

**Revised Scheme for Second Professional MBBS University Examination in Pathology**  
**(to be implemented from 2010 Regular Examinations)**

**A. Written Paper:***Paper I – General Pathology & Hematology**Paper II – Systemic Pathology & Clinical Pathology***Scheme of Theoretical Examination in Pathology.**

Paper : 1. [General Pathology / Haematology]

- Q1. Problem questions (without alternative) 10 Marks.
- Q2. Comment on ; any two out of three ; 2 X 5 = 10  
There shall be conceptual questions on general Pathology/ Haematology. e.g.  
1. Difference between difference by primary and secondary intention in wound healing.  
2. Retic count is important in diagnosis of anaemia.
- Q3. Pathogenesis / Differentiation / Blood or Bone marrow picture etc.  
(any two out of three: ) 2 X 5 = 10
- Q4. Short notes (any two out of four) 2 X 5 = 10

Paper : II [ Systemic Pathology [ Investigative Pathology]

- Q1. Same as above
- Q2. Same as above
- Q3. Pathogenesis / investigations/ interpretations etc.
- Q4. Short notes as above.

**B. Oral/Viva:***There will be two tables with 7 ½ marks in each table**Marks will be 15 (7 ½ x 2)****Table I – General and Systemic Pathology******Table II – Hematology and Clinical Pathology*****C. Practical:****Scheme of Practical Examination in Pathology.**

- Q1. Exercise on Peripheral Blood Smear 4 Marks
- Q2. Exercise on Urine (2 Tests at least) 4 Marks
- Q3. Exercise on Blood group / ESR / TLC / Hb estimation 4 Marks
- Q4. Exercise on Histopathology slide (identification of description of the  
Changes therein) 4 Marks
- Q5. Exercise on Problem based card (interpretation Questions therein) 4 Marks
- Q6. Exercise on Spotting 6 items (1/2 marks each) 3 Marks  
(2 specimens + 2 slides + 2 instruments)

Q7. Practical Exercise book 2 Marks  
 (Should be properly signed by appropriate teachers)

**Distribution of Internal Assessment marks:**

**Total marks – 30**

**Theory – 15**

**Practical – 15**

Class-tests(Continuous I.A.) = 7.5

Item cards (Continuous I.A.) = 7.5

1<sup>st</sup> Periodical I.A. – 40

1<sup>st</sup> Periodical I.A. – 25

2<sup>nd</sup> Periodical I.A. – 40

2<sup>nd</sup> Periodical I.A. – 25

3<sup>rd</sup> Periodical I.A. – 40

3<sup>rd</sup> Periodical I.A. – 25

Total – 120

Total – 75

$120/16 = 7.5$

$10\% \text{ of } 75 = 7.5$

**Question pattern for Periodical Internal Assessment examination:**

**A. Theory : One paper of 40 marks**

**Time – 2 hrs.**

- |  |                          |
|--|--------------------------|
| 1. One clinical problem-oriented question    | 10 marks                 |
| 2. Two short-answer questions (2-3 segments) | $10 \times 2 = 20$ marks |
| 3. Five short notes                          | $2 \times 5 = 10$ marks  |

**B. Practical (including Oral):**

**C.**

**1<sup>st</sup> Periodical I.A. exam. 25 marks**

- ☐ Instruments (two)  $5 \times 2 = 10$
- ☐ Peripheral blood smear staining 5
- ☐ Any two of the following three tests  $5 \times 2 = 10$   
 ( ESR, TC, Hb estimation)

**2<sup>nd</sup> Periodical I.A. exam. 25 marks**

- ☐ Urine examination (two)  $5 \times 2 = 10$
- ☐ Problem card 5
- ☐ Blood grouping 5
- ☐ Instrument 5

**3<sup>rd</sup> Periodical I.A. exam. 25 marks**

- ☐ Urine examination 5
- ☐ Peripheral blood smear 5
- ☐ Blood grouping / ESR/TC 5
- ☐ Problem card & its interpretation 5
- ☐ Identification 5  
 (4 HP & 1 Hematology slide)

**SYLLABUS for Second Professional M.B.B.S. course in PATHOLOGY**

The Syllabus for the 2<sup>nd</sup> Professional MBBS Course in Pathology is based on the Curriculum prescribed by the Medical Council of India

**A) GOAL**

The broad goal of the teaching of undergraduate student in Pathology is to provide the students with a comprehensive knowledge of the mechanisms and causes of disease, in order to enable him/her to achieve complete understanding of the natural history and clinical manifestations of disease.

