पाटन स्वास्थ्य विज्ञान प्रतिष्ठान, सेवाआयोग

प्राज्ञिक सेवा, विकृति विज्ञान समूह, प्राध्यापक एघारौं (११) तहको

खुला र आन्तरिक प्रतियोगितात्मक परीक्षाको पाठ्यक्रम

एवं **परीक्षायोजना**

यस पाठ्यक्रम योजनालाई दुई चरणमा विभाजनगरिएको छ :

प्रथम चरण :– लिखित परीक्षा (Written Examination) पूर्णाङ्क :– २००

द्वितीय चरण :– अन्तर्वार्ता (Interview) पूर्णाङ्क :– ३०

प्रथम चरण (First Phase) : **<u>लिखित परीक्षा योजना (Written Examination Scheme)</u>**

Paper	Subject		Marks	Full Marks	Pass Marks	No. Questions & Weightage		Time Allowed
I	General Subject	**Part I: Management, General Health Issues, Academic Research and Teaching-Learning Practices**	50	100	40	$10 \times 5 = 50$ (Subjective)	1.30 hrs	2.15 hrs
		Part II: Technical Subject (Relevant Subject)	50			$50 \times 1 = 50$ (Objective Multiple Choice)	45 min	
II	Technical Subject (Relevant Subject)			100	40	$7 \times 10 = 70$ (Long answer) $2 \times 15 = 30$ (Critical Analysis)		3.00 hrs
	द्वितीय चरण (Second Phase)							
	Interview			30		Oral		

द्रष्टव्य :

१. लिखित परीक्षाको माध्यम भाषा नेपाली वा अंग्रेजी अथवा नेपाली र अंग्रेजी दुवै हुन सक्नेछ ।

२. प्रतिष्ठानको प्राज्ञिक सेवा अन्तर्गतका सबै समूह/सबै उपसमूहहरुको लागि प्रथमपत्रको Part I को पाठ्यक्रमको विषयवस्तु एउटै हुनेछ । तर प्रथम पत्रको Part II र द्वितीयपत्र Technical Subject को पाठ्यक्रम समूह/उपसमूह अनुरुप फरक फरक हुनेछ ।

३. प्रथम र द्वितीय पत्रको लिखित परीक्षा छुट्टाछुट्टै हुनेछ । प्रथम पत्रको Part II र द्वितीय पत्रको विषयवस्तु एउटै समूहको हकमा समान हुनेछ । परीक्षामा सोधिने **प्रश्नसंख्या र अङ्कभार** यथासम्भव सम्बन्धित पत्र, विषयमा दिईए अनुसार हुनेछ ।

४. वस्तुगत बहुवैकल्पिक (Multiple Choice) प्रश्नहरुको गलत उत्तर दिएमा प्रत्येक गलत उत्तर बापत २० प्रतिशत अङ्क कट्टा गरिनेछ । तर उत्तर नदिएमा त्यस बापत अङ्क दिइने छैन र अङ्क कट्टा पनि गरिने छैन ।

५. वस्तुगत बहुवैकल्पिक हुने परीक्षामा परीक्षार्थीले उत्तर लेख्दा अंग्रेजी ठूलो अक्षर (Capital letter) A, B, C, D मा लेख्नुपर्नेछ । सानो अक्षर(Small letter) a, b, c, d लेखेको वा अन्य कुनै सङ्केत गरेको भए सबै उत्तरपुस्तिका रद्द हुनेछ ।

६. बहुवैकल्पिक प्रश्नहरु हुने परीक्षामा कुनै प्रकारको क्याल्कुलेटर (Calculator) प्रयोग गर्न पाइने छैन ।

७. विषयगत प्रश्नहरुको हकमा एउटै प्रश्नका दुई वा दुई भन्दा बढी भाग (Two or more parts of a single question) वा एउटा प्रश्न अन्तर्गत दुई वा बढी टिप्पणीहरु (Short notes) सोध्न सकिने छ ।

८. विषयगत प्रश्नमा प्रत्येक पत्र/विषयका प्रत्येक खण्डका लागि छुट्टाछुट्टै उत्तरपुस्तिकाहरु हुनेछन् । परिक्षार्थीले प्रत्येक खण्डका प्रश्नहरुको उत्तर सोही खण्डका उत्तरपुस्तिकामा लेख्नुपर्नेछ ।

पाटन स्वास्थ्य विज्ञान प्रतिष्ठान, सेवाआयोग

प्राज्ञिक सेवा, विकृति विज्ञान समूह, प्राध्यापक एघारौं (११) तहको

खुला र आन्तरिक प्रतियोगितात्मक परीक्षाको पाठ्यक्रम

९. यस पाठ्यक्रम योजना अन्तर्गतका पत्र/विषयका विषयवस्तुमा जेसुकै लेखिएको भएतापनि पाठ्यक्रममा परेका कानून, ऐन, नियम, विनियम तथा नीतिहरु परीक्षाको मितिभन्दा ३ महिना अगाडि (संशोधन भएका वा संशोधन भई हटाईएका वा थप गरी संशोधन भई) कायम रहेकालाई यस पाठ्क्रममा परेको सम्झनु पर्दछ ।

