Azadi Ka Amrit Mahotsav

GOVERNMENT OF MIZORAM
HEALTH & FAMILY WELFARE DEPARTMENT
MIZORAM SECRETARIAT BUILDING, MINECO, KHATLA, AIZAWL – 796001

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NOTIFICATION

Dated Aizawl, the 6th December, 2024

No.A.11018/3/2024-HFW/121 : In the interest of public service, the competent authority is pleased to notify Syllabus for Direct Recruitment to the post of **Laboratory Technician** under Health & Family Welfare Department as per Annexure.

This is issued with the approval of DP&AR(GSW) vide their I.D.No.A.12018/11/2024-P&AR(GSW) dated 28.11.2024.

Sd/-SANGCHHIN CHINZAH
Secretary to the Govt. of Mizoram
Health & Family Welfare Department

Memo No.A.11018/3/2024-HFW/121 : Dated Aizawl, the 6th December, 2024

Copy to :

1. P.S. to Secretary, Health & Family Welfare Department.
2. Principal Director, Health & Family Welfare Department.
3. Director of Health Services, Health & Family Welfare Department.
4. Director of Hospital & Medical Education, Health & Family Welfare Department.
5. Director, Zoram Medical College.
6. Controller of Examinations, Mizoram Public Service Commission.
7. Website Manager, IT Cell, DHS.
8. Guard File.

06/12/2024

(LALHLIMPUII HMAR)
Under Secretary to the Govt. of Mizoram
Health & Family Welfare Department

APPROVED SYLLABUS FOR DIRECT RECRUITMENT TO THE POST OF LABORATORY TECHNICIAN (LEVEL 06) UNDER HEALTH & FAMILY WELFARE DEPARTMENT

1)	Paper – I General English	:	100 Marks (3 hours)
2)	Paper - II General Studies (MCQ)	:	100 Marks (2 hours)
3)	Paper – III (Technical Paper)(MCQ)	:	200 Marks (2 hours)
4)	Paper – IV (Technical Paper)(MCQ)	:	200 Marks (2 hours)
	Personal Interview	:	80 Marks
		Total :	**680 Marks**

DETAILS OF SYLLABUS:

PAPER – I (General English) – 100 marks

(a)	Précis Writing	:	10 Marks
(b)	Letter Writing	:	15 Marks
(c)	Comprehension of given passages	:	15 Marks
(d)	Grammar: Parts of Speech	:	20 Marks
(e)	Correct usage and Vocabularies	:	20 Marks
(f)	Formation of Sentence	:	20 Marks

PAPER – II (General Knowledge)(MCQ) - 100 Marks

(a)	Current events of state, national and international importance	: 12 marks
(b)	History of India and Indian National Movement	: 12 marks
(c)	Indian and World Geography - Physical, Social, Economic Geography of India and the World	: 12 marks
(d)	Indian Polity and Governance - Constitution, Political System, Public Policy, Duties & Rights Issues	: 12 marks
(e)	Economic and Social Development Sustainable Development, Poverty, Inclusion, Demographics, Social Sector initiatives, and other related issues	: 12 marks
(f)	General issues on Environmental Ecology, Bio-diversity and Climate	: 12 marks
(g)	General Science	: 12 marks
	The topics listed above shall cover the State of Mizoram wherever applicable.	
(h)	General awareness on Mizo culture, its heritage and society.	:16 marks

Paper – III (Technical Paper – I)

(Full Marks - 200)

Unit – I **Anatomy & Physiology** **(20 Marks)**

a) Musculo skeletal system
- Bones :- types, structure and functions

b) Digestive System:-
- Gross anatomy of digestive organs
- Physiology of Digestion
- Digestive juices – Secretion, Composition and functions

c) Respiratory System:-
- Gross anatomy of respiratory organs
- Physiology of respiration
- Oxygen and Carbon dioxide transport

d) Cardiovascular System :-
- Gross anatomy of heart and blood vessels

e) Excretory System:-
- Gross anatomy of excretory organs
- Function of Kidneys, mechanism of urine formation.
- Structure and function of Kidney

f) Reproductive System:-
- Gross anatomy of Male & Female reproductive organs
- Physiology of menstruation

g) Cerebro spinal fluid
- Formation, composition of CSF

h) Endocrine System:-
- Gross anatomy of endocrine organs
- Brief description of Endocrine hormone and their functions.

Unit – II Biochemistry (80 marks)

a) Introduction and scope of Biochemistry, cleaning and care of laboratory glass ware and equipments, preparation and storage of Distilled water, Analytical balance, calorimeter, spectrophotometer, pH Meter, flame photometer, S.I. unitof measurement, Preservation and disposal of biological sample, Basic statistics –mean, median, modes, SD, CV, normal reference ranges. Acid and base, pH, buffer solution, indicator, standard solution, storage of chemicals, water, electrolytes, acid base balance

b) * Carbohydrate, Lipids, Proteins – Classification, Properties, Biological importance, functions.

