TWO YEARS POST MATRIC TEACHING PROGRAM OF PARAMEDICS

F. Sc. (Operation Theatre Technology)

CURRICULUM WING
MINISTRY OF EDUCATION, ISLAMABAD
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**PREFACE**

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Live nations continue to develop. New fields emerge with the laps of time and pace of development. Medical Technology has gained importance with technological development in diagnostic, therapeutic, and preventive aspects of health care delivery system. This has produced a need for trained and skilled manpower in this field. Present curriculum is one of the outcomes of that necessity.

These curricula will not only help in providing a base for better healthcare but also decrease unemployment in our country. It will open up new avenues for our youngsters.

Curriculum development is a hectic task and is not possible in a day. Present curriculum also passed through many phases of development. Initially it was developed by consultants of Pakistan Institute of Medical Sciences on request of the then Project Director, College of Medical Technology, PIMS 1987.

In 1990, it was later on suggested by the faculty of the College of Medical Technology to bring it at par with F. Sc. The Committee of two members i.e. Dr. M.A. Aziz Shahzada and Engr. Sher Afzal Awan expanded it over a period of two years. The same curricula was revised and updated by Engr. Sher Afzal Awan in 1995.

In 1995, equivalence was granted by IBCC on continuous struggle for three years of Lt.Col.(r) Dr. Azra Javed. Qureshi, Principal, CMT.

The college approached Curriculum Wing, Ministry of Education in 2001 for approval and standardization. The process continued till to date. National Review Committee, constituted by the Curriculum Wing has discussed it in its meeting held from 18th May 2004 to 20th May 2004. The Committee has approved this draft.

Curriculum development is a continuous process. It may have many mistakes or it may be better than this. We have tried our best to update it so that trained people under this program may fulfill the needs and requirements of the hospitals in Pakistan.

This curriculum is first trail of its kind in Pakistan in the field of medical education. All our colleagues have made the history by taking part its preparation, review and approval. We do hope that both educationists and Paramedical Institutes will accept it. At last, we thank to Lt.Col.(r) Dr. Azra J. Qureshi, Mr. Sher Afzal Awan (PIMS) and Mr. Saeed Ahmad Meher (Curriculum Wing) for their valuable co-operation and contribution in completing this difficult task.

The Ministry of Education appreciates the contributions of all the Provincial Governments and Health Departments.

(Prof. Dr. Haroona Jatoi)
Joint Educational Advisor
Curriculum wing.
Ministry of Education Islamabad.
ACKNOWLEDGEMENT

Grateful acknowledgement is hereby made to all the contributors from all provinces of Pakistan, from Ministry of Education and different hospitals at Federal area Islamabad who reviewed drafts of curricula of five disciplines and gave fruitful suggestions for its improvement.

Above all, I am indebted to Prof. Dr. Haroona Jatoi, Mr. Aurang Zeb Rehman and Mr. Saeed Ahmad Meher (Curriculum Wing) for their valuable co-operation and contribution in completing this difficult task.

My gratitude goes to Engr. Sher Afzal Awan, Registrar, CMT for his contribution in developing, updating, incorporating changes proposed by NRC and giving it a present shape.

I am also indebted to all the secretarial staff of Curriculum Wing and CMT for helping in clerical work. And above formal way of acknowledgement to past concerns, gratitude goes to all those who will use it in shaping the future of coming generations in the field of medical education.

I am also indebted to W.H.O.EMRO for its contribution in standardization of curricula for Paramedics Resource development in Pakistan.

Principal,
College Of Medical Technology,
Pakistan Institute of Medical Sciences,
Islamabad.
**OBJECTIVES:**

A) To prepare the students to become an efficient Medical Technician in Operation Theatre well versed with techniques and background analyses, in all of the operation theatre procedure.

For this purpose the teaching in the special technical subjects involves lectures; practical that include demonstration and bench work; and job training of both “Observing Type” and “Involvement Type” in the latter the students participate in duty performance in the working Operation Theatre Laboratory.

B) To make the course and qualification comparable with similar programs in the country so that the candidates have a competitive standing in job seeking as well as in eligibility for entry into a graduation course in the technology in any such Institute.
## SURGICAL TECHNOLOGY (O.T.)

