach Bharucha Reprinted in 2006, Orient Longman Private Limited /Universities Press India Pvt. Ltd.

IV. CLINICAL PSYCHOLOGY Total teaching hours: 20

1. Introduction to psychology
2. Intelligence, Learning, Memory, Personality, Motivation
3. Body integrity- one's body image
4. Patient in his Milan
5. Self-concept of the therapist, Therapist patient relationship-some guidelines
6. Illness and its impact on the patients
7. Maladies of the age and their impact on the patient's own and others concept of his body image
8. Adapting changes in vision
9. Why Medical Psychology needs / demands commitment?

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Scheme of Examination for 2nd Year B. Sc Anaesthesia

Sl.No	Theory	Theory Max+ IA	Viva	Total
1	Applied Pharmacology	80+20	-	100
2	Applied Pathology + Microbiology Section A Section B	80+20 40+10 40+10	-	100
3	Basics of Anaesthesia Technology	60+20	20	100
4	Applied Technology in Anaesthesia	60+20	20	100

Sl. No	Questions	Questions asked	Questions to attem	Marks	Max. Marks	Internal Assessment	Viva	Total Marks
1	Long Essay Questions	3	2	2x10	20			
2	Short essay Question	6	5x5	25	25			
3	Short Answers	5	5x3	15	15			
						20	20	100

Scheme of examination for Applied Microbiology and Applied pathology

Sl. No	Questions	Questions asked	Questions to attempt	Marks	Max. Marks	Internal Assess	Viva	Total Marks
1	Long Essay Questions	2	1	1x10	10			
2	Short essay Question	3	3	3x5	15			
3	Short Answers	5	5	5x3	15			
						10	10	100

Third Year B.Sc. ANAESTHESIA TECHNOLOGY APPLIED

ANAESTHESIA TECHNOLOGY

Paper -1: ANAESTHESIA FOR PATIENTS WITH MEDICAL DISORDERS/CLINICAL ANAESTHESIA

Anaesthesia & co- existing diseases

Anaesthesia & co- existing diseases

- Hypertension
- Chronic bronchitis & COPD Bronchial asthma
- Renal disease and anaesthesia
- Obesity and anaesthesia
- Diabetes mellitus and anaesthesia
- Obstetric Anaesthesia:
    1. Anaesthesia for LSCS
    2. Labour Analgesia
- Ventilators – types & methods of ventilation
- Humidification
- Aerosol therapy
- 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

Practicals

1. Attending preoperative rounds with anaesthesiologists
2. Attending postoperative rounds with anaesthesiologists
3. Attending pain clinic everyday along with anaesthesiologists
4. Attending rounds in ICU, ICCU, MICU, SICU along with anaesthesiologists and understanding ventilators and its implication and sterilization.
5. Attending regular operation theatre for regular anaesthesia cases and attending emergency cases along with anaesthesiologists
6. Arrangement of anaesthesia trolly for general anaesthesia
7. Arrangement of anaesthesia for regional anaesthesia example: epidural, Brachial plexus block etc.
8. Arrangement of monitors and anaesthesia machine before starting of any cases for anaesthesia.
9. Sterilization of anaesthesia machine& circuits
10. Arrangement of anaesthesia breathing circuits ex: Magill's, Ayer's circuits etc.
11. Filling of soda lime canisters of close circuits
12. Arrangement of Simple oxygen administration devices during postoperative ward
13. Airway gadgets arrangements during anaesthesia procedures like Oropharyngeal airways, Nasopharyngeal airways, endotracheal tubes and Laryngeal mask airways etc
14. AnaesthesiaVaporizers to be filled and make arrangements for inhalational anaesthesia with use of either, halothene and isoslurane, seroflurane.
15. Assisting anaesthesiologists during blood transfusion
16. Assisting in transfusion of fluids ex. Ringer lactate, dextrose 5% etc.
17. Assisting anaesthesiologist during patient in shock, complications of general anaesthesia and regional anaesthesia
18. Assisting anaesthesiologists during bronchoscopy and invasive procedures during anaesthesia.
19. Observing cardiopulmonary resuscitation
20. Assisting during transportation of patients from casualty to other wards and care units

Paper -2: Regional Anaesthesia Techniques

A. General outlook about regional techniques

- ✶ Introduction, techniques for nerve location-peripheral nerve stimulator, ultrasound guided block & Anatomical landmark
- ✶ Indication
- ✶ Contraindication
- ✶ Complications-local anesthesia systemic toxicity& block specific complications

B. Spinal & epidural- * Spinal and * Epidural

C. Upper limb blocks

* Supraclavicular
* Interscalene
* Axillary
* Wrist Block

D. Lower limb blocks-femoral nerve, popliteal nerve sciatic nerve & 3 in 1 block

* Femoral Nerve block
* Sciatic nerve block
* Popliteal block
* Ankle block

E. Drugs used in regional blocks:

a. Local anaesthetics-xylocaine, bupivacaine, ropivacaine- all preparations Adjuvants used in regional anaesthesia-clonidine, dexmeditomedine, dexamethasone, soda bicarbonate, Fentanyl, morphine, buprenorphine

Practical

Paper -3: Applied Anesthesia Technology

1. Position for spinal/epidural
2. Usage of peripheral nerve stimulator
3. Ultrasound machine use and maintenance,
4. Procedure of all the above-mentioned blocks,
5. Items included in LP set,
6. Asepsis
7. Spotters
   - ❖ Types of spinal needles
   - ❖ Touhy epidural needle
   - ❖ Items included in LP set
   - ❖ Epidural catheter set-contents
   - ❖ Peripheral nerve stimulator
   - ❖ Stimuplex needles
8. Drugs used in regional anaesthesia+adjuvants Atropine, ephedrine, mephentermine, Lipid emulsion

