सकेंगे। छूट सहित परीक्षा शुल्क भुगतान करने की स्थिति में शुद्धिकरण का दावा परीक्षा शुल्क भुगतान की राशि तक सीमित होगा।

16. परीक्षा शुल्क भुगतान करने की प्रक्रियाः–

परीक्षा शुल्क जमा करने के लिए Submit To Proceed Payment Click करें। एक नया पेज खुल जायेगा जिसमें Term & Condition को टिक (√) कर Proceed बटन दबाकर आगे बढ़ें। इसके बाद Select Payment category के सामने **JPMCCE-2023** Select करें तथा अपना Registration Number डालकर अपना परीक्षा शुल्क का भुगतान करें।

17. परीक्षा का स्वरूप :–

आयोग द्वारा ओ॰एम॰आर॰/ कम्प्यूटर आधारित परीक्षा ली जायेगी तथा किसी विषय की परीक्षा यदि विभिन्न समूहों में लिया जाता है तो अभ्यर्थियों के प्राप्तांक का Normalisation किया जायेगा। अभ्यर्थियों की मेधा सूची उनके प्राप्तांक के Normalised अंक के आधार पर तैयार किया जायेगा तथा परीक्षाफल प्रकाशन के पश्चात् उन्हें Normalised अंक ही दिया जायेगा।

परीक्षा का स्वरूप एवं पाठ्यक्रम :–

(क) परीक्षा एक चरण में ली जायेगी।

(ख) परीक्षा में सभी प्रश्न वस्तुनिष्ठ एवं बहुविकल्पीय उत्तर युक्त होंगे। लिखित परीक्षा में प्रत्येक सही उत्तर के लिए एक अंक प्रदान किए जायेंगे। परीक्षा में ऋणात्मक अंक का प्रावधान नहीं होगा अर्थात् गलत उत्तर के लिए कोई अंक की कटौती नहीं की जाएगी।

18. लिखित परीक्षा के विषय एवं पाठ्यक्रम :–

मुख्य परीक्षा एक पत्र का होगा जिसका आयोजन एक पाली में किया जाएगा। परीक्षा की अवधि एक घंटे की होगी। लिखित परीक्षा अन्तर्गत पदों हेतु वांछित न्यूनतम शैक्षणिक योग्यता से संबंधित प्रश्न पूछे जायेंगे। लिखित परीक्षा के सभी प्रश्न वस्तुनिष्ठ एवं बहुविकल्पीय प्रकार के होंगे।

(क) **लिखित परीक्षा** – लिखित परीक्षा में विभिन्न पदों के अनुसार (फार्मेसी/एक्स–रे प्रावैधिकी/प्रयोगशाला प्रावैधिक/नर्सिंग से संबंधित प्रश्न) 50 प्रश्न पूछे जाएंगे। प्रत्येक सही उत्तर के लिए 01 (एक) अंक दिए जाएंगे।

विभिन्न पदों के लिए प्रश्न लिखित का विस्तृत पाठ्यक्रम **परिशिष्ट–XIII** के रूप में संलग्न है।

(ख) **तकनीकी योग्यता (फार्मेसी/एक्स–रे प्रावैधिकी/प्रयोगशाला प्रावैधिक/ नर्सिंग से संबंधित परीक्षा में उत्तीर्णता/ प्रशिक्षण प्राप्ति के लिए) देय अंक**

क्र॰ स॰	तकनीकी योग्यता से सबंधित परीक्षा में उत्तीर्णता/ प्रशिक्षण की स्थिति	देय अंक
01	02	03
1.	60 प्रतिशत एवं उससे ऊपर अथवा समकक्ष ग्रेड	10 अंक
2.	60 प्रतिशत से कम तथा 45 प्रतिशत तक अथवा समकक्ष ग्रेड	07 अंक
3.	45 प्रतिशत से कम अथवा समकक्ष ग्रेड	05 अंक

(ग) **शैक्षणिक योग्यता के आधार पर देय अंक**

(i) मैट्रिक

क्र॰ स॰	मैट्रिक परीक्षा में प्राप्त प्रतिशत	देय अंक
01	02	03
1.	60 प्रतिशत एवं उससे ऊपर अथवा समकक्ष ग्रेड	20 अंक
2.	60 प्रतिशत से कम तथा 45 प्रतिशत तक अथवा समकक्ष ग्रेड	15 अंक
3.	45 प्रतिशत से कम अथवा समकक्ष ग्रेड	10 अंक

(ii) इन्टरमीडिएट (10+2)

क्र॰ स॰	इन्टरमीडिएट/(10+2) परीक्षा में प्राप्त प्रतिशत	देय अंक
01	02	03
1.	60 प्रतिशत एवं उससे ऊपर अथवा समकक्ष ग्रेड	20 अंक
2.	60 प्रतिशत से कम तथा 45 प्रतिशत तक अथवा समकक्ष ग्रेड	15 अंक
3.	45 प्रतिशत से कम अथवा समकक्ष ग्रेड	10 अंक

(घ) **झारखण्ड राज्य के सरकारी अस्पतालों में संविदा कार्य अनुभव के लिए देय अंक** – 50 अंक (अधिकतम) (पाँच अंक प्रति पूर्ण वर्ष की दर से देय होगा)

19. मुख्य परीक्षा के आधार पर मेधा सूची का निर्माण :

(i) उपर्युक्त कंडिका 18 की उपकंडिका (क), (ख), (ग) एवं (घ) में प्राप्त अंक के आधार पर मेधा सूची का गठन किया जाएगा।

(ii) मेधा सूची में एक से अधिक उम्मीदवारों के प्राप्तांक समान (Equal Marks) रहने पर मेधा का निर्धारण उम्मीदवारों की जन्म तिथि के आधार पर किया जायेगा तथा अभ्यर्थी, जिनकी उम्र ज्यादा होगी, उन्हे अपेक्षाकृत ऊपर स्थान मिलेगा। यदि एक से अधिक उम्मीदवारों के प्राप्तांक और जन्म तिथि समान पायी जाती है, तो ऐसी स्थिति में उनके मैट्रिक अथवा समकक्ष परीक्षा में अधिक अंक प्राप्त करने वाले उम्मीदवार को मेधाक्रम में ऊपर रखा जाएगा। वरीयता के उपरोक्त सभी शर्त्तें समान रहने की स्थिति में अँगेजी वर्णमाला के अनुसार वरीयता का निर्धारण किया जाएगा।

(iii) मेधा के आधार पर अनारक्षित पद के लिये तैयार मेधा सूची में समान मापदंड पर आरक्षित वर्ग के अभ्यर्थी के आने की स्थिति में उक्त अभ्यर्थी की गणना अनारक्षित वर्ग के अनुमान्य पदों के विरूद्ध की जायेगी और उनके नाम के सामने उनका आरक्षण वर्ग भी वही होगा। इस सम्बन्ध में राज्य सरकार से प्राप्त अद्यतन निर्देशों का पालन किया जायेगा।

(iv) लिखित परीक्षा में निम्न न्यूनतम अर्हतांक से कम अंक पाने वाले अभ्यर्थियों को मेधा सूची में शामिल नहीं किया जायेगाः– (कार्मिक, प्रशासिनक सुधार तथा राजभाषा विभाग के संकल्प संख्या 3298 दिनांक 11.08.2020 के अनुसार)

(क) अनारक्षित /आर्थिक रूप से कमजोर वर्ग (EWS) – 40 (चालीस) प्रतिशत

(ख) अनुसूचित जाति/अनुसूचित जनजाति/ महिला – 32 (बत्तीस) प्रतिशत

(ग) अत्यन्त पिछड़ा वर्ग – (अनुसूची–1) – 34 (चौंतीस) प्रतिशत

(घ) पिछड़ा वर्ग अनुसूची–2 – 36.5 (साढ़े छत्तीस) प्रतिशत

(ङ) आदिम जनजाति – 30 (तीस) प्रतिशत

उपर्युक्त उप कंडिकाओं के आधार पर प्रत्येक पद हेतु अलग–अलग सामान्य मेधा–सूची तैयार की जायेगी और तदुपरान्त रिक्तियों के सापेक्ष आरक्षण कोटिवार चयन सूची गठित होगी।