<table>
<thead>
<tr>
<th>Name of Subject</th>
<th>Theory / Practical</th>
<th>Topics Included</th>
<th>Marks</th>
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<tbody>
<tr>
<td><strong>PART – I &amp; II</strong></td>
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<tr>
<td>Basic Medical Sciences</td>
<td>Theory</td>
<td>Anatomy, Physiology, Public Health and First Aid</td>
<td>150</td>
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<td></td>
<td>Practical</td>
<td>As per above subjects through charts and models etc. only for anatomy and physiology</td>
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<tr>
<td>Surgical Techniques</td>
<td>Theory</td>
<td>Applied anatomy &amp; physiology, Microbiology (sterilization, outline of bacteria, Viruses &amp; fungi), Surgical Techniques (Trolleys related to specific operations, Anaesthesia Equipment, Outline of surgical diseases)</td>
<td>75+75 150</td>
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<tr>
<td></td>
<td>Practical</td>
<td>Practical will include observation on Job and practice in O.T.</td>
<td>50+50 100</td>
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<td>Applied Sciences</td>
<td>Theory</td>
<td>Physics, Chemistry, Computer &amp; Hospital Safety</td>
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## SURGICAL TECHNOLOGY (O.T.)

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## SURGICAL TECHNOLOGY (O.T.)

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<td>Computer &amp; Hospital Safety</td>
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## OPERATION THEATRE

### PART – I

#### HOURS DISTRIBUTION PER WEEK

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#### HOURS DISTRIBUTION PER YEAR

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### PART – II

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#### HOURS DISTRIBUTION PER YEAR

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<td>600</td>
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<td>Applied Sciences – II</td>
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<td>4</td>
<td>English – II</td>
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<td>240</td>
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<td>Urdu – II</td>
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<td></td>
<td></td>
<td>920</td>
<td>440</td>
<td>1360</td>
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</table>
PHYSICS AND CHEMISTRY

1. The nature of Science, Divisions of Science, and Scientific method.
2. The Measurement – Metric System, scientific notation, units of mass, length and volume.
4. Gravity – speed, velocity and acceleration, center of gravity, weight and mass.
8. Pressure – Definition, pressure in hydrostatic fluids, pressure in flowing liquids.
9. Gas Laws – Boyle’s and Charles laws, gas laws applicable to respiratory process, effects of changes in atmospheric pressure on physiology of the human body.
12. Sound – How it is produced, characteristic, transmission, reflection of sound, echoes, ultrasound.
14. Magnets and Magnetism – Properties, magnetic field, magnetic lines of force, electromagnet, magnetic effect of electric current, Motor and generator effect of current, magnetic and electric induction, Transformer.
15. Charge – Coulomb’s law, capacitor and capacitance, capacitor in series and in parallel.
16. A.C. Definition, RMS value, Peak value Sine wave.
17. Electromagnetic Radiation – Spectrum, ionization, excitation, Inverse Square law, frequency, wave length, terms and their definitions.
18. Composition of Substance – Atoms and molecules, symbols, formulae, Elements and compounds, chemical formula.
20. Water – physical and chemical properties, Deliquescent, efflorescent, hygroscopic substances, solvent properties, Hydrolysis, Water cycle, impurities, hard and soft water.
22. Acid, Bases, and salts.
23. pH Scale and buffer system.
24. Electrolytes and electrolysis.
25. Amines and amides
27. Carbohydrates
28. Lipids
Practical Chemistry

1. How fitting up a wash bottle is prepared?
2. To pacify the given sample of impose naphthalene crystallization.
3. To pacify the given sample of naphthalene by sublimation.
4. To determine the melting & boiling point of organic compound.
5. To prepare the standard solution of acid or Base.
6. To prepare a standard solution of exotic acid and with its help standardize a solution of NaoH.
7. To prepare approximates N/10 solution of H₂SO₄ determine its exact normality by titrating it against standard N/10 NaoH?
8. To standardize a given solution by direct method.
9. To standardize a given solution by indirect method.

Practical Physics

a. To find the unknown force.
b. To find the center of gravity of an irregular shape.
c. To verify the law of reflection.
d. To find the path of light passing through a prism.
e. To find the focal point of a lens.
f. Determine the critical angle of glass using a glass prism.
g. Determine the focal length of convex lens.
h. To find the reflective index of a liquid using a concave mirror.
i. Determine the speed of sound at a room temperature.
APPLIED COMPUTER SCIENCES

Note: This is an introduction to computer science. A brief description and definitions of terms will be taught to the students.