१०. प्रथम चरणको परीक्षाबाट छनौट भएका उम्मेदवारहरुलाई मात्र द्वितीय चरणको परीक्षामा सम्मिलित गराइनेछ ।

११. पाठ्यक्रम लागु मिति : २०७९/१२/२१

पाटन स्वास्थ्य विज्ञान प्रतिष्ठान, सेवाआयोग
प्राज्ञिक सेवा, विकृति विज्ञान समूह, प्राध्यापक एघारौं (११) तहको
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Paper I: General Subject

Part I: (Management, General Health Issues, Academic Research and Teaching - Learning Practices)

Section (A) - 25 Marks

1. General Administration and Management:

1.1. Health care management system in Nepal and other parts of the world
1.2. Rules and regulations of Ministry of Health and Population, Nepal
1.3. Fundamental principles of healthcare institution and hospital management.
1.4. Effective hospital management principles
1.5. Purpose of medical and non-medical data and records
1.6. Ethics and responsibility of management
1.7. Concept of management and its application in health care including hospital.
  - 1.7.1 Management: Concept, principles, functions, scope and role, level and skills of manager
  - 1.7.2 Planning: Concept principles, nature, types, instruments and steps
  - 1.7.3 Leadership: Concept, function, leadership styles, leadership and management, effectiveness
  - 1.7.4 Coordination: Concept, need, types, techniques and approaches of effective coordination
  - 1.7.5 Communication and counselling: Concept, communication processes and barrier to effective communication, techniques for improving communication
  - 1.7.6 Decision making: Importance, types, rational process of decision making, problem solving techniques, improving decision making
  - 1.7.7 Participative management: Concept, advantage and disadvantages, techniques of participation
  - 1.7.8 Time management: Concept, Essential factors and strategies for effective time management
  - 1.7.9 Conflict management: Concept, Approaches to conflict, levels of conflict, causes of conflict and strategies for conflict management
  - 1.7.10 Stress management: Concept, causes and sources of stress, techniques of stress management
  - 1.7.11 Change management: Concept, sources of organizational change, resistance to change, management of resistance to change
  - 1.7.12 Appreciative inquiry: Concept, Basic principle and management
  - 1.7.13 Financial management: Concept, approaches, budget formulation and implementation, Auditing and topics related to fiscal administration
  - 1.7.14 Human resource management: Concept, functions and different aspects
  - 1.7.15 Hospital management
  - 1.7.16 Health manpower recruitment and development
  - 1.7.17 Project management: Concept, process, techniques and approaches

1.8. Current financial and administrative regulations
1.9. Private sector health institution, its regulation and management

2. General Health Issues:

2.1. Present constitution of federal republic of Nepal (including health and welfare issues)
2.2. Organizational structure of Ministry of Health at national/federal, regional/state, district (if applicable), municipal and village council level
2.3. Professional council and related regulations
2.4. National Health Policy 2071
2.5. Second Long term health plan (1997-2017)
2.6. Health Management Information System, forms, indicators, annual reports
2.7. Human Development Indices, Millennium Development Goals, Sustainable Develop Goals
2.8. Health Service Act 2053, Health Service Regulation 2055
2.9. Health volunteers in the national health system, its rationale, use and effectiveness
2.10. Local governance and community participation in health service delivery
2.11. Health Insurance and financing in health care
2.12. Alternative health care system: Ayurveda, homeopathy, Unani, Chinese etc.
2.13. Indigenous and traditional faith health and health practices
2.14. International Health Agencies: Roles and responsibilities of WHO, UNICEF, UNFPA, Inter-agency relationships, Government-agency coordination: Joint Annual Review meeting
2.15. Supervision, types and its usage in health sector
2.16. Monitoring and evaluation system in health sector
2.17. National Health Training Centre
2.18. National and International Disaster Plan, Coordination
2.19. Health and Human Right
2.20. Social justice and social inclusion in the health planning, human resources and services
2.21. Patan Academy of Health Sciences Act, Mission, Goals, Organogram
2.22. Scope and function of Patan Academy of Health Sciences executive bodies (senate, executive committee, academic council, faculty board, hospital management committee, subject committee), various other committees

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खुला र आन्तरिक प्रतियोगितात्मक परीक्षाको पाठ्यक्रम
General Academic and Research Issues