परिशिष्ट (XIII)

SYLLABUS FOR LABORATORY TECHNICIAN

(A) Fundamentals of Physiology & Basics of Biochemistry

Fundamental of Physiology

General outline along with the functional anatomy of various body systems

1. Cell : Structure & function
2. Tissue : Epithelium, Connective, Sclerous, Muscular & Nervous
3. Blood : Blood cells, Hemoglobin, Blood groups, Coagulation Factors, Anemia & Immunoglobulins
4. Cardiovascular system: Heart rate, cardiac cycle, cardiac output, blood pressure, hypertension, radial pulse, Measurement of pulse, blood pressure, Auscultation for Heart Sounds.
5. Respiratory System : Ventilation, Functions, Lungs Volumes and capacities
6. Gastrointestinal System : Process of digestion in various parts
7. Endocrinology: Endocrine Glands, Hormones - Their secretion and functions
8. Excretion system: Structure of nephron, Urine formation
9. Central Nervous System: Parts, Sliding Filament Theory, Neuromuscular Junction, Wallerian Degeneration, Motor Nervous system, Sensory nervous system, Sympathetic Nervous system, Parasympathetic nervous system
10. Reproductive System: Male and Female reproductive systems
11. Skin: Structure & Function
12. Muscular System : Classification of muscles & their functions
13. Special Senses : Eye & ear (in brief)

Basics of Biochemistry

1. Introduction to Apparatus, Chemical Balance: Different types, Principles and Practice.
2. Concepts of Molecular weight, Atomic weight, Normality, Molarity, Standards,
3. Atomic structure, Valence, Acids, Bases, Salts, & Indicators.
4. Chemistry of carbohydrates & their related metabolism: Introduction, definition, classification, biomedical importance & properties.
5. Brief outline of metabolism: Glycogenesis &glycogenolysis, Glycolysis, Citric acid cycle & its significance, HMP shunt & Gluconeogenesis, regulation of blood glucose level, Hyperglycemia & hypoglycemia, Diabetes mellitus - definition, types, features, gestational diabetes mellitus , glucose tolerance test, glycosurias, Hypoglycemia & its causes

6. Amino acids: Definition, classification, essential &non essential amino acids.
7. Chemistry of Proteins & their related metabolism: Introduction, definition, classification, biomedical importance.
8. Metabolism: Transamination, Decarboxylation, Ammonia formation & transport, Urea cycle, metabolic disorders in urea cycle, catabolism of amino acids especially Phenylalanine, Tyrosine & Tryptophan, Creatine, Creatinine, Proteinuria.
9. Chemistry of Lipids & their related metabolism: Introduction, definition, classification, biomedical importance, essential fatty acids.
10. Brief out line of metabolism: Beta oxidation of fatty acids, Fatty acid synthesis, Ketosis, Cholesterol & its clinical significance. Lipoproteins- composition & functions, Fatty liver & Atherosclerosis.
11. Chemistry of Nucleic acids: DNA Structure and function, RNA Types: Structure and function.
12. Vitamins: Fat & water soluble vitamins, sources, requirement, deficiency disorders & biochemical functions.
13. Enzymes: Introduction, definition, classification, coenzymes, isoenzymes, properties, factors affecting enzyme action, enzyme inhibition, diagnostic value of serum enzymes

(B) Hematology & Clinical Pathology

Hematological Disorders

1. Classification of Anemia (Morphological & etiological), Definition, causes, classification & lab findings of Iron Deficiency Anemia, Megaloblastic Anemia, Hemolytic Anemia
2. Bone Marrow : Cell composition of normal adult Bone marrow
3. Leukemia: Classification, Blood Picture, Differentiation of Blast Cells.

Basic Hematological Techniques

1. Blood collection
2. Anticoagulants used in Hematology
3. Normal values in Hematology
4. Basic Hematological Techniques: RBC count, Hemoglobin estimation, Packed cell volume.
5. Calculation of absolute indices: WBC counts-Total and differential, Absolute eosinophil count, Platelet count, Erythrocyte sedimentation rate, Reticulocyte count
6. Preparation of blood films
7. Stains used in Hematology
8. Morphology of red cells

9. Morphology of Leukocytes and platelets
10. Bone marrow: Techniques of aspiration, preparation and staining of films, Bone marrow biopsy
11. Laboratory methods used in the investigation of anemia.

Clinical Pathology

1. Urine examination: Physical, Chemical & Microscopic
2. Examination of body fluids, cell counts
3. Semen analysis
4. CSF (Cerebrospinal Fluid)
5. Stool Examination.

(C) General Microbiology

1. Introduction & History of Microbiology

Development of microbiology as a discipline, Contributions of Anton von Leeuwenhoek, Louis Pasteur, Robert Koch, Joseph Lister, Alexander Fleming, Edward Jenner.

2. Microscopy

Study of compound microscope-magnification, numerical aperture, resolution and components of microscope, different types of microscopy-Bright field microscope, Dark field microscope, Phase contrast microscope, Electron Microscope-Transmission & Scanning Electron Micoscope, Precautions and care of microscope

Bacteria

1. General characters and classification.
2. Morphology: Shape, Capsule, Flagella, Inclusion, Granule, Spore.

Growth and Maintenance of Microbes

1. Bacterial division, Batch Culture, Continuous culture, bacterial growth- total count, Viable count, bacterial nutrition, oxygen requirement, CO_2 requirement, temperature, pH,light.

Sterilization and Disinfection

1. Physical agents- Sunlight, Temperature less than 1000C, Temperature at 1000C, steam at atmospheric pressure and steam under pressure, irradiation, filtration.
2. Chemical Agents- Alcohol, aldehyde, Dyes, Halogens, Phenols, Ethylene oxide.

Culture Media

1. Definition, uses, basic requirements, classification, Agar, Peptone, Transport
2. Media, Sugar Media, Anaerobic Media, Containers of Media, Forms of Media

Staining Methods

1. Simple, Grams staining, Ziehl-Nelsen staining or AFB staining, Negative Impregnation

Collection and Transportation of Specimen

1. General Principles, Containers, Rejection, Samples- Urine, Feces, Sputum, Pus, body fluids, Swab, Blood.

Care and Handling of Laboratory Animals

1. Fluid, Diet, Cleanliness, Cages, ventilation, Temperature, Humidity, handling of animals, Prevention of disease.

Disposal of Laboratory/Hospital Waste

1. Non-infectious waste, infected sharp waste disposal, infected non-sharp waste disposal.

Nosocomial Infections/ Hospital Acquired Infections (HAI)

1. Causative methods, transmission methods, investigation, prevention and control of Hospital Infection

(D) Clinical Biochemistry

Photometry

1. Definition,
2. Laws of photometry, absorbance, transmittance, absorption maxima,
3. Instruments,
4. Parts of photometer, types of photometry–colorimetry, spectrophotometry,
5. Flame photometry,
6. Fluorometry, choice of appropriate filter,
7. Measurements of solution,
8. Calculation of formula, applications.

Water & Mineral Metabolism

1. Distribution of fluids in the body,
2. ECF & ICF,
3. Water metabolism, dehydration,
4. Mineral metabolism, macronutrients (principal mineral elements) & trace elements.