1. An overview of Computer system.
2. The shapes of computer today—Super Computer, Main frame, mini computer, Works stations and PC.
3. Input methods—Keyboard, Mouse,
5. Monitors and sound system—Monitors—PC. Projectors, sound system.
6. Printer and brief introduction to its types.
7. Transforming data into information representation, process, speed etc.
8. CPU—types with definition
10. Measuring drive information—access time, file compression, transfer rate, interface standard.
11. Basic of operating system—interface, programme, files, hardware and software management
13. Words processing and Desk topo Publishing software.
15. Presentation programme
17. Networking basics—brief of use, structure, LANs, Media, Hardware and Software.
18. Networking—Standard telephone lines, digital lines, Network in the home.
19. Internet basics
20. Accessing, connecting, working on internet, introduction to DICOM, PACS.
21. Working with images.
23. Understanding multi-media.
24. Creating and distributing media contents.
25. Basics of information system—Use, Parts.
26. Building information system—five phases—need, Design, development, implementation, maintenance.
27. Creating programmes—definitions of programme and approaches.
28. Programming languages and system development life cycle.
29. Ergonomics, health and privacy issues.
30. Brief of computer crimes, Viruses, Theft and computer environment
PATIENT SAFETY

1-10 **Electrical Hazards**
- Electrical current and body muscles
- Electric shock
- Defibrillators
- Pace makers
- High and low frequency electricity in medicine
- Classification of medical equipment
- Degree of protection in equipment
- Earth leakage current
- Maximum current limits and safety tests

11-15 **Fire and explosion in hospitals**
- Inflammable gases and liquids
- Static electricity
- Precaution against fire and explosion

16-26 **Surgical diathermy and other possible hazards in hospitals**
- Surgical diathermy and precautions
- Mechanical hazards
- Heat and light hazards
- Chemical burns

27-35 **Radiation**
- Non-ionizing radiation
- Ionizing radiation
- Microwave ovens
- Ultrasound therapy equipment
- Lasers

36-40 **Infection in hospitals**
- The hospital environment
- Pathogenic, non-pathogenic microgenisms
- Modes of spread of infection
- Kinds of infection
- Cross-infection
- Precautions and prevention.
BASIC MEDICAL SCIENCES
PART - I
### ANATOMY

The depth of the subject will only be diagram and labeling of the diagram.

<table>
<thead>
<tr>
<th>Week</th>
<th>Contents</th>
</tr>
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<tbody>
<tr>
<td>1.</td>
<td>Introduction</td>
</tr>
<tr>
<td>2-3.</td>
<td>The study of human cell and functions of organelles, Nucleus, DNA helix, RNA, genetic code, Chromosomes. Cell Division Mitosis and Meiosis of cell</td>
</tr>
</tbody>
</table>
| 4-9. | **BASIC TISSUES**  
- Different Types of tissues.  
- Connective tissues.  
- Epithelial tissues.  
- Muscle tissues.  
- Nervous tissues.  
- Blood tissues. |
| 10-11. | The **circulatory system**- Structure of heart. Different chambers of heart, main arteries arising from the heart and main veins of the heart, branches of arch of aorta, Thoracic aorta, abdominal aorta, main vessels of upper and lower limbs. |
| 12-13. | **Lymphatic System** |
| 14-17. | **The Gastro Intestinal Systems**  
- Mouth  
- Pharynx  
- Esophagus  
- Stomach  
- Small Intestine  
- Large Intestine  
- Accessory organs (Liver, Spleen, Pancreas & Gall Bladder) |
| 18-20. | **Respiratory System**  
1. Organs of respiration  
2. Upper respiratory tract  
3. Lower respiratory tract |
| 21-22. | **The Skin**  
- Epidermis  
- Dermis  
- Sebaceous glands  
- Nails |
23-25. **The Nervous System**

1. CNS central nervous system
2. Peripheral Nervous System
   - Different parts of nervous system
   - Structure of cerebrum, mid brain, cerebellum, pons and medulla oblongata, spinal cord and
   - Autonomic nervous system

26-28. **The Endocrine Glands**

- Short description and position of:
  - Pituitary gland
  - Thyroid gland
  - Parathyroid gland
  - Adrenal gland
  - Hormones of Testis
  - Prostate
  - Ovaries
  - Pancreas and Thymus

29-31. **The urinary system**

- Structure of kidney, urethra, urinary bladder, prostate gland and ureter. Difference of right and left kidneys.