Section (B) - 25 Marks

3. Bio-ethics (including Medical Ethics/ Research Ethics) and Research Methodology

3.1. Ethics
3.2. Bioethics
3.3. Professionalism
3.4. Human dignity and Human Right
3.5. Benefit and Harm
3.6. Autonomy and Individual responsibility
3.7. Consent and capacity to consent
3.8. Privacy and confidentiality
3.9. Respect for humans and personal integrity
3.10. Equality, justice and equity
3.11. Non-discrimination and non-stigmatization
3.12. Respect for cultural diversity and pluralism
3.13. Solidarity and cooperation
3.14. Social responsibility and health
3.15. Sharing of benefits
3.16. Protecting future generation
3.17. National Health Research Council (NHRC), its guidelines and Institutional Review Board
3.18. Institutional Review Committees, formation, use and mandate, coordination with NHRC
3.19. Research process: ethical research proposal development, research principles, methods and materials, conclusion/recommendation/lesson learnt, commonly used referencing styles
3.20. IRB/IRC forms, types, use, importance; getting IRB/IRC clearance,
3.21. Ethics on research methodology: sample selection, sample size calculation, ensuring reliability and validity of the instruments as well as methods proposed for health research
3.22. Publication ethics, plagiarism including self-plagiarism
3.23. Research process: research proposal development and ethical clearance
3.24. National Health Research Council (NHRC), its guidelines and Institutional Review Board
3.25. Institutional Review Committees, formation, use and mandate, coordination with NHRC
3.26. IRB/IRC forms, types, use, importance; getting IRB/IRC clearance,
3.27. Research ethics on non-vulnerable population
3.28. Research ethics on vulnerable population
3.29. Research proposal/protocol/publication:

3.29.1 Abstract Section: writing abstract or executive summary for the appropriate study/research

3.29.2 Introduction Section: Background, Rationales, Statement of the Problem, Aim and Objectives of the research, research hypothesis

3.29.3 Methodology Section:

3.29.3.1. Quantitative studies: Study design, inclusion and exclusion criteria, sample size calculation, tool development and validation techniques, data management (good practice on data entry, data verification, data cleaning)

3.29.3.2. Qualitative studies: Guiding questions, Saturation point, memo, notes, transcribe, themes, codes, triangulation

3.29.3.3. Data analysis (data visualization, descriptive statistics, inferential statistics with statistical hypotheses and appropriate tools/methods for quantitative studies; theme and code generation, thematic analysis, content analysis, grounded theory for qualitative and triangulation for mixed method studies

3.29.4 Result Section: Presentation of results, tables, graphs, diagrams, plots, maps etc. Legend and index on table and graphs/maps.

3.29.5 Discussion Section: Compare and contrast the results, literature review and citation, limitation of the study

3.29.6 Conclusion section: writing conclusion, lesson learnt, and recommendation for appropriate research studies

3.30. Publication ethics, plagiarism including self-plagiarism

4. Teaching-Learning, Assessment and Evaluation:

4.1. Lancet Commission Report on Education of Health Professionals for the 21st Century

4.2. Adult learning: Theories, principles, Use, Importance and Outcomes in Nepal and beyond, Adragogyvs Pedagogy

4.3. Conventional teaching-learning: Didactic lectures, Teacher Centred Approaches, Use and Importance in Nepal and beyond

4.4. Surface learning, deep learning and metacognition

4.5. Integrated teaching: Genesis, use, importance and outcomes in Nepal and beyond

4.6. Problem-based learning: Genesis, use, importance and outcomes in Nepal and beyond

4.7. SPICES model its use, importance and outcomes in Nepal and beyond

4.8. Socialization, self-directed learning, mentoring, role model

4.9. Community orientation/community posting, re-orientation of medical education camp, community based learning and community engaged teaching-learning methods/models, use, importance and outcomes in Nepal and beyond

4.10. Outcome Based Education (Competency-based Medical/Health Professions Education): Genesis, use, importance and outcomes in Nepal and beyond