Acid base balance concepts & disorders

1. Concepts of Acid Base reaction and hydrogen ion concentration. pH meter & pH buffer.
2. pH, Buffers, Acidosis, Alkalosis

Organ Function Tests

1. Liver Function Tests, Renal Function Tests,
2. Thyroid function tests and Pancreatic Function tests

Cardiac Profile

1. Hypertension, Angina, Myocardial Infarction,
2. Pattern of Cardiac Enzymes in heart diseases.

Diabetic Profile

1. Regulation of Blood Glucose,
2. Glucose tolerance test,
3. Glycosylated Hemoglobin,
4. Microalbuminuria etc.

Endocrinology

1. Classification of hormones;
2. Regulation and general mechanism of action of hormones;
3. Pituitary gland & hypothalamus;
4. Hormones of the Anterior Pituitary, neurohypophysis,
5. Thyroid gland,
6. Adrenocortical hormones, Adrenal medulla,
7. Gonads & Pancreas.

(E) Histopathology & Cytology

1. Introduction to Histopathology, Exfoliative cytology.
2. Basic steps for Tissue Processing: Fixing, Embedding, Microtomy, Staining, Mounting, methods of decalcification.
3. Laboratory requirements for Histopathology & Cytology: Chemicals & Reagents
4. Equipments - Microscope, Microtome: Types, Uses, Parts, different types of microtome knives, care & maintenance. Automated tissue processor - components, working & precautions during use, Tissue floating bath.
5. Staining Methods
    a) Hematoxylin & Eosin stain,
    b) Reticulin stain
    c) PAP staining
6. Museum Techniques

a) The mounting of pathological specimens: Introduction, Preparation of specimen, Fixation of specimen

b) Precaution taken for the Fixation of Specimens.

c) Storage of Specimens.

d) Mounting of Museum Specimens.

e) Routine Mounting of Specimens.

f) Filling and Scaling.

(F) Immunology, Serology & Parasitology

Immunology & Serology

1. Immunity - Definition and classification, General Principles of Innate & Acquired Immunity.
2. Immune Response - Humoral immunity & cell mediated immunity.
3. Antigen - Definition, classes, properties.
4. Antibodies/ Immunoglobulins - Definition, Properties, Sub types of Immunoglobulins, Introduction of hybridoma technology, monoclonal antibodies, polyclonal antibody
5. Antigen/Antibody Reaction/ Serological Refractions
6. Features of antigen/antibody Reaction- Precipitation, Agglutination, ELISA, RIA, Complement fixation test, Neutralization, Opsonization, Immune adherence, Immuno fluorescence, Immuno electron microscopic test
7. Structure and functions of Immune System
   a) Parts of Immune system
   b) T/B cells, Natural Killer cells, other cells & their functions
8. Hyper sensitivity Reactions
   a) General Principles of different types of hypersensitive reactions i.e., type 1, 2, 3, 4.
   b) Auto immune disorders
9. ELISA
10. Vaccination- Immunoprophylaxis schedule in neonates, children and in pregnancy

Parasitology

1. Definition - parasitism, Host, Vectors etc.
2. Classification of Parasites.
3. Lab diagnosis of parasitic infections.

Protozoa: Life cycle, Morphology, Disease & Lab Diagnosis

1. Intestinal Amoebae: E. histolytica, E. coli
2. Flagellates of intestine/genitalia: Giardia lamblia, Trichomonas vaginalis
3. Malarial Parasite: Plasmodium vivax ; Differences between P. vivax, P. malaria, P. falciparum & P. ovale.

Nematodes: Intestinal Nematodes:

1. Ascaris: Life cycle, Morphology, disease & lab diagnosis
2. Enterobiusvermicularis (Thread worm) and Ancylostomaduodenale (Hook worm) (inbrief)
3. Tissue Nematodes: W. bancrofti - Life cycle, Morphology, Disease & Lab Diagnosis

Phylum Platyhelminths

1. Cestodes - T. solium, T. saginata & E. granulosus.
2. Trematodes - S. haematobium& F. hepatica

(G) Coagulation studies & Blood Bank procedures

Coagulation studies

1. Hemostasis: Definition, Basic concept and principle, Basic steps involved in Hemastosis.
2. Coagulation:
   a) Basic Physiology, coagulation factors.
   b) Mechanism of blood coagulation.
   c) Extrinsic Pathway.
   d) Intrinsic Pathway.
   e) Regulators of blood coagulation.
3. Testing of blood coagulation:
   a) Bleeding Time, Duke's method.
   b) Clotting Time- Capillary tube method & Lee white's method.
   c) PT, APTT
   d) Clot retraction time
   e) Determination of fibrinogen.
4. Quality Assurance for routine Heamostasis Laboratory:
   a) Introduction.
   b) Sample collection technique (Phlebotomy)
   c) Sample preparation, Anticoagulant used, Importance of use of Sodium Citrate.

5. Role in Diseases, Bleeding disorders
    a) Platelet disorder - Thrombocytopenia - causes including aplastic anemia
    b) Hemophilia

Blood Bank Procedures

1. Principles and practice of:
    a) Blood Grouping
    b) Blood Transfusion
    c) Blood Donation
    d) Blood Collection
    e) Storage & Transport
    f) Maintenance of Blood Bank Records
    g) Compatibility Testing
    h) Blood Components
    i) Blood Transfusion Reactions

(H) Systematic Bacteriology, Mycology & Virology

Systematic Bacteriology

1. Morphology, cultural characteristics,
2. Biochemical reaction,
3. Pathogenesis/ disease caused & lab diagnosis of:
    a) Staphylococcus,
    b) Streptococcus,
    c) Pneumococcus,
    d) Neisseria gonorrhoeae,
    e) Neisseria
    f) meningitidis,
    g) Corynebacteriumdiptheriae,
    h) Mycobaterium,
    I) Clostridium,
    j) E.coli,
    k) Klebsiella,
    l) Salmonella,

m) Proteus,

n) Pseudomonas,

o) Vibrio

p) Spirochaetes.

4. Molecular techniques in diagnostic microbiology -PCR, DNA hybridization Mycology

a) Morphology and Structure of fungi

b) Classification of fungi

c) Nutrition and cultivation of fungus

d) Cutaneous, Subcutaneous and Systemic Mycosis

e) Lab diagnosis of fungal Infections

f) Opportunistic fungal infections

Virology

1. General characters of viruses
2. Classification of viruses
3. Structure of Viruses: Capsid symmetry, enveloped and non-enveloped viruses
4. Lab diagnosis of viral infections
5. Cultivation of viruses
6. Bacteriophages.
7. Retro viruses - HIV, Hepatitis virus, Pox virus
8. Picorna virus - Polio
9. Orthomyxo virus - Influenza
10. Arbo virus - Chikungunya, Dengue
11. Herpes and Adeno virus

Syllabus for X-Ray Technician

1. Human Anatomy & Physiology

Scope of Anatomy and Physiology - Definitions and Terms in Anatomy and Physiology- Structure and function of human cell - Elementary tissues of human body- Brief account on Composition of Blood - functions of blood elements - Blood Group and coagulation ofblood.

(i) Cardio Vascular System (Structure and functions of various parts of the heart, arterial and venous system, briefaccount on common cardiovascular disorders).

(ii) Respiratory System (various parts of respiratory system and their functions,

Physiology of Respiration).

(iii) Digestive System (names and various parts of digestive system-Liver, Spleen, Gall Bladder, Pancreas, Buccal Cavity, Pharynx, Oesophagus, Stomach, intestine etc.-physiology of digestion and absorption)

(iv) Urinary System (various parts of urinary system and its function-structure and function of kidneys-physiology of urine formation - pathophysiology of renal disease and edema.)

(v) Reproductive System (physiology and anatomy of Male & Female reproductive system-Prostate & Uterus& Ovaries etc.)

(vi) Musculoskeletal System (Classification of bones & joints, structure of skeleton – structure of skeletal muscle –physiology of muscle contraction)

(vii) Nervous System (various parts of nervous system- Brain and its parts – functions of nervous system - SpinalCord & Nerves).