- Amino acids, nucleic acids, Enzymes, Co–enzymes – Definition, classifications,Biological role/importance.

c) Glycolysis, TCA–cycle, Electron transport chain, Pentose Phosphate Pathway, Glyconeogenesis, Gluconeogenesis, Cori–cycle, Blood sugar and its regulation.

d) Fatty acid, cholesterol, lipoproteins, Purine ribonucleotide – Biosynthesis,utilization, Ketone bodies formation and its utilization.

e) Amino acids, vitamins, mineral – classification, Biological role, deficiency state.

- Transamination, Deamination, Biological importance of catecholamine, GABA,Serotonin, Histamine, Melanin.

f) * Tumour – markers – Brief history, classifications, clinical applications,Laboratory test (AFP,CEA,PSA)

- Liver function test, renal function test.
- Thyroid function test, Enzymes and co–enzyme in diagnosis of the diseases,Hormone analysis.
- Cardiac function test
- Qualitative test for – Carbohydrates, lipids, proteins, Bence Jonce's Protein
- Estimation of Serum electrolytes, and bicarbonates Blood sugar
- Quantitative test for organic constituent (Urea, uric acid, creatinine) inorganicconstituent (sodium, Potassium, calcium, ammonia, chloride, Phosphate, bicarbonate and sulphate in urine with clinical significance and study of abnormal constituent or urine (glucose, Protein ketone bodies, blood, bile salt, bile pigments.

g) * Radio Immuno Assay (RIA)

- Enzyme Link Immuno sorbent Assay (ELISA)
- Chromatography (thin layer paper, gas, liquid Electrophoresis, (gel electrophoresis, liquid electrophoresis)

Unit - III **Microbiology - (80 marks)**

a) * Introduction, brief history of Microbiology, origin of microbial life – theory ofspontaneous generation.

*Safety measures in microbiology

- Classifications and nomenclature of bacteria (five kingdom concept)
- Sterilization – Principle, methods, antiseptic, disinfectants.
- General characteristic of Bacteria, anatomy of bacteria (shape, size, components)
- Growth and nutrition of bacteria, classification of bacteria on the basis ofnutritional requirements, measurement of cell mass and factor affecting growth.
- Cultivation of microbes (Bacteria)
- Culture technique (media preparation and inoculation
- Isolation of Pure cultures (streak plate, spread plate, pours plate and serialdilution)
- Identification of microbes by colony morphology.

b) Bacteriology, Normal Micro flora of human body, Germ theory of diseases,microbial infection (types, sources and transmission)

- Bacterial toxin (Endotoxin & exotoxin)
- Bacterial morphology, isolation, identification, Pathogenicity, Lab diagnosis(Culture, Biochemical test, Hanging drop method for motility, Anaerobic, aerobic culture methods of staphylococcus, streptococcus, Neisseria Gonorrhea, N. meningitidis, Clostridium tetani & C. perfringens
- E.coli, Vibrio cholera, Salmonella typhi, Shigella, Mycobacterium / Mycobacterium tuberculosis, Spirochetes– Treponema pallidum.
- Collection, preservation, transportation of clinical specimens for microbialinvestigation.
- Bacteriological methods of examination of blood, faeces, pus, sputum, throatswab and urine
- Antibiotic sensitivity test (Disc diffusion and broth dilution methods)
- Hospital acquired infections and their control.
- Waste disposal and management

c) Instruments & Glass ware:

- Autoclave, Incubator, Laminar Airflow,
- Hot air oven, water bath, vortex shaker,
- Petri dish, test tube, screw cap tube, glass spreader/ L–rods, Pasteur pipettes.

d) Medical Mycology:

- Classification and nomenclature of fungi
- General characteristics, structures, reproduction, cultivation
- Medically important Division of fungi
- Morphology, culture characteristics, Pathogenicity, Lab diagnosis of CommonPathogenic fungi, (Aspergillus Sp., Candida Sp., Cryptococcus Sp., Dermatophytes, Penicillium Sp.)