4.11. Experiential learning, Reflective practice, Feedback and feed-forward, Situated learning, Co-operative learning, Communities of practice
4.12. Assessment of students: Blueprinting (Table and specification), use and importance, outcomes in Nepal and beyond
4.13. Assessment of students: Bloom's taxonomy of cognitive, psychomotor and affective domains, use and importance in Nepal and beyond
4.14. Assessment of students: Diagnostic, Formative, Summative and Professional exams
4.15. Assessment of knowledge: Selection methods like Multiple Choice Questions, Extended Matching Items and supply methods like Short Answer Question, Problem Based Question, Long Answer Question with or without model answers and marking schemes, unstructured, semi-structured and structured viva-voce examination, advantages and limitations, use and importance, outcomes and its use in quality control in Nepal and beyond
4.16. Assessment of performance (in-vitro): Direct observation of skills in the simulated setting, lab, ward etc. with or without checklist, Objective Structured Practical Examination, Objective Structured Clinical Examination, Standardized patients, use and importance, analysis, quality assurance, outcomes and its use in quality control in Nepal and beyond
4.17. Assessment of performance (in-vivo): Mini-Clinical Evaluation Exercise (Mini-CEX), Direct Observation of Procedural Skills (DOPS), Case-Based Discussion (CbD), OSATS/PBA, Multi-Source feedback (360 degree evaluation) etc., use and importance for competency based health professions education, analysis, quality assurance, outcomes and its use in quality control in Nepal and beyond
4.18. Assessment of observable behaviours in small groups e.g. Problem Based Learning sessions, Community Based Learning and Education sessions, Clinical clerkship rotations
4.19. Evaluation: Difference between assessment and evaluation, theory of change and its use in health professions education, process and outcome evaluation, qualitative, quantitative and mixed methods used in evaluation of health professions education, their use and importance for self-review and quality assurance system of the course, program, institute and beyond.

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Paper I

Part II: Technical Subject

Section (C) - 25 Marks

1. General Pathology

A. **Cellular adaptation, injury and death:** cellular response to injury, growth and differentiation, Morphology of cell injury and necrosis, apoptosis, intracellular accumulations, calcification

B. **Acute and chronic inflammation:** general features, cells and chemical mediators involved, events, outcome

C. **Tissue repair and renewal:** Normal cell proliferation and tissue growth, their control, mechanism of tissue regeneration, repair by healing , scar and fibrosis, healing by first and second intention, factors effecting wound healing,

D. Hemodynamic disorders: Normal hemostasis, thrombosis and embolism, Infarction, Shock, Disseminated intravascular coagulation

E. **Genetic diseases:** Mutations, Mendelian disorders, Karyotyping, Diagnosis of genetic diseases

F. **Diseases of immunity:** Types of immunity, cell involved, cytokines, Histocompatibilty molecules, Hypersensitivity reaction and types, Autroimmune diseases, Immunological immunodeficiency syndromes, AIDS, Amyloidosis

G. **Neoplasia:** Definition, nomenclature, biology of tumor growth, cell cycle, Molecular basis of cancer, Carcinogenic agents, paraneoplastic syndrome, tumor markers, clinical features of tumors, grading and staging, laboratory diagnosis of cancer

H. **Environmental and nutritional pathology:** Common environmental and occupational hazards, food safety, nutrition deficiencies.

I. **Infectious disease:** General principle of microbial pathogenesis, Agentsof bio-terrorism, Infections in immunocompromised host, Special techniques in diagnosing infectious agent

1. Surgical Pathology

A. Components Surgical pathology Report, Limitation of Histological diagnosis

B. Information system in surgical pathology, Digital pathology and Tele-pathology

C. Automated surgical pathology

D. Legal aspects of surgical pathology

E. Gross techniques in surgical pathology: Gross room, handling of specimens, general principles, photography, radiography, Guidelines for handling common specimens

F. WHO classification of tumors of various systems, their grading and staging

G. Synoptic reporting system

2. Cytopathology

A. Role of Diagnostic Cytology
B. Structure and function of cells, morphological features of dysplasia
C. Evaluation of various samples in conventional smears and liquid based preparations
D. Cell blocks and its use in cytological diagnosis
E. Immunochemistry and Molecular Biology in Cytological Diagnosis
F. Digital Analysis of Cells and Tissues
G. Flow Cytometry
H. Advanced techniques in diagnostic cytopathology

3. Gynecological Cytopathology

A. Anatomy, Histology and Cytology
B. Normal Female Genital Tract
C. Bethseda system for reporting cervical cytology
D. Inflammations, bacterial and viral infections of cervic
E. Benign proliferative reaction, intraepithelial neoplasia and invasive cancers
F. Cytologic Evaluation of Menstrual Disorders and Hormonal Abnormalities
G. Proliferative Disorders and Carcinoma of the Endometrium
H. Diseases of the Vagina, Vulva, Perineum
I. Tumors of the Ovary and Fallopian Tube

4. Non-gynecological cytopathology:

A. Normal findings in different cytological specimens of upper and lower respiratory tract
B. Cytology of bronchogenic carcinomas in sputum, bronchial brushing and Broncho-alveolar lavage
C. Sampling of Oral Cavity, Larynx, Trachea, Nasopharynx, and Paranasal Sinuses
D. Benign, reactive and malignant lesion of Oral Cavity, Larynx, Trachea, Nasopharynx, and Paranasal Sinuses
E. Tumors of the Urinary Tract in Urine and Brushings
F. Non-neoplastic findings in samples of urinary tract
G. Different cytology samples of gastrointestinal tract, including hepatobilliary tract and pancreas and normal their cytological findings
H. Cytology non neoplastic lesion of gastrointestinal tract, hepatobilliary tract and pancreas
I. Cytology of tumors of gastrointestinal tract, hepatobilliary tract and pancreas
J. Various types of effusions and their normal findings
K. Non neoplastic lesions in effusions
L. Neoplastic lesions in effusion, including cytology of CSF in leukemia