32-33. **The Reproductive System**

- Male reproductive system
- Female Reproductive System
- Different organs of male reproductive system, structure of testis, the scrotum, seminal vesicles, prostate gland, the penis and urethra.
- Different organs of females reproductive system, Mammary glands, Structure of ovaries, uterus, cervix and vagina,

34-35. **The Skeleton**

- Different bones of skull. Bones of upper limbs, lower limbs, thorax, pelvis and vertebral column.

36-38. Structure of individual bones, scapula, humerus, radius, ulna, femur, tibia and hip bones, hands, foot, ribs, sternum, clavical, sacrum, thyroid, hyoid, */

39-40. **The Special Senses:**

- Brief anatomy of eye. Three coats of eye ball. Brief anatomy of ear Outer, middle and inner ear, nose- inner and outer, tounge, salivary glands, skin.

**Recommended Books:**

PHYSIOLOGY

The physiology of the following topics will consist of brief description of the function of part of the body.

1-3. **The cell and its functions**
   1. Structure and Functions of a human cell
      - The cytoplasm and its organelles
      - Comparison with animal cell
      - Functional system of the cell
   2. Endocytosis & Phagocytosis
      - Ingestion and digestion by the cell
      - Functions/Structures of Golgi apparatus
   3. Cell Division
      - Mitochondria and reticulum.
      - Cell reproduction.

4-9. **Tissues and fluids of body.**

10-11. **Cardiovascular system (Heart and circulation)**
   - Description of Heart and vessels (arteries, vein, and capillaries)
   - Cardiac cycle, diastole and systole
   - Functions of atria and ventricles
   - Functions of valves
   - Heart pumping (work output of heart)
   - Cardiac output, stroke volume etc.
   - Heart sounds
   - **Lymphatic system function**

12-14. **Respiratory System**
   - Basic mechanism of respiration
   - Inspiration expiration mechanism
   - Pulmonary capacities and pulmonary volumes
   - Respiratory rate and tidal volume definitions
   - Functions of respiratory pathways (Chemical & Neural Control)
   - Artificial respiration, mouth breathing
   - Transport of oxygen and carbon dioxide in the blood and body fluids

15-18. **Gastro intestinal tract.**
   - Ingestion of food, mastication (Chewing)/ Digestion and Swallowing
   - Functions of stomach
   - Storage function, mixing of food

19-20. **Secretions of GIT**
   - Saliva, Salivary glands functions of
   - Saliva, Gastric Secretion, Functions of
   - Pancreatic secretion, Bile secretion and its function
Secretions of the small intestine, secretion of large intestine, Digestion and absorption of food

21-25. Metabolism
   Introduction to Fat and Protein Metabolism
   Introduction to Carbohydrates Metabolism, Role of glucose in Carbohydrate metabolism, Transport of glucose in body tissue, Lipid metabolism transport of lipids in the blood.
   Transport from the GIT, and fat deposits, Proteins metabolism, basic properties of protein, use of proteins for energy, Vitamins and their metabolic role.

   Endocrine glands and their hormones
   The pituitary hormones and their functions
   The thyroid hormone, The adrenocortical hormones
   Parathyroid hormones and their functions

29-32. Reproductive System.
   Functions of the male reproductive organs
   Functions of the female reproductive system
   Testosterone and other male sex hormones
   Pregnancy, lactation and female hormones

33-37. Special Senses
   Introduction to Sensory organs and their function
   The eye functions and elements of eye, Sclera, choroid retina, The eye as a camera, Sense of Hearing, tympanic membrane and external ear, middle ear and vesicles, Internal ear and its functions
   Conduction of sound to the cochlea
   The functions of Tongue and salivary glands.
   The functions of nose and tonsils / Adenoids.
   The functions of skin and its appendages

38-40. Nervous System
   General design of nervous system types and parts of nervous system Functions of brain, cerebrum cerebellum spinal cord. Cranial nerves. Autonomic nervous system (Parts and functions)
FIRST AID