(viii) Ear, Nose, Throat and Eye (Elementary knowledge of structure and functions of organs of taste, smell,hearing, vision.)

(ix) Endocrine System (Endocrine glands ,their hormones and functions-Thyroid, Parathyroid, Suprarenal,Pituitary, pituitary and Thymus)

(x) Haemopoietic and Lymphatic System (Name of the blood vessels & lymph gland locations).

(xi) Surface Anatomy & Surface Markings of Human Body.

2. <u>Radiology Physics, Radiation Physics & Physics of Diagnostic Radiology</u> -

Basic concepts of power, work, force, energy, electricity, magnetism and their units and measurements- einstein's formula – electromagnetic induction – Atomic structure – radioactivity- ionization and excitation - electromagnetic waves – X-rays production and properties – X-ray tube - quality of x-rays – factors affecting quality and intensity of x- rays. X-ray circuits - interaction of X and gamma rays - X-radiation measurements etc. Principles of Radiation detection and measurements – TLD, Pocket Dosimeter, Radiation Survey meter and radiation zone monitor. Study with charts, models & power point presentations Atomic structure, X-ray tubes, X-ray circuits involving students to present and discuss.

3. <u>X-Ray Machines & Accessories and their Maintenance</u>

X-ray machines – Anode & Cathode - Thermionic diode – X-ray valves and tubes – principle and practical aspects – semiconductors – triode valves – cathode ray oscilloscopes – X-ray circuits – self rectifying circuits – half wave pulsating voltage circuits – full valve pulsating voltage circuits - measurement of high voltage – control ofKV circuit – mA circuit. X-ray beam quality

4. **X-ray Film / Image processing Techniques**

X-ray Films- X-ray cassettes - Intensifying screens X-ray films types – basic film structure & quality – choosing films for different studies - basics on hard copies of radiographic images – dry & wet processing – Fixer –Developer –film processing methods - manual and automatic processing – conventional & modern image processing rooms – image processing equipments – types & maintenance – day light systems advantages & disadvantages – processing faults –- glossy prints, paper prints etc – production of best quality images. Intensifying screen- Fluorescence -structure of Intensifying screens – Casette types – screen un-sharpness etc.

5. **Clinical Radiography - Positioning**

Radiological Equipments – X-ray machine - transformers, x-ray units, fluoroscopy, grids and filters - Positional Radiography - Radiographic views of different parts of the body – Chest, Abdomen, Upper Limb, Cervical & Thoracic Spine, Lumbar Spine, Sacrum & Coccyx, Bony thorax - Sternum & Ribs, Skull and cranial bones, facial bones, paranasal sinuses, Mastoids & Temporal bones etc. Upper & Lower GIT, Gall Bladder & Biliary duct, GUT etc.

6. **Equipments, basic Techniques of modern Imaging Modalities**

C.R (principle, equipment & imaging)

Digital Radiography (principle, equipment & imaging)
Mammography (basic principle, equipment & image acquisition)

CT (Basic physics – Tomography principle - basics of plain studies, contrast studies, specialprocedures)

MRI (basic principle – imaging methods - slice section- plain & contrast studies – imagecontrast – factors affecting image quality)

USG (Basic acoustics - ultrasound terminologies – Interaction of US with matter – Ultrasound display modes etc) Demonstration of basic procedures in all modern modalities.

7. **Contrast & Special Radiography procedures.**

Barium swallow - barium meal - barium enema (single and double contrast), Enteroclysis PTBD, Sinograms, Fistulograms, IVU, AUG, MCU, HSG, Sialogram, T-tube Cholangiogra –Fluroscopy, Image intensifiers - Tomography basics, etc

8. **Quality Control in Radiology & Radiation Safety**

Quality control procedure in Radiology as per NABH.
Biological effects of Radiation – Radiation dose –Effects of time, distance and shielding – personnel and area monitoring – Planning of X-ray rooms, dark rooms – Evaluation of workload versus radiation factors – Radiation safety instruments - ICRP / AERB recommendations.

SYLLABUS FOR PHARMACIST

PHARMACEUTICS

1. Introduction of different dosage forms. Their classification with examples- their relative applications. Familiarisation with new drug delivery systems.
2. Introduction to Pharmacopocias with special reference to Indian Pharmacopocia.
3. Metrology- Systems of weights and measures. Calculations including conversion from one to another system. Percentage calculations and adjustments of products. Use of allegation method in calculations. Isotonic solutions.
4. Packing of Pharmaceuticals- Desirable features of a container types of containers study of glass and plastics as materials of containers and rubber as material for closures- their merits and demerits. Introduction to aerosol packaging.
5. Size reduction objectives and factors affecting size reduction, methods of size reduction- Study of Hammer mill, Ball mill, Fluid Energy mill and disintegrator.
6. Size separation- Size separation by sifting. Official Standard for powders. Sedimentation methods of size separation. Construction and working of cyclone separator.
7. Mixing and Homogenisation – Liquid mixing and powder mixing, mixing of semisolids, study of Silverson Mixer- Homogeniser, Planctary Mixer, Agitated powder mixer; Triple roller mill, Propeller mixer, Colloid mill and hand homogenizer. Double cone mixer.
8. Classification and filtration – theory of filtration, filter media, filter aids and selection of filters. Study of following filtration equipments- Filter Press, Sintered filters, Filter candles, Metafilter.
9. Extraction and Galenicals- (a) Study of percolation and maceration and their modification. Continuous hot extraction, - Application in extraction of tincture and extracts. (b) Introduction to Ayurvedic dosages forms.
10. Heat processes Evaporation- Definition. Factors affecting evaporation. Study of evaporating still and evaporating pan.
11. Distillation- Simple distillation and fractional distillation, steam distillation and vacuum distillation. Study of vacuum still, preparation of purified water I.P. and water for injection I.P. Construction and working of still used for the same.
12. Introduction to drying processes- Study of tray dryers, Fluidized Bed dryer vacuum Dryer and freeze Dryer.
13. Sterilization- Concept of sterilization and its differences from disinfection, thermal resistance of micro organism, Detailed studies of the following sterilization process– (a) Sterilization with moist heat, (b) dry heat sterilization, (c) Sterilization by radiation, (d) Sterilization by Filtration and (e) Gaseous sterilization. Aseptic techniques. Study of sterilization process in hospitals particularly with reference to surgical dressing and intravenous fluids, precautions for safe and effective handling of sterilization equipment.
14. Processing of tablets- Definition; Different types of compressed tablets and their properties, Processes involved in production of tablets, Tablets excipients, Defects in tablets, Evaluation of Tablets: physical standards including disintegration and Dissolution. Tablet coating- sugar

coating, film coating cnteric coating and microencapsulation (Tablet coating may be dealt in an elementary manner.)

15. Processing of capsules- Hard and soft gelating capsules, different sizes capsules, filling of capsules, handling and storage of capsules, special application of capsules.

16. Study of immunological products like sera vaccines, toxoids and their preparations.

PHARMACEUTICS-II

1. Dispensing Pharmacy:

(i) Prescriptions- Reading and understanding of prescription; Latin terms commonly used (Detail study is not necessary), modern methods of prescribing, adoption of metric system, calculation involved in dispensing.

(ii) Incompatibilities in Prescriptions- Study of various types of incompatibilities- Physical, Chemical and therapeutic.

(iii) Posology- Dose and doses of drugs, Factors influencing dose, Calculation of dose on basis of age, sex and surface area, Veterinary doses.

2. Dispensed Medications:

(Note- A detailed study of the following dispensed medication is necessary Methods of preparation with theoretical and practical aspects, use of appropriate containers and closures, special labilling requirements and storage conditions should be highlighted).