5. Fine needle aspiration cytology

a. Techniques of Fine Needle Aspiration, Smear Preparation, and Principles of Interpretation

b. Imaging methods for guidance of aspiration cytology
c. Diagnostic pitfalls in FNA diagnosis of various lesions
d. FNAC diagnosis and differential diagnosis of different lesions of head and neck, including salivary gland
e. FNAC diagnosis and differential diagnosis of different lesions in lymph node. FNAC findings of different lymphomas
f. Reporting FNAC of thyroid nodules. FNAC findings in various thyroid lesions.
g. Cytology reporting categories of breast nodules. FNAC diagnosis of various non-neoplastic and neoplastic lesions of breast
h. FNAC diagnosis of various lesions of lung, mediastinum, chest wall pleura
i. FNAC diagnosis of various lesions of kidney, adrenal and retroperitoneum
j. FNAC diagnosis of bone and soft tissue lesions
k. Evaluation of FNAC of testes for male infertility
l. FNAC diagnosis and differential diagnosis of testicular tumors and otherlesions of male genital tract

6. Histo/cyto techniques

A. Organization of Histopathology/cytopathology Laboratory
B. Various Histological equipment, their uses and care
C. Reception and recording of specimen
D. Theory of routine (H/E, Pap)and special stains and their practical implication
E. Preparation, reagent preparation, procedure and quality control of all routine and special stains used in Histopathology/cytopathology
F. Grossing technique of various surgical specimens
G. Technique of processing various tissues including bone for histological studies, Errors in sectioning and remedies
H. Frozen section and their uses, processing tissue for frozen section and its interpretation
I. Stains for bacteria, AFB, fungi, amoeba in tissue
J. Preparation of cell blocks and their interpretation
K. Fine needle aspiration techniques involved in preparation of smear and staining
L. Different types of cytology specimens, their preservation and transport, processing of various cytology specimens, smear preparation and staining
M. Liquid based cytology; principle, instruments, procedure advantage, disadvantage
N. Cytocentrifuge and itsuses in diagnostic cytopathology
O. Immunochemistry: Principle, procedure, uses, quality control, Immunohistochemical markers of various neoplasms
P. Use of microwaves in histopathology/cytopathology
Q. Principle and use of flow cytometry in cytopathology
R. Preparation and Quality control of various stains, reagents and methods used in histopathology/ cytology
S. Molecular methods in histopathology and cytopathology
T. Principle, method and use of In-situ Hybridization, recent methods in

hybridization techniques

U. Enzyme histochemistry: principle, reagent and specimen preparation, procedure and application

7. Histopathology

A. Tissue processing techniques
B. Different stains used in bone marrow trephine biopsies and lymph node biopsies
C. Interpretation of bone marrow trephine biopsies and lymph node biopsies
D. Use of immunohistochemistry in bone marrow and lymph nodes for diagnosis of leukemias and lymphomas and other disorders

8. Cytogenetics, Molecular Pathology and Immunopathology

A. Methods, procedures, and interpretation of standard karyotyping analysis
B. Principle and use of fluorescent in situ hybridization and more specialized techniques
C. Cytogenetics of myeloid, lymphoid and plasma cell disorders, their use in prognosis and therapy monitoring
D. Basic concepts in molecular biology and pathology
E. Basic gene structure and function
F. Principle, brief procedure and interpretation of Molecular pathology tests pertinent to hematopathology: Southern blot, PCR and its different types, restriction fragment length polymorphism, Real-time PCR
G. DNA & RNA extraction techniques
H. Separation of lymphocytes using density gradient and centrifugation
I. Recent advances and other emerging techniques and technologies in hematopathology

9. Laboratory management:

A. Fundamental of Total Quality management
B. Statistical process in quality control
C. Element of quality assurance program
D. Concept of Evidence based medical practice
E. Concept of critical values and alert values in laboratory practice
F. The laboratory information system
G. Concept of reference laboratory
H. Implementation of reference system in laboratory medicine
I. Standard operating procedure and their preparation
J. Errors and identification of the source of error in hematology laboratory
K. Internal and External quality control and proficiency testing
L. Preparation of quality policy manual
M. Laboratory Accreditation, Key component of accreditation, ISO 15189 and others laboratory related accrediting bodies
N. Quality control in procedure, equipment, NEQAS, EQAS

O. Ethics in medicine
P. Health and Safety measures (Physical/Chemical/Biological/Radiation)
Q. Waste disposal
R. Management of under resourced laboratory