1. First Aid

- Definition

- Principles

- Actions at emergency

2. Dressing + Bandages
3. Short structure & function of respiratory system
4. Asphyxia
5. Assisted respiration
6. Short structure and function of C.V.S.
7. Shock (Circulatory failure) Patho-Physiology
8. Cardiogenic shock Treatment
9. Hypo-volumic shock (Haemotologic) with treatment other condition.
10. Anaphylactic shock
    - Signs
    - Symptoms
    - Treatment

11. Septic Shock
12. Neurogenic shock
13. Cardiopulmonary resuscitation principles practical demonstration.
14. Assessment of newborn
15. Resuscitation of newborn
16. Short structure & function of locomotive, Sprains and strains
17. Fractures, First Aid Management
18. Burns, Scalds causes and First Aid Management
19. Wounds cuts stabs and management
20. Management of Bleeding from wound/NOSE/mouth/misc.
21. Drowning-First Aid management
22. Road traffic accidents (First Aid Management)
23. Transport of injured persons especially spinal care
24. Care of Coma / stupor unconscious victim
25. Poisonings-Swallowed persons and first aid management
26. Poisonings inhalation poisonings first aid management
27. Bites Stings management human, cat dog insect
28. Snake bite and first aid management
29. Anaphylactic Shock and its management
30. Choking (Foreign body in airway)
31. Abdominal pain (First aid)
32. Sport injuries
33. Safety at home precautions / safety
34. Precautions at kitchen to avoid accidents.
35. Precautions at bathroom
36. Precautions in living room
37. Precautions at stairs and at terraces
PUBLIC HEALTH

1. **Introduction:** To health field, definition of health, preventive, social, community and family medicine.

2. Health care organization in Pakistan.
   
   i. General introduction to federal, provincial, divisional and district level organizational structure.
   
   ii. Role of paramedics in hospitals.

3-6. AIR
   
   Composition and functions-Pollution and pollution indicators-impurities in air-cleaning methods (an over view)

7-12. WATER
   
   Sources of water with special reference to Pakistan. Impurities-Safety-Purification, Natural and artificial methods.

13-17. VENTILATION
   
   Objectives and merits. Over crowing and its effects on human body. Natural ventilation and artificial ventilation.

18-25. Wastage
   

26-27. Infection and disinfecting
   
   Introduction-Terminology-Methods of disaffection.

28-29. Sources of infection-routes of transmission i.e., air, water and food.

30-39. Communicable diseases
   
   Introduction-EPI and diseases related to it, vaccination schedule. Communicable diseases like T.B., diphtheria, tetanus, polio, whooping cough and measles Epidemiology and prevention methods for above diseases.

40. Family Planning
   
   Need and objectives-general methods.
OPERATION THEATRE TECHNIQUES
PART - I
MICROBIOLOGY

1. Introduction to micro-organisms
2. Classification of Bacteria
3. Structure and reproduction of bacteria
4. Characteristic of Rickettsiae
5. Transmission and diseases caused by Rickettsiae
6. Prevention and control of Rickettsiae
7. Characteristic of Chlamydiae
8. Transmission and diseases caused by Chlamydiae
9. Treatment, prevention and control
10. Characteristics of Spirochetes
11. Transmission, prevention and control
12. Diseases caused by Spirochetes
13. Composition and structure of Virus
14. Classification of Virus
15. Mode of Transmission and common diseases caused by Virus
16. Prevention and control
17. Characteristics of Protozoa
18. Biology and diseases caused by Protozoa
19. Prevention and control
20. Characteristics and reproduction of Fungi
21. Diseases caused by Fungi with reference to O.T.
22. Control and prevention
23. Sterilization and disinfection
24. Introduction to chemotherapy
25. Characteristics and use of chemotherapeutic agents in O.T.
26. Introduction to Immunity and Immunology
27. Acquired Immunity and resistance factors
28. Methods of environmental cleanliness in O.T.
29. How to keep instruments, equipments and other things bacteria free

STERILIZATION AND SUPPLIES

1. Introduction to sterilization
2. Sterilization and Disinfections
3. General Principles of sterilization
4. Types of Sterilizations
6. Autoclave, main parts and working principle.
7. Chemical Sterilization and the chemical used in it.
8. Sterilization by radiation.
9. Detergents, types and uses.
11. Scrubbing and its methods
12. Draping and its methods.
13. Lighting and ventilation requirements.
14. Humidity and heating requirements.
15. Blood Transfusion: Blood storage, grouping, cross matching etc.
16. Infusion.