(i) Powders- Types of powders- Advantages and disadvantages of powders, Granules, Cachets and Tablet triturates. Preparation of different types of powders encountered in prescriptions, weighing methods, possible errors in weighing, minimum weighable amounts and weighing of material below the minimum weighable amount, geometric dilution and proper usage and care of dispensing balance.

(ii) Liquid - Oral Dosage Forms:

(a) Monophasic- Theoretical aspects including commonly use vehicles, essential adjuvant like stabilizers, colourants and flavours with examples.

Review of the following monophasic liquids with details of formulation and practical methods.

Liquids for internal administration	Liquids for external administration or used on mucus membranes
Mixtures and Concentrates Syrups, Elixirs	Ga Gargles, Mouth washes, Throat paints, Douches, Ear drops, Nasal drops & sprays, Liniments, Lotions,

(b) Biphasic Liquid Dosages forms:

(i) Suspension (elementary study) Suspension containing diffusible solids and liquids and their preparations. Study of adjuvants used like thickening agents, wetting agents, their necessity and quantity to be incorporated. Suspensions of precipitate forming liquids like tinctures, their preparation and stability. Suspensions produced by chemical reaction. An introduction of flocculated, non flocculated suspension system.

(ii) Emulsions- Types of emulsions, identification of emulsion system, formulation of emulsions, selection of emulsifying agents. Instabilities in emulsions. Preservation of emulsions.

(iii) Semi- Solid Dosages Forms:

(a) Ointments- Types of ointments, classification and selection of dermatological vehicles. Preparation and stability of ointments by the following processes: (i) Trituration (ii) Fusion (iii) Chemical reaction (iv) Emulsification.

(b) Pastes- Difference between ointments and pastes, bases of pastes. Preparation of paste and their preservation.

(c) Jellies- An introduction to the different types of Jellies and their preparation.

(d) An elementary study of poultice.

(e) Suppositories and pessaries- Their relative merits and demerits, types of suppositories, suppository bases, classification, properties. Preparation and packing of suppositories. Use of suppositories for drug absorption.

(iv) Dental and Cosmetic Preparations: Introduction to Dentrifices, Facial cosmetics. Deodorants, Antiperspirants, Shampoos, Hair dressing and hair removers.

(v) Sterile dosages forms:

(a) Parenteral dosage forms- Definition, General requirements for parenteral dosage forms. Types of parenteral formulations, vehicles, adjuvants, processing, personnel, facilities and Quality control, Preparation of Intravenous fluids and admixtures- Total parenteral nutrition, dialysis fluids.

(b) Sterility testing, Particulate matter monitoring – Faulty seal packaging.

(c) Ophthalmic products- Study of essential characteristics of different ophthalmic preparations. Formulation additives, special precautions in handling and storage of ophthalmic products.

PHARMACEUTICAL CHEMISTRY

1. General discussion on following inorganic compounds including important physical and chemical properties , medicinal and pharmaceutical uses, storage condition and chemical incompatibility.

(a) Acids, bases and buffers. Boric acid, Hydrochloric acid, strong ammonium hydroxide, Calcium hydroxide, sodium hydroxide and official buffers.

(b) Antioxidants- Hypophosphorous acid, sulphur dioxide, Sodium bisulphite, Sodium metabisulphite, Sodium thiosulphate, Nitrogen and Sodium Nitrite.

(c) Gastrointenstal agents- (i) Acidifying agents, dilute Hydrochloric acid. (ii) Antacids- Sodium bicarbonate, Aluminium hydroxide gel, Aluminium Phosphate, Calcium carbonate, Magnesium carbonate, Magnesium trisilicate, Magnesium oxide, Combination of antacid preparations. (iii) Protective and Adsorbents- Bismuth subcarbonate and Kaolin. (iv) Saline Cathartics- Sodium Potassium tartrate and Magnesium sulphate.

(d) Topical Agents- (i) Protective- Talc, Zinc oxide, Calamine, Zinc stearate, Titanium dioxide, Silicon Polymers. (ii) Antimicrobials and Astringents- Hydrogen peroxide, Potassium permanganate, Chlorinated lime, Iodine, Solutions of Iodine, Povidone iodine, boric acid, Borax, Silver nitrate, Mild silver protein, Mercury, Yellow Mercuric oxide, Ammoniated Mercury. (iii) Sulphur and it's compounds- Sublimed sulphur, precipitated sulphur, Selenium sulphide. (iv) Astringents- Alum and Zinc sulphate.

(e) Dental products- Sodium fluoride, Stannous fluoride, Calcium carbonate, Sodium meta phosphate, Dicalcium phosphate, Strontium chloride, Zinc chloride.

(f) Inhalants- Oxygen, Carbon dioxide, Nitrous oxide.

(g) Respiratory stimulants- Ammonium carbonate.

(h) Expectorants and Emetics- Ammonium chloride, Potassium iodide, Antimony Potassium tartrate.

(i) Antidote- Sodium nitrate.

2. Major Intra and Extracellular electrolytes-

(a) Electrolytes used for replacement therapy- Sodium chloride and it's preparations, Potassium chloride and it's preparations.

(b) Physiological Acid- base balance and electrolytes used- Sodium acetate, Potassium acetate, Sodium bicarbonate injection, Sodium citrate, Potassium citrate, Sodium lactate injection, Ammonium chloride and it's injection.

(c) Combination of oral electrolyte powder and solutions.

3. Inorganic official compounds of Iron, Iodine AND Calcium ferrous sulphate and Calcium gluconate.

4. Radio pharmaceuticals and Contrast media- Radio activity- Alpha, Beta and Gamma radiation, Biological effects of radiation, measurement of radio activity, G.M. Counter, Radio isotopes- their uses, storage and precautions with special reference to the official preparation. Radio opaque. Contrast media- Barium sulphate.

5. Quality control of drugs and pharmaceuticals- Importance of quality control, significant errors, methods used for quality control, sources of impurities in pharmaceuticals. Limit test for Arsenic, Chloride, sulphate, Iron and heavy metals.

6. Identification test for cations and anions as per Indian Pharmacopoeia.

PHARMACEUTICAL CHEMISTRY-II

1. Introduction to the nomenclature of organic chemical systems with particular reference to heterocyclic system containing up to 3 rings.

2. The chemistry of following pharmaceutical organic compound, covering their nomenclature, chemical structure, uses and important physical and chemical properties (Chemical structure of only those compounds marked with astcrisk(*).

3. The stability and storage conditions and the different types of Pharmaceutical formulation of drugs and their popular brand names.

Antiseptics and Disinfectants- Proflavine*, Benzal- koniumchlorides, Cetrimide, Chlorocresol*, Chloroxylene, Formaldehyde solution, Hexachlorophene, Liquified phenol, Nitrofurantoin.

Sulfonamides- Sulfadiazene, Sulfaguanidine*, Phthalylsulfathiazole, Succinylsulfathiozole, Sulfamethoxypyridazine, Sulfamethoxazole, co-trimoxazole, Sulfacetamide*.

Antileprotic drugs- Clofazimine, Thiambutosine, Dapsone*, Solapsone.

Anti tubercular drugs- Isoniazid*, PAS*, Streptomycin, Rifampicine, Ethambutol*, Thiacetazone, Ethionamide, Cycloserine, Pyrazinamides*.

Anti amoebic and Anthelminitic Drugs- Emetine, Metronidazole*, Halogenated Hydroxyquinolines, diloxanidefuroate, Paramomycin Piperazine*, Mebenazole, D.E.C.*.

Antibiotics- Benzyl Penicillin*, Phenoxy methyl, Penicillin*, Benzathine Penicillin, Ampicillin*, Cloxacillin, Carbenicillin, Gentamicin, Neomycin, Erithromycin, Tetracycline, Cephalexin, Cephaloridine, Cephalothin, Griscofulvin, Chloramphenicol.