Section (D) - 25 Marks

10. Systemic pathology

A. Gross anatomy, relevant physiology and histology of specimens and tissuesof gastrointestinal, cardiovascular, respiratory systems, genitourinary system, male and female reproductive system, Endocrine system, central nervous system, peripheral nervous system, Musculoskeletal system and neurosensorysystem

B. **Skin:** Inflammatory diseases, dermatoses, vesiculobullous diseases, degenerative diseases, tumors and tumors like conditions

C. **Oral cavity and oropharynx:** Congenital anomalies, inflammatory and non-neoplastic diseases, Tumors and tumor like conditions of surface epithelium, odontogenic epithelium , disease of temporo-mandibular joints. Tumors and tumorlike lesions of salivary gland of Salivary gland

D. **Respiratory system & mediastinum:** Inflammations, cysts, neoplastic diseases of larynx and trachea. Pleuritis, tumors of pleura, Non neoplastic diseases of lung. Lung tumors. Cyst in mediastinum, mediastinal tumors

E. **Endocrine system;** Congenital anomalies, inflammatory lesions, tumors and tumor like conditions of thyroid, parathyroid, adrenal glands and paraganglia, pituitary , hypothalamus

F. **Urinary tract:** Congenital anomalies, cystic diseases of kidney, Glomerular lesion associated with nephrotic and nephritic syndrome, vascular lesions, Hereditary diseases, pyelonephritis,interstitial nephritis, Renal transplant rejection , lithiasis. Tumors, tumor like conditions

G. **Male Reproductive system:** Congenital anomalies, cryptorchidism, atrophy and infertility, Tumors of testes and paratesticular tissue, hydrocele, Prostatitis, Prostatic, hyperplasia, Tumors of prostate

H. **Female reproductive system:** Inflammatory and other non-neoplastic disease of vulva and vagina, Pelvic inflammatory diseases, Lesions of cervix. Cervical intraepithelial neoplasia, Tumors of cervix, Menstrual cycle, Endometrial dating, Non neoplastic and neoplastic lesions of uterus. Abortion, ectopic pregnancy, endometriosis. Lesion of ovary, polycystic ovarian diseases, ovarian tumors, Gestational trophoblastic diseases, lesions of placenta, Neoplastic and non-neoplastic disease of fallopian tubes, Inflammatory, other non neoplastic and neoplastic disease of breast

I. Gastrointestinal tract: Congenital anomalies of GIT, Reflux and other esophagitis, tumors and tumor like conditions of esophagus Gastritis and Peptic ulcers, Polyps of stomach and intestine, tumors and tumor like conditions

of stomach , Gastrointestinal stromal tumors, Malabsorption, Diseases associated with malabsorption, inflammatory bowel disease, Intestinal obstruction, AIDS related inflammatory diseases of intestine, tumors and tumor like conditions of intestine, infections, hemorrhoids, rectal prolapse, diseases of peritoneum and retroperitoneum

J. **Hepatobiliary System:** Viral hepatitis, Cirrhosis, Alcohol, drug and toxin induced liver injury, Cholestatasis, disorders of metabolism, vascular disorders, Liver diseases in pregnancy , Liver involvement in systemic illness, Liver pathology in organ transplant, tumors and tumor like conditions of liver, Cholelithiasis, cholecystitis, Tumors of gall bladder and intra as well as extrahepatic bile ducts, Pancreatitis, tumors and tumor like conditions pancrease,Ampullary carcinoma

K. **Cardiovascular system:** congenital anomalies, Myocardial infarction, atherosclerosis, vasculitis and other vascular disorders, Hypertension, Tumors of heart and pericardium, Rheumatic heart diseases, infective endocarditis, valvular anomalies, myocarditis and cardiomyopathies, blood vessels tumors,

L. **Musculoskeletal system:** Histochemistry of Muscle biopsy, Muscle diseases, atrophies, neuromuscular junction disorders, myopathies Fractures, Osteomyelitis, Pagets disease, osteopetrosis, tumors and tumor like lesions of bone Non neoplastic diseases of joints, gout, rheumatoid arthritis, osteoarthritis, tumors and tumor like lesions of joints, histopathological evaluation of bone marrow biopsies

M. **Neurosensory system;** Congenital anomalies, cerebrovascular accidents, inflammatory and infectious diseases of CNS, meningitis, Tumors of brain and meninges, Neuropathies, Diseases of peripheral nerves,I nflammatory and infectious disease of eye and ear, tumors and tumor like lesions of eye and ear

N. **Lymphoreticular system:** Lymph node evaluation, patterns of hyperplasia, Inflammatory/hyperplastic disease of lymph node, malignant lymphomas, metastatic tumors, Congenital anomalies of spleen, neoplastic and non-neoplastic diseases of spleen, Hypersplenism.