e) Immunology

- Introduction, Antigens (Types and properties) Antibodies/ Immuno globintypes and properties)
- Antigen – antibody reactions and their applications (Agglutination, precipitation, complement fixation and neutralization tests)
- Immunity (Innate & Acquired)
- Hypersensitivity
- Immunodeficiency diseases

f) Serology

- Quality control measures in serology
- Common serological technique and their applications (VDRL, Widal, RA test,ASO, Pregnancy test, Hbs Ag and HCV, HIV, mantoux test)

g) Medical Virology

- Classification, nomenclature, general characteristics (Morphology, chemical,biological properties and multiplication)
- Cultivation of viruses (chick embryo, cell culture and animals)
- Bacteriophages (lytic and lysogenic cycles)
- Morphology, cultural characteristics, Pathogenicity and Laboratory diagnosisof the following viruses
  - ❖ Poliomyelitis
  - ❖ Mumps
  - ❖ Measles
  - ❖ Hepatitis A,B,C
  - ❖ Cytomegalovirus
  - ❖ Rabies
  - ❖ HIV/AIDS

h) Molecular Biology

- Introduction
- DNA & RNA
- Isolation of DNA (Genomic & Plasmid)
- Plasmids (types and Importance)

i) Principles, methods and application of

- ELISA, Immunoflourescence test, Western Blot
- PCR

Unit - IV **Parasitology** **(20 marks)**

a) Introduction, classification, characteristics of human parasites

- Collection, storage and transportation of specimens, preservation of parasites
- Morphology, transmission, life cycle, Pathogenicity and Lab. Diagnosis of :–
  - ❖ Entamoeba histolytica, Giadia Lamblia, Trichomonas vaginalis, Leishmaniadonovani and L. tropica. Plasmodia species, Toxoplasma gondii, nematodes– Intestinal flukes, Blood flukes, Lung flukes, Liver fluke.

b) Common vectors of human diseases (mosquito, flies, ticks and fleas)

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PAPER – IV (Technical PAPER – II)

(Full Marks – 200 Marks)

Unit – I: Pathology & Clinical Pathology , Basic Lab. Techniques & Instruments

(a) Pathology – definition, Branches **(40 Marks)**

- Acute and Chronic inflammation (definition, characteristics)
- Sub acute, granulomatous inflammation (definition, characteristics)
- Changes in inflammation
- Chemical mediators of inflammation

(b) Cell Injury

- definition, causes, Ischaemia, necrosis
- apoptosis, degeneration, dehydration

(c) cellular adaptation of growth and differentiation (Atrophy, Hypertrophy, Hyperplasia, Metaplasia, Dysplasia, Anaplasia)

(d) Neoplasia (Benign and Malignant, definition, characteristics, etiology, spread)

(e) Cell of Immune System (B&T lymphocytes, macrophage, dendritic and langerhan's cells, NK Cells)

(f) Laboratory organization, role of laboratory technicians and responsibilities, safety measures, instruments, reporting and recording, common laboratory accidents and its preventions, handling of infectious materials, preventions and disposal, reagents and its storage.

(g) Routine examination and clinical significant of –

- Urine
- Stool
- Body fluids (Ascitic fluid, pleural fluids, pericardial fluid, synovial fluids, CSFseminal fluids, sputum)
- Medico legal importance of semen analysis and abnormal morphology ofsperm

Unit – II: (i) Haematology (60 Marks)

(a) * Introduction to haematology

* Blood – components, collection, anticoagulants, preparation of smears &quality
* Haemoglobin, TLC, DLC with absolute count, WBC, Red cell indices, Reticulocytes (methods of estimation, clinical significant)
* Erythropoiesis, Granulopoiesis, Megakaryopoiesis (normal, abnormal & clinicalsignificant)
* Blood parasites, bone marrow smears

(b) * Haemoglobin (normal and abnormal, Biosynthesis, Haemoglobinopathies andits investigation)

(c) RBC – structure, erythropoietin, functions

(d) WBC – Physiology, pathological variation

(e) Platelets – functions, purpuras, investigation of disorders, thrombocytosis, thrombocytopaenia

(f) Haemostasis (Coagulation) – Normal mechanism, abnormal, investigation ofabnormal haemostasis)

* Thrombosis – definition, causes

(g) Leukaemia – definition, classification (FAB), Acute & Chronic leukaemias, Lab. features of Acute & Chronic leukaemia (AML, ALL, CML, CLL) Aleukaemic Leukaemia, Leukaemoid reaction, Myelodysplastic syndrome (definition Lab. features)

(h) Anaemias (Normochromic, Normocytic, Megaloblastic, Microcytic hypochronic, Anaemia of infections, Haemolytic Anaemias) – Definition, classification, causes, laboratory, features and investigations)

(i) Thalassaemia (Trait, Minor, Major)

- Sideroblastic Anaemia
- Pancytopaenia, Aplastic Anaemias, Pure red cells aplasia (Definition, causes, lab. investigation etc)