Antifungal agents- Undecylenic acid, Tolnaftate, Nystatin, Amphotericin, Hamycin.

Antimalarial drugs- Chloroquin*, Amodiaquine, Primaquine, Proguanil, Pyrimethamine*, Quinine, Trimethoprim.

Tranquilizers- Chlorpromazine*, Prochlorperazine, Trifluo Perazine, Thiothixene, Haloperidol*. Triperidol, Oxypertine, Chlordiazepoxide, Diazepam*, Lorazepam, Meprobamate.

Hypnotics-, Phenobarbitone*, Butobarbitone, Cyclobarbitone, Nitrazepam, Phenobarbitone Glutethimide*, Methyprylone, Paraldehyde, Triclofor sodium.

General Anaesthetics- Halothane*, Cyclopropane*, Diethyl ether*, Methohexial sodium, Thiopental sodium, Trichloroethylene.

Antidepressant drugs- Amitriptyline, Nortryptyline, Imipramine*, Phenelzine, Tranyleypromine.

Analeptics- Theophylline, Caffeine*, Coramine*, Dextroamphetamine.

Adrenergic Drugs- Adrenaline*, Noradrenaline, Isoprenaline*, Salbutamol, Terbutaline, Ephedrine*, Pseudoepherdine.

Adreneric Antagonist- Tolazine, Propranolol*, Practolol.

Cholinergic Drugs- Neostigmine*, Pyridostigmine, Pralidoxime, Pilocarpine, Physostigmine*.

Cholinergic Antagonist- Atropine*, Hyoscine, Homatropine, Propantheline*, Benztropine, Tropicamide, Biperiden*.

Diuretic drugs- Furosemide, Chlorothiazide, Hydrochlorothiazide*, Benzthiazide, Urea*, Mannitol*, Ethacrynic acid.

Cardiovascular Drugs- Ethyle nitrite, Glyceryl trinitrate, Alpha methyl dopa, Guanethidine, **Clofhrate** Quinidine .

Hypoglycemic Agents- Insulin, Chlorpropamide*, Tolbutamide, Glibenclamide, Phenformin*, Metaformin.

Coagulants and Anti- Coagulants- Heparin, Thrombin, Menadione*, Bishydroxycoumarine, Warfarin Sodium.

Local Anaesthetics- Lignocaine*,Procaine*, Benzocaine.

Histamine and Anti- Histamine Agents- Histamine, Diphenhydramine*, Promethazine, Cyprohepatadine, Mepyramine, Pheniramine, Chlorpheniramine*.

Analgesics and Anti- pyretics- Morphin, Pethidine*, Codeine, Methadone, Aspirin*, Paracetamol*, Analgin, Dextropropoxyphene, Pentazocine.

Non steroidal anti inflammatory Agents- Indomethacine*, Phenylebutazone*, Oxyphenbutazone, Ibuprofen, Thyroxine and Antihydroids-Thyroxine*, Methimazole, Methylethiouracil, Propylthiouracil.

Diagnostic agents- Iopanoic acid, Propyliodone, Sulfobromophthalein. SodiumIndigotindisulfonate, Indigo Caramine, Evans blue, Congo red, Fluorescein Sodium.

Anticonvulsant, cardiac glycosides, Antiarrhythmic antihypertensives& vitamins.

Steriodal drugs- Betamethazone, Cortisone, Hydrocortisone, prednisolone, Progesterone, Oestradiol, Nandrolone.

PHARMACOGNOSY

1. Definition, history and scope of Pharmacognosy including Indian system of medicine.
2. Various systems of classification of drugs of natural origin.
3. Adulteration and drug evaluation; significance of Pharmacopocial standards.
4. Brief outline of occurrence, distribution, outline of isolation, identification tests, therapeutic effects and pharmaceutical application of alkaloids, terpenoids, glycosides, volatile oils, tannins and resins.
5. Occurrence , distribution, organoleptic evaluation, chemical constituents including tests wherever applicable and therapeutic efficacy of following categories of drugs-
   (a) Laxatives: Aloes, Rhuburb, Castor oil, Ispaghula, Senna.
   (b) Cardiotonics- Digitalis, Arjuna.
   (c) Carminatives &G.I. regulators- Umbelliferous fruits, Coriander, Fennel, Ajowan, Cardamom, Ginger, Black pepper, Asafoetida, Nutmeg, Cinnamon, Clove.
   (d) Astrigents- Catechu.
   (e) Drugs acting on nervous system- Hyoscyamus, Belladonna, Aconite, Ashwagandha, Ephedra, Opium, Cannabis, Nux vomica.
   (f) Antihypertensives- Raulwolfia.
   (g) Antitussives- Vasaka, Tolu balsam, Tulsi.
   (h) Antirheumatics- Guggul, Colchium.
   (i) Antitumour- Vinaca.
   (j) Antileprotics- Chaulmoogra oil.
   (k) Antidiabetics- Pterocarpus, Gymnema, Sylvestro.
   (l) Diuretics- Gokhru, Punarnava.
   (m) Antidysentrics- Ipecacuanha.
   (n) Antiseptic and disinfectants- Benzoin, Myrrh, Nim, curcuma.
   (o) Antimalarials- Cinchona.
   (p) Oxytocics- Ergot.
   (q) Vitamins- Shark liver oil and Amla.
   (r) Enzymes- Papaya, Diastase, Yeasts.

(s) Perfumes and flavouring agents- Peppermint oil, Lemon oil, Orange oil, Lemon grass oil, Sandalwood.

(t) Pharmaceutical aids- Honey, Arachis oil, Kaolin, Pectin, Olive oil, Lanolin, Bees wax, Acacia, Tragacanth, Sodium alginate, Agar, Gaur gum, Gelatin.

(u) Miscellaneous- Liquorice, Garlic, Picrorhiza, Dioscorea, Linseed, Shatawari, Shankhpushpi, Pyrethrum, Tobacco.

6. Collection and preparation of crude drug for the market as exemplified by Ergot, Opium, Rauwolfia, Digitalis, Senna.
7. Study of source, preparation and identification of fibres used in sutures and surgical dressings- cotton, silk, wool and regenerated fibres.
8. Gross anatomical studies of Senna, Datura, Cinnamon, Cinchona, Fennel, Clove, Ginger, Nux vomica & Ipecacuanha.

BIOCHEMISTRY AND CLINICAL PATHOLOGY.

1. Introduction to biochemistry.
2. Brief Chemistry and role of proteins, polypeptides and amino acids, classification , Quantitative tests, Biological value, Deficiency diseases.
3. Brief chemistry and role of carbohydrates, Classification, qualitative tests. Diseases related to carbohydrate metabolism.
4. Brief chemistry and role of Lipids, Classification, qualitative tests, Diseases related to lipid metabolism.
5. Brief chemistry and role of vitamins and enzymes.
6. Role of minerals and water in life process.
7. Enzymes: Brief concept of enzymic action, factors affecting it, therapeutic and pharmaceutical importance.
8. Brief concept of normal and abnormal metabolism of proteins, carbohydrates and lipids.
9. Introduction to pathology of blood and urine.
   (a) Lymphocytes and Platelets, their role in health and disease.
   (b) Erythrocytes – Abnormal cells and their significance.
   (c) Abnormal constituents of urine and their significance in disease.

HUMAN ANATOMY AND PHYSIOLOGY

1. Scope of Anatomy and Physiology.
2. Definition of various terms used in Anatomy. Structure of cell, function of it's components with special reference to mitochondria and micomes.
3. Elementary tissues of the body i.e. epithelical tissue, muscular tissue, connective tissue and nervoustissue.
4. Structure and function of skeleton, classification of joints and their function, joint disorder.
5. Composition of Blood, function of blood elements. Blood group and coagulation of blood. Brief information regarding disorder of blood.
6. Name and function of lymph glands.