11. Basic Hematology

A. Morphology, physiology and biochemistry of blood, marrow, lymphatic tissueand spleen

B. Basic morphology and basic concepts of hematopoiesis

C. Normal hemostatic mechanism, pathophysiology of blood coagulation and thrombosis

D. Development of Immune system

E. Cell Cycle and Carcinogenesis

F. Principles of chemotherapy

G. Effects of other systemic disorders on the blood, blood - forming organs and lymphatic tissue

H. Genetic aspects of hematology

I. Relevant drugs, their mechanisms of actions, pharmacokinetics and clinical

indications and limitations, including effects, toxicity, and interactions

J. Infections and hematological problems

K. Cluster of differentiation antigens (CD markers) relevant to hematological diseases, their distribution, detection and use in diagnosis

L. Use of radioisotopes in hematology

12. Clinical Hematology and Hemato-pathology

a. Erythrocytes:

i. Production, composition, destruction of erythrocytes
ii. Clinical manifestations and classification of erythrocyte disorders
iii. Definition and classification of anemia
iv. Iron metabolism. Vitamin B12 and folic acid metabolism
v. Causes, clinical features laboratory diagnosis of iron deficiency anemia, megaloblastic anemia, anemia resulting from other nutritional deficiencies, anemia of chronic diseases
vi. Etiopathogenesis, clinical features, diagnosis and treatment of congenitaldyserythropoetic anemia
vii. Etiopathogenesis, clinical features, diagnosis and treatment of congenitalparoxysmal nocturnal hemoglobinuria
viii. Acquired and inherited aplastic anemia and pure red cell apalsia: etiopathogenesis, clinical and laboratory findings, diagnosis,management
ix. Anemia in systemic disorders, endocrine disease and associated with marrow infiltration
x. Red blood cell membrane disorders: hereditary spherocytosis, elliptocytosis and related disorders
xi. Disorders of red cell resulting from enzyme abnormalities
xii. Thalassemia and hemoglobinopathies: epidemiology, etiopathogenesis, classification, genetic mechanism, clinical and hematological features, complications, laboratory diagnosis, antenatal diagnosis, management
xiii. Sickle cell anemia and related abnormalities; epidemiology, etiopathogenesis, classification, genetic mechanism, clinical and hematological features, complications, laboratory diagnosis, management
xiv. Classification, etiology, clinical and laboratory diagnosis of hemolytic anemias and Hemolytic anemias due top physical, chemical, microbial causes and immune mechanisms
xv. Red cell disorders in the newborn
xvi. Hemolytic disease of newborn: Basis, diagnosis, clinical and laboratory features
xvii. Hereditary and acquired sideroblastic anemias; etiopathiogenesis, diagnosis, clinical and laboratory features,management

xviii. Primary and secondary polycythemias: etiopathogenesis, clinical and hematological features, complications, laboratory diagnosis,management
xix. Red cell disorders in pregnancy

b. Leucocytes:
   i. Morphology, composition, production, function, distribution and fate of different WBCs
   ii. Classification, clinical manifestations and diagnosis of qualitative and quantitative disorders of neutrophils
   iii. Production, function, morphology and disorders of eosinophils, masts cells and basophils,
   iv. Classification, clinical manifestations and diagnosis of monocytes and macrophages, Inflammatory and malignant histiocytosis, etiopathogenesis, clinical and laboratory features, diagnosis
   v. Lipid storage disorders; Types, genetic basis, etiopathogenesis, clinical and laboratory features, complications, management
   vi. Hematological manifestation of AIDS
   vii. Production, morphology and functions of lymphocytes. Lymphocytosis and lymphocytopenia.
   viii. Etiopathogenesis, classification,clinical features, diagnosis,treatment, genetic and molecular evaluation, prognostic markers and complications of acute and chronic myeloid and lymphoidleukemias
   ix. Leucocyte cytochemistry
   x. Etiopathogesnesis, classification, clinical features, diagnosis, treatment, genetic and molecular evaluation, prognostic markers andcomplications of various myeloproliferative disorders and Moleculardiagnosis, Monitoring response to therapy in CML
   xi. Hodgkin and Non Hodgkin Lymphomas: pathophysiology, classification, clinical and laboratory findings, diagnosis, prognosis
   xii. Plasma cell disorders: Etiopathogenesis, classification, clinical features, diagnosis, treatment

c. Hemostasis and Thrombosis:
   i. Overview of megakaryopoesis
   ii. Biochemistry, morphology and function of platelets
   iii. Various coagulation factors, their molecular biology and biochemistry
   iv. Pathophysiology of blood coagulation and thrombosis, pathwaysof hemostasis
   v. Classification, clinical manifestation, evaluation, treatment of disorders of hemostats
   vi. Etiopathogenesis, clinical and laboratory features, treatment and prognosis of Hereditary and acquired qualitative disorders of platelets,effect of drugs on platelet function.
   vii. Hematological and systemic disorders associated with abnormal