(j) * Coagulation disorders, lab. diagnosis, causes, haemophillia, DIC

* lymphoma – definition, causes, classification, lab. features/diagnosis

* Myeloma – definition, causes, classification, lab. features/diagnosis

* Polycythaemia – definition, causes, classification, lab. features/diagnosis

* Purpuras – definition, causes, classification, lab. features/diagnosis

(k) Staining – Leishman's stain, MGG, Giemsa's, PAS, Sudan B–Black, Iron, Fats, NAP, Acid Phosphatase, Esterase (Principle, composition, methods & results)

(ii) Blood Banking & Immuno Haematology (20)

(a) Introduction

- Blood bank organization, equipments, donor registration
- Blood groups – types, technique of grouping
- Donor's selection, collection of blood
- Preservatives (storage), laboratory screening of blood for transfusion

(b) * Cross matching, compatibility testing

* Coomb's test

* Transfusion reaction

* Antigens, Antibodies (properties, production), Complements, Sensitization, Agglutination, Haemolysis, Neutralization, Precipitation, Complement fixation, Immune response.

(c) Diseases transmitted through blood and their screening, Haemolytic diseases of new born.

(d) Blood component preparation and its uses, Haemaphereis, Massive transfusion, Autologous transfusion, exchange transfusion.

Unit – III: Histopathology – Basic & Technique (60 Marks)

(a) * Cells and tissues – definition, cells and its organelles, function, cell cycle,mitosis meiosis

*Epithelial tissues, definition, classifications & functions

* Connective tissues (bone & cartilage)

* Muscle tissues

* Nerve tissues

(b) Histology of different systems & organs – Respiratory system, Alimentary system,Excretory systems, Reproductive system (male & female), Endocrine system.

(c) Histopathology technique –

- Sample reception, registering, labeling
- Fixative & fixation, (definition, classification, details of fixative, aims & object,fixation and preservation)
- Decalcification (definition, methods & test of end point decalcification)
- Grossing (definition, material required)
- Processing of tissues (manual & automatic)
- Waxes (types of waxes)
- Microtomies (types of microtome, knives, honing & stropping)
- Dehydration, clearing, impregnation, embedding or blocking (definition,chemicals used etc)
- Section cutting, mounting, labeling

(d) Immunohistochemistry (definition, purposes)

(e) Staining

- Theory, progressive & regressive, metachromasia, mordants, Accentators
- Staining preparation, procedures of –
  - Haematoxylene and Eosin stain
  - MGG stain ;connective tissue stains,
  - Giemsa's stain ; mucicarmine stains
  - Z.N. stain
  - PAS stain

Unit – IV: Cytology (Basic, technique) (20 Marks)

(a) Definition of cytology, material for operation and establishment of cytologylaboratory, role of cytology in the diagnosis, branches of cytology

(b) * Reception, registration, numbering and supply of material for collectingspecimens.

*Preparation of cytological smears

* Cytological fixation – aims & objects, chemical use for cytological fixation &methods of fixation

* Progressive changes of the cells.

*Nuclear criteria of malignancy

(c) * Exfoliative cytology – definition, source of samples for exfoliative cytology
*Body cavity fluid (Pleural effusion, Pericardial effusion, Ascitic fluids, sputum,urine, synovial fluids, CSF, Pus and Abscess)
- Methods of collection, fixation, methods of cytopreparations & staining
- Clotted & blood fluids (methods of cytopreparations)
- Cellular components in Benign and malignant effusion, acute and chronic inflammations

(d) Interventional cytology,(FNAC) Fine Needle Aspiration Cytology
- Definition
- Application, methods

- Role of FNAC
  - Common sites
  - Advantage & disadvantage, limitations
  - Complications, precaution & contra-indications
  - Preparation of smears
  - General properties of wet and dry smears
  - Imprint, crush smears, biopsy sediments, cell block preparations

(e) Aspiration of specific lesion eg. cyst, thyroid, lung, peritoneum, prostate, testis, radiological imaging aids for FNAC

(f) Methods of collection, fixation and cytopreparation of samples from – Female Genital tracts, Respiratory tracts, Gastro-intestinal tracts, urinary tracts etc.

(g) Staining
- Pap's stain
  - Chemical requirements, preparation of various chemicals for pap's stain
  - Various pap's stain methods
  - Types of haematoxylene and its preparation
  - Stain maintenance
  - Preparation of graded alcohols (50%, 60%, 70%, 80% , 85%)
  - Preparation of 0.5%Hcl, Lithium Carbonate, EA modified, 0.2%Hcl, 1% Ammonium hydroxide in 70% ethanol, Orange G-6
- Bismark Brown, EA-50, EA-36
  - Procedures of Pap's stain

- MGG stain
  - Giemsa's stain
  - Modified pap's stain
  - PAS stain, Alcian Blue Staining
  - Mayers & South Gate Mucicarmine stain
  - Gram's stain
  - ZN stains

Quality controls (Internal & External) definition, methods, advantage