7. Structure and function of various parts of the heart. Arterial and venous system with special reference to the names and positions of main arteries and veins. Blood pressure and it's recording. Brief information about cardiovascular disorders.
8. Various parts of respiratory system and their functions. Physiology of respiration.
9. Various parts of urinary system and their functions, structure and function of kidney. Physiology of urine formation. Pathophysiology of renal disease and oedema.
10. Structure of skeletal muscle, physiology of muscle contraction. Names, position, attachments and function of various skeletal muscles. Physiology of neuromuscular junction.
11. Various parts of central nervous system, brain and it's parts, functions and reflex action, anatomy and physiology of autonomic nervous system
12. Elementary knowledge of structure and functions of the organs of taste, smell, ear, eyes and skin. Physiology of pain.
13. Digestive system, names of the various parts of digestive system and their functions. Structure and functions of liver, physiology of digestion and absorption.
14. Endocrine glands and hormones. Locations of the glands, their hormones and functions. Pituitary, thyroid, Adrenal and Pancreas.
15. Reproductive system- Physiology and Anatomy of Reproductive system.

HEALTH EDUCATION AND COMMUNITY PHARMACY

1. Concept of health – Definition of physical health, mental health, social health, spiritual health, determinants of health, indicators of health, concept of disease, natural history of diseases, the disease agents, concept of prevention of diseases.
2. Nutrition and health- Classification of foods, requirements, diseases induced due to deficiency of proteins, vitamins and minerals- treatment and prevention.
3. Demography and family planning- Demography cycle, fertility, family planning, contraceptive methods, behavioural methods, natural family planning method, chemical method, mechanical methods, hormonal contraceptives, population problem of India.
4. First aid- Emergency treatment in shock, snake bite, burns, poisoning, heart disease, fractures and resuscitation methods. Elements of minor surgery and dressings.
5. Environment and health- Sources of water supply, water pollution, purification of water, health air, noise, light, solid waste disposal and control- medical entomology, anthropod borne diseases and control, rodents, animal and diseases.
6. Fundamental principles of microbiology, classification of microbes, isolation, staining techniques of organisms of common diseases.
7. Communicable diseases- Causative agents, modes of transmission and prevention.
   (a) Respiratory infections- Chicken pox, measles, Influenza, diphtheria, whooping cough and tuberculosis.
   (b) Intestinal infections- Poliomyelitis, Hepatitis, Cholera, Typhoid, Food poisoning, Hook worm infection.
   (c) Anthropod borne infection- Plague, Malaria, Filariasis.
   (d) Surface infections- Rabies, Trachoma, Tetanus, Leprosy.
   (e) Sexually transmitted diseases- Syphilis, Gonorrhea, AIDS.

8. Non communicable diseases- Causative agents, prevention, care and control, cancer, diabetes, blindness, cardiovascular diseases.
9. Epidemiology- It's scope, methods, dynamics of disease transmission, immunity, immunization, Immunological products and their schedule, principle of disease control and prevention, hospital acquired infection, prevention and control, Disinfection, types of disinfection, disinfection procedures for faces, urine, sputum, dead bodies, instruments.

PHARMACOLOGY & TOXICOLOGY

1. Introduction to Pharmacology, scope of pharmacology.
2. Routes of administration of drugs, their advantages and disadvantages,
3. Various process of absorption of drug and the factors affecting them, Metabolism, distribution and excretion of drugs.
4. General mechanism of drugs action and the factors which modify drug action.
5. Pharmacological classification of drugs. The discussion of drug should emphasise following aspects-

(i) Drugs acting on the central nervous system:

(a) General anaesthecics, adjunction to anaesthesia, intravenuous anasesthetics,
(b) Analgestic antipyretics and non steroidal anti- inflammatory drugs, Narcotics analgesic, Antirheumatic and anti-gout remedies, Sedatives and Hypnotics, Psychophamacological agents, Anti convulsants, analeptics.
(c) Centrally acting muscles relaxants and anti parkinsonism agents.

(i) Local anaesthetics.

(ii) Drug acting on autonomic nervous system.

(a) Cholingeric drug, Anticholinergic drugs & anti cholinesterase drugs,
(b) Adrenergic drugs and adrenergic recepter blockers.
(c) Neurone blockers and ganglion blockers.
(d) Nueromuscular blockers, drugs used in myasthenia gravis.

(iii) Drugs acting on eyes, mydriatics, drugs used in glaucoma.

(iv) Drugs acting on respiratory system- Respiratory stimulants, Bronchodialatiors,Nasal decongestants, Expectorants and Antitussive agents.

(v) Antacids, Physiological role of histamine and Anti histamines, and serotonin, Histamine and Antihistamines, Prostaglandins.

(vi) Cardio vascular drugs, Cardiotonics, Antiarrhythmic agents, Antianlginal Agents, Anti hypertensive agents, Peripheral Vasodialators and drugs used in anterosclerosis.

(vii) Drugs acting on the blood and blood forming organs, Haematinics, Coagulants and anti coagulants, Haemostatics, Blood substitutes and plasma expanders.

(viii) Drugs affecting renal function- Diuretics and anti diuretics.

(ix) Hormones and hormone antagonists- hypogly Ycemic agents, Anti thyroids drugs, sex hormones and oral contraceptives, Corticosteroids.

(x) Drugs acting on digestive system- Carminatives, digestants,, Bitters, Antacids and drugs used in peptic ulcers, purgatives and laxatives, Anti diarrhoeals, Emetics, Anti emetics, Anti- spasmodic.

(6) Chemotherapy of microbial diseases- Urinary antiseptic, Sulfonamides, Penicillin, Streptomycin, Tetracyclines and other antibiotics, Anti tubercular agents, Anti fungal agents, Anti viral drugs, Anti leprotic drugs.

(7) Chemotherapy of protozoal diseases, Anti helmintic drug.

(8) Chemotherapy of cancer.

(9) Disinfectants and antiseptic.

A detailed study of the action of drugs on each organ is not necessary.

PHARMACEUTICAL JURISPRUDENCE

1. Origin and nature of pharmaceutical legislation in India, it's scope and objectives. Evolution of the " Concept of Pharmacy" as an integral part of Health care system.
2. Principles and significance professional ethics, Critical study of the code of Pharmaceutical Ethics drafted by Pharmacy Council of India.
3. Pharmacy Act, 1948- The General study of the Pharmacy Act with special reference to Education Regulations, working of State and Central Councils, Constitution of these Councils and functions, Registration procedure under the Act.
4. The drugs and cosmetics Act, 1940- General study of drugs and cosmetics Act and Rules there under. Definitions and salient features related to retail and wholesale distribution of drugs. The powers of Inspectors, the sample procedures and the procedure and formalities in obtaining license under the rules. Facilities to be provided for running a Pharmacy effectively. General study of the schedules with special reference of schedules C, C1,F,G,J,H,P and X and salient features of labeling and storage condition of drugs.
5. The Drugs and Magic Remedies (Objectionable advertisements) Act,1954- General study of the Act, Objectives, special reference to be laid on Advertisements. Magic remedies and objectionable and permitted Advertisements- disease which cannot be claimed to be cured.
6. Narcotic drugs and Psychotropic Substances Act 1985-A, brief study of the Act with special reference to it's objectives, offences and punishment.
7. Brief introduction to the study of the following acts-
   (a) Latest Drugs (Price Control) Order in force.
   (b) Poisons Act- 1919 (As amended to date).
   (c) Medicinal and Toilet Preparations (Excise Duties) Act,1955 (as amended to date).
   (d) Medical Termination of Pregnancy Act, 1971 (as amended to date).