plateletfunction

viii. Thrombocytopenia, their causes, clinical and laboratory features, diagnosis
ix. Thrombocytosis, causes, clinical and laboratory features, reactivethrombocytosis
x. Hemophilia a & B, Von willebrand disease, Disseminated intravascular coagulation,
xi. Thrombotic thrombocytopenic purpura and Heparin induced thrombocytopenia: Etiopathogenesis, clinical and laboratory features, complications, management
xii. Anticoagulant monitoring

13. Laboratory Hematology

A. Interpretation of peripheral blood counts and abnormal flags
B. Performance of WBC differential counts; subjective assessment of platelet countsand diagnostic interpretation of abnormal counts
C. Review of normal and abnormal blood films with emphasis on morphology of red cells, white cells and platelets
D. Supravital staining of reticulocytes, counting of reticulocytes
E. Limitations and uses of automated WBC differentials
F. Interpretation of RBC indices to characterize anemias
G. Preparation and staining of thick and thin blood films for Hemoparasites
H. Identification of different hemoparasites in blood and marrow
I. Measurement and significance of ESR and plasma viscosity
J. Indication, instruments, procedure of bone marrow aspiration; trephine needle biopsy, splenic aspiration
K. Principle, procedure and interpretation of sickling test, HbS solubility test, osmotic fragility
L. Screening for unstable hemoglobin, supravital staining of Hb H inclusions
M. Principles,procedure and practice of separation and identification of normal and abnormal hemoglobins by electrophoresis and chromatography, interpretation of electrophoresis and HPLC data
N. Quantitation of HbF by alkali denaturation and cellular distribution of HbF
O. Heinz body preparation and identification screening for G6PD deficiency and quantitative estimation of G6PD andother red cell enzymes
P. Direct and indirect Coomb's test, warm and cold autoantibody titres
Q. Screening for cryoglobins, principles of immunoglobin estimationand immune electrophoresis,
R. Principle, procedure and interpretation of routine tests : PT, PTT, thrombin time, reptilase time, bleeding time, platelet count
S. Workup of abnormal PTT and PT results
T. Understanding of platelet kinetics, study of platelet morphology
U. Principles, practice and interpretation of platelet aggregometry tests

14. Immunophenotyping

A. Principle and practice of flow cytometry
B. Interpretation and clinical significance of flow cytometry data in leukemias, lymphomas and other hematological disorders

15. Transfusion Medicine

A. History of Transfusion Medicine
B. Indications for blood and component transfusion
C. Donor registration, donor selection, blood collection from donors, adverse donor reaction, predonation counselling, bleeding of the donor, post donation care, post donation counseling
D. Blood collection room equipment, their principles, and use, emergency medicines,
E. Blood components –Indications, preparation of blood components, Selection of blood bags for component preparation, preparation of red Cell concentrate, Fresh Frozen plasma, platelet concentrate, cryoprecipitate, washed red cells, frozen red cells. Component Testing, Labeling, Transportation and storage of blood components, Metabolic changes in blood components during storage
F. Blood groups and genetics, Principles of immune system central to transfusion medicine, Immunology of red blood cells, Different major and minor blood groups and their importance
G. Red cell allo-and autoantibody formation and function
H. Blood grouping and Compatibility testing –Major, minor, Coomb'scrossmatch, Factors influencing the results of blood grouping
I. Coomb's test –application–DCT, ICT, Rh antibody titre
J. Gel testing for antibody screening and identification
K. Hazards of blood transfusion, Strategies to prevent transfusion reactions
L. Pathophysiology, clinical signs and symptoms, and LaboratoryInvestigation for hemolytic transfusion reactions
M. Investigation of ABO, Rh and other immunohaemolytic diseases of the newborn
N. Practical aspects in the selection of blood for neonatal exchange transfusion, Hemolytic disease of the new born and exchange transfusion
O. Management of Blood Bank Issue Counter, Criteria for acceptance of requisition form, inspection of blood component prior to issue
P. Screening of blood units for TTI, ELISA, rapid and other tests for diagnosis of transfusion transmitted infections
Q. Nucleic acid testing
R. Basics of Tissue banking & Cord blood banking
S. Disposal of wastes and biologically hazardous substance in the blood bank
T. Medico legal aspects of blood transfusion
U. Quality control in blood banking, Quality control of bags and different blood bank components, sterility test on component
V. Calibration, validation and maintenance of blood bank equipment, QC of blood bank techniques, external and internal quality assessment
W. Hemovigilance in blood banking

X. Automation in Blood Banking

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