O. T. EQUIPMENT

1. Introduction to electro-medical equipment used in O.T.
2. O.T. light, uses, types, lamps etc
3. Shadow less lighting – features, types
4. Direct, semi direct, indirect lighting.
5. Grounding system – parts and structure.
6. Monitoring equipment such as cardiac monitors.
7. Defibrillators
8. Surgical diathermy – structure, block diagram, types.
9. Safety Precautions
10. General equipment maintenance requirements
11. Anesthesia machine – parts, block diagram etc.
12. Sterilizers, types and characteristics
REGIONAL ANATOMY AND PHYSIOLOGY

Brief revision of the following topics. The number shows number of periods in which each topic should be covered:

1 – 10 General survey of human skeleton
   - Skeletal Tissues
   - Cartilages
   - Tendon
   - Ligaments
   - Bone
   - Joints

11 – 15 Respiratory System
   a. Upper and lower respiratory tract
   b. Lungs
   c. Pleura
   d. Diaphragm

16 – 19 Cardiovascular System
   - Arteries
   - Veins
   - Heart

20 – 24 Excretory System
   - Kidneys
   - Ureter
   - Bladder
   - Urethera

25 – 28 Endocrine Glands
   - Pituitary Gland
   - Adrenal Gland
   - Thyroid Gland
   - Para thyroid Gland

29 – 35 Nervous System
   - Nervous Tissues
   - Central Nervous System
   - Peripheral System
SURGICAL TECHNIQUES

1. Introduction to operating department.
2. O.T. Table and position used for surgery.
3. Operation Preparations.
4. Classification of instruments and apparatus: Disposable/Non disposable, sharp instrument, sutures, needless, syringes and hypodermic needless, special instrument, catheters their working and care.
5. Ligature and suture materials
   Introduction, cat guts (preparation, sizes, handling), absorbable and non absorbable ligatures and sutures, natural materials (silk warm gut, silk threads, linen cotton their sizes and classes) Nylon, polyesters, polyethylene, polypropylene, metallic wire, metal clips as sutures and as ligatures.
6. Storage and handlings of suture materials associated with instrument. Ligature requisits, scalpel blades, handleless and needless scissors etc.
7. Draping operation areas.
8. Terminology and technical words used in theatre.
9. Operating microscopes:
   Principle, parts, use and care.
11. Introduction to general instrument, scalpel, scissors, forceps, knives, hooks, retracters etc. The instruments types, sizes and materials.
12. Abdominal surgery: Tabratomy set, types of incisions, gall balder, hernia appendectomy etc.
13. The patient, procedure, instruments used in each operation will be taught and operation on breast.
14. ENT operations:- Definitions of operations, position of the patient, general instrument used in each operations.
15. Neuro-surgical Operations:- Positions of the patient, general instruments used in each operation.
16. Ophthalmic Operations
17. Orthopaedic Operations
18. Urological Operations
19. Thoracic Surgery
20. Gyneacological Operations
21. Plaster of Paris Techniques
22. Radioactive material used in theatre:- Care, use, safety precautions, and disposal.
ANAESTHESIA AND PATIENT CARE

1. Introduction to anesthesia.
2. Physics and chemistry of anesthesia.
3. Anesthetic agents, types and uses.
5. Physiology of Respiration
7. Patient preparation before and after anesthesia.
8. Patient management during anesthesia.
9. Anesthesia Machine
   Pre and postoperative care of patients

BOOK RECOMMENDED
OPERATIVE TECHNIQUES BY Dr. S. DAS, JAPEE.
SURGERY BY Dr. KUMAR (JAPEE)
BOOK OF SURGICAL INSTRUMENTS BY D
## WEIGHTAGE OF VARIOUS SECTION OF THE SYLLABUS
### PART - I

<table>
<thead>
<tr>
<th>S.No</th>
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<th>Part / Class</th>
<th>Section</th>
<th>Weightage</th>
<th>Total Marks</th>
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## WEIGHTAGE OF VARIOUS SECTION OF THE SYLLABUS

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