Paper 4: Advanced Anaesthesia Technology

- ❖ Anaesthesia for Neurosurgery
- ❖ Anaesthesia for Urosurgery
- ❖ Anaesthesia for Plastic Surgery
- ❖ Anaesthesia for Transplant Surgery
- ❖ Techniques in Pain and Palliative Medicine
- ❖ Techniques in Intensive Care and Management of ICU
- ❖ Newer advances in Anaesthesia and Critical Care

Reference books:

6. Berry and Kohn's operating room technique.
   Author - Berrry, Edna Cornelia; Kohn, Mary Louise.
7. Ward's anesthetic equipment.
   Author – Ward, Crispian.
8. Clinical anaesthesiology.
   Author – Morgan, G. Edward; Mikhail, Maged: Murray. Michael.J.
9. Clinical anaesthesia.
   Author - Paul, Arun Kumar.
10. Drugs and equipment in anaesthetic practice.
    Author - Paul, Arun Kumar.

Subsidiary Subjects

Sl No	Subject	Teaching hours
1	Research methodology	20
2	Biostatistics	20

I. RESEARCH METHODOLOGY

Teaching hours: 20

1. Introduction: Research Methodology

   - Research process
   - Steps involved in research process
   - Research methods and methodology

2. Variables and scales of measurements

- Definitions and examples of qualitative, quantitative, continuous discrete, dependent and independent variable
- Definitions, properties and examples of nominal, ordinal, interval and ratio scales of measurements.

3. Sampling
   - Population, sample, sampling, reasons for sampling, probability and non-probability sampling.
   - Methods of probability sampling – simple random, stratified, systematic-procedure
   - Merits and demerits.
   - Use of random number table.

4. Organization of data
   - Frequency table, histogram, frequency polygon, frequency curve, bar diagram, pie chart

5. Measures of location
   - Arithmetic mean, median, mode, quartiles and percentiles – definition
   - Computation (for raw data), merits, demerits and applications

6. Measures of variation
   - Range, inter-quartile range, variance, standard deviation, coefficient of variation-definition
   - Computation (for raw data), merits, demerits and applications

II. BIO-STATISTICS

Teaching hours:20

1. Introduction I: Biostatistics
   - Definition
   - Role of statistics in health science and health care delivery system
2. Normal distribution
   - Concept, graphical form, properties, examples
   - Concept of Skewnes and Kurtosis
3. Correlation
   - Scatter diagram
   - Concept and properties of correlation coefficient, examples [No computation]

4. Health Information System
    - Definition, requirement, component and uses of health information system.
    - Sources of health information system- Census, Registration of vital events, Sample registration system (SRS), Notification of diseases, Hospital records, Disease registries, Record linkage, Epidemiological surveillance, Population survey

5. Vital statistics and hospital statistics
    - Rate, ratio, proportion, Incidence, Prevalence. Common morbidity, mortality and

6. Fertility statistics – Definition and computation.

7. Hypothesis
    - What is hypothesis
    - Formulation of hypothesis
    - Characteristics of good hypothesis.

8. Epidemiology
    - Concept of health and disease
    - Definition and aims of Epidemiology,
    - Descriptive Epidemiology- methods and uses.

9. Concept of reliability & validity

RECOMMENDED BOOKS

1. Methods in Biostatistics for medical students & Research workers, Mahajan B.K.- 6th edition
2. Research methodology – Methods & techniques, Kothari. C.R
3. Introduction to Biostatistics: A manual for students in health sciences, Sundar Rao PSS, Richard. J
4. Text book of Preventive and social medicine, Park. E. Park

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Sl No.	Subject	Theory + IA + Practicals	Total
1	Applied Anaesthesia Technology	60+20+20	100
2	Regional anaesthesia Technology	60+20+20	100
3	Anaesthesia for patients with Medical disorders/Clinical Anaesthesia	60+20+20	100
4	Advanced Anaesthesia Technology	60+20+20	100

Sl. NO.	Questions	Questions asked	Questions to attempt	Marks	Max. Marks	Internal Assessment	Practicals	Total Marks
1	Long Essay Questions	3	2	2 x 10	20	20	20	100
2	Short Essay Questions	6	5	5x 5	25			
3	Short Answer Questions	5	5	5x 3	15			

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 academic progress an assessment of student performance throughout the said course 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.

Internship Details:

ICU – 3 months
SICU – 2 months
NSICU – 1 month

Operation Theatre – 9 months
To be rotated equally among General Surgery, ObG, Orthopaedics, CFU and super specialty branches.

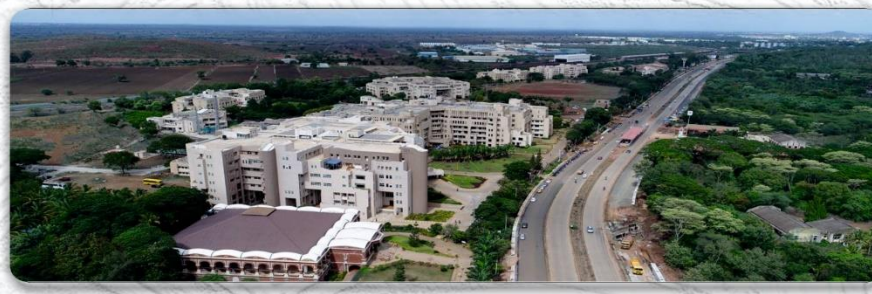
SDM College of Medical Sciences & Hospital

SDM College of Dental Sciences & Hospital

SDM College of Physiotherapy &
SDM Institute of Nursing Sciences

Shri Dharmasthala Manjunatheshwara University

SDM Research Institute for Biomedical Sciences



Panoramic View of Campus