DRUG STORE AND BUSINESS MANAGEMENT

Part 1- COMMERCE

1. Introduction- Trade, Industry and Commercial Functions and subdivision of Commerce, Introduction to Elements of Economics and Management.
2. Forms of business organizations.
3. Channels of distribution.
4. Drug house management- Selection of site, Space lay out and legal requirement. Importance and objectives of purchasing, selection of suppliers, credit information, tender, contracts and price determination and legal requirements there to. Codification, handling of drug stores and other hospital supplies.

5. Inventory control- Objectives and importance , modern techniques like ABC, VED analysis, the lead time, inventory carrying cost, safety stock, minimum and maximum stock levels, economic order quantity, scrap and surplus disposal.
6. Sales Promotion, Market research, salesmanship, quality of salesman, Advertising and window Display.
7. Recruitment, training, evaluation and compensation of the pharmacist.
8. Banking and Finance Service and functions of banks, Finance planning and source of finance.

Part-2 - ACCOUNTANCY

1. Introduction to accounting concepts and convention, double entry book keeping, different kinds of account.
2. Cash book.
3. General ledger and trial balance,
4. Profit and loss account, balance sheet.
5. Simple technique of analyzing financial statements.
6. Introduction to budgeting.

HOSPITAL AND CLINICAL PHARMACY

Part 1- Hospital Pharmacy

1. Hospitals- Definition, Function, Classification based on various criteria, organization, management and Health delivery system in India.
2. Hospital pharmacy-
   (a) Definition.
   (b) Function and objectives of Hospital Pharmaceutical Service.
   (c) Location, layout, flow chart of material and men.
   (d) Personnel and facilities requirements including equipments based on individual and basic needs. Requirement and abilities required for Hospital pharmacist.
3. Drug distribution system in Hospitals:
   (a) Out patient service.
   (b) In patient services- (i) types of services, (ii) detailed discussion of Unit dose system, Floor ward stock system, satellite pharmacy services, Central Sterile services, Bed side pharmacy.
4. Manufacturing:
   (a) Economical considerations estimation of demand.
   (b) Sterile manufacture- Large and small volume parenterals, facilities, requirements, layout, production planning, man power requirements.
   (c) Non sterile manufacture- Liquid orals, externals- bulk concentrates.
   (d) Procurement of stores and testing of raw material.
5. Nomenclature and uses of surgical instruments and Hospital Equipments and health accessories.
6. PTC (Pharmacy Therapeutic Committee), Hospital Formulary system and their organization, functioning, composition.
7. Drug Information service and drug Information bulletin.

8. Surgical dressing like cotton, gauze, bandage and adhesive tapes including their pharmacopocial test for quality. Other hospital supplies e.g. I V sets, Ryals tubes, D.G. sets, Catheters, Syringes etc.
9. Application of Computer in maintenance of records, inventory control, medication monitoring, drug information and data storage and retrieval in hospital and retail pharmacy establishments.

Part-2 - Clinical Pharmacy

1. Introduction to Clinical Pharmacy Practice- definition, scope.
2. Modern dispensing aspects- Pharmacists and patient counseling and advice for the use of common drugs, medication history.
3. Common daily terminology used in practice of medicine.
4. Diseases, manifestation and pathophysiology including salient systems to understand the disease like Tuberculosis, Hepatitis, Rheumatoid Arthiritis, Cardiovascular diseases, Epilepsy, Diabetes, Peptic Ulcer, Hypertension.
5. Physiological parameters with their significance.
6. Drug Interactions:
   (a) Definition and introduction,
   (b) Mechanism of drug interaction,
   (c) Drugs- drug interaction, with reference to analgesics, diuretics, cardiovascular drugs, Gastrointestinal agents, Vitamins and Hypoglycemic agents.
   (d) Drug- food interaction.
7. Adverse drug reactions: definition and significance. Drugs- induced diseases and Teratogenicity.
8. Drugs in clinical Toxicity- Introduction, general treatment in poisoning, systematic antidotes, Treatment of insecticide poisoning, heavy metal poison, Narcotic drugs, Barbiturates, Organo phosphorous poison.
9. Drug dependence, drug abuse, addictive drugs and their treatment, complication.
10. Bio- availability of drugs including factors affecting it.

SYLLABUS FOR GRADE "A" NURSE

Fundamental of Nursing

Nursing as a profession, its scope, etiquette & ethics. Basic nursing procedures for the care of the patients with an understanding of the scientific principles involved, Maintenance of records of patients and nursing care.

Basic Science

Anatomical and biochemical structures to explain the physiological functions of human body and factors, which may disturb these, and mechanism of such disturbance. Various groups of micro-organisms of clinical importance.

Community Health Nursing

Concept of Health, Community Health practices, Health problems and policies, Health Organization, Role of Health team, Structure of Community, Rural community, Dynamics of Community, Community need assessment, Community methods & Media, Counseling, Community based Rehabilitation, Concept of Family Planning.

Health Promotion

Nutrition **-** Essential nutrients, Nutritional problems, prevention and management, Nutritional assessment, promotion of Nutrition, Therapeutic diets for various disease conditions.

Human body and Hygiene **-** The Human Body, Hygiene of the Body, Optimal functioning of the Body.

Environmental Sanitation – Environmental Sanitation, Safe water, Disposal of Excreta and Waste, Community participation.

Mental Health – Mental Health, Maladjustment, Mental illness, Old age care.

Psychology and Psychiatric Nursing – Normal and deviation in behavior among various age group and their cause, Principles of psychology and its application in health and diseases, therapies utilized in psychiatry and the various roles of nurses in psychiatric nursing.

Primary Health Care

Infection and Immunization – Concept of Disease, Infection, Immunity and Body defense mechanisms, immunization, Collection of Specimen (Principles & Methods), Disinfection and Sterilization, waste Disposal.

Communicable Diseases – Introduction to Communicable diseases, Communicable diseases, Care in Communicable diseases, Epidemic Management.

Community Health Problems – Care of the Sick In the Community, Fever (Vital signs), Respiratory problems (Types & Classification), Aches and Pains (Nursing Management), Digestive problems, Urinary Problems, Cardiovascular problems (Signs & Symptoms), Diseases of the nervous system (Neurological problems, Metabolic diseases, Diseases of Musculo-skeletal system, care of Handicap.

Primary Medical Care – Types of Drugs, Administration of Drugs, Drugs used in minor ailments, Common Emergency Drugs, Toxic Symptoms related to common drugs and poisons,

First Aid and Referral – Need for First Aid, Minor Injuries and Ailments, Fractures, Life threatening conditions, First aid in case of disaster, emergency and accidents.

Medical and Surgical Nursing – Patho-physiology, symptoms, treatment and prophylactic measures in common medical and surgical condition, Common equipment used in Operation Theater, Anesthesia and their effects and dangers, Care of critically ill patients.

Child Health Nursing

Growth & Development, Nutrition of Infants and Children, Children's Rights, Basic principles involved in pediatric nursing, Nursing Management to neonates and children with medical and surgical disorders, Care of the sick child, Care of School children, School Health, Care of Adolescents, Care of Adolescent girls.

Midwifery

Human Reproductive System, Female Pelvis and Foetal skull, Foetus and Placenta, Normal Pregnancy, Antenatal Care, Normal Labour, Care during Normal labour, Normal puerperium, Episiotomy and suture as first and second degree tear, Care of New-born, High risk New-Born, Safe Mother-hood, High risk Pregnancies, Abnormalities of pregnancy, Domiciliary Services to mothers and children, Abortion, Abnormal childbirth, Abnormal puerperium, Surgical Intervention, Medications used In midwifery, Life cycle approach, Status of women and empowerment, women Heath Problems, RTIs and STIs, HIV/AIDS, Infertility, Population Education, Family welfare.

Health Centre Management

The Sub-centre, Maintenance of Stock, Co-ordination, Implementation of National health programs, Update knowledge.