**B) OBJECTIVES**

**a) Knowledge**

At the end of the course, the student should be able to :-

- (1) describe the structure and ultrastructure of a sick cell, mechanisms of cell degeneration, cell death and repair and be able to correlate structural and functional alterations.
- (2) explain the pathophysiological processes which govern the maintenance of homeostasis, mechanisms of their disturbance and the morphological and clinical manifestations associated with it.
- (3) describe the mechanisms and patterns to tissue response to injury such that she/he can appreciate the pathophysiology of disease processes and their clinical manifestations.
- (4) correlate normal and altered morphology (gross and microscopic) of different organ systems in common diseases to the extent needed for understanding of disease processes and their clinical significance.

**b) Skills**

At the end of the course, the student should be able to:-

- (1) describe the rationale and principles of technical procedures of the diagnostic laboratory tests and interpretation of the results;
- (2) perform the simple bed-side tests on blood, urine and other biological fluid samples;
- (3) draw a rational scheme of investigations aimed at diagnosing and managing the cases of common disorders;
- (4) understand biochemical/physiological disturbances that occur as a result of disease in collaboration with pre clinical departments.

**c) Integration**

At the end of training he/she should be able to integrate the causes of disease and relationship of different etiological factors (social, economic and environmental) that contribute to the natural history of diseases most prevalent in India.

**Lecture classes: 100 hours**

**Each Lecture class will be of one hour duration. The important aspects of each topic are given below**

**General Pathology:****A] Cell injury and adaptations- (7 classes)**

§ Causes & Mechanism of cell injury

§ Macroscopic and microscopic features of reversible & irreversible cell injury

§ Definition and types of necrosis - characteristics of each type of necrosis with example

§ Apoptosis - definition, examples, its mechanism, morphological changes and its difference from necrosis

§ Definition of gangrene - different types with morphology and examples

**B] Acute Inflammation- (6 classes)**

§ Definition of acute inflammation and its causes

§ Vascular phenomenon of inflammation

§ Cellular phenomenon - chemotaxis, phagocytosis and formation of exudate

§ Chemical mediators of inflammation - list, histamine, complement, arachidonic acid metabolites, brief mention of coagulation cascade

§ Morphological types of acute inflammation with examples

§ Clinical & hematological manifestations and outcome of acute inflammation

**C] Chronic Inflammation and granuloma - (4 classes)**

§ Chronic inflammation - definition, examples, morphology, cells of chronic inflammation with emphasis on epithelioid cells & giant cells

§ Granuloma- definition pathogenesis & description of a granuloma with special emphasis on tuberculous granuloma

§ Other types of granuloma - Syphilis, Sarcoidosis, Leprosy

§ Giant cells - different types, morphology & examples

**D] Tissue repair, regeneration and fibrosis - (6 classes)**

§ Cell cycle and different types of cells

§ Normal cell growth

§ Regeneration - role of growth factors and extracellular matrix

§ Repair - role of collagen, granulation tissue, angiogenesis and fibrosis

- § Wound healing - first and second intention
- § Factors affecting wound healing
- § Complications of wound healing
- § Healing in bone and specialized tissue
  - E] Hemodynamic disorders, thrombosis and shock - ( 10 classes)
- § Hyperemia and congestion - definition and morphology
- § Normal hemostasis - mechanism and pathways
- § Thrombosis - definition, pathogenesis, causes, morphology and fate
- § Differences between Thrombophlebitis and Phlebothrombosis
- § Differences between Thrombus and Clot
- § Embolism & Infarction
- § Oedema - definition, types, pathogenesis with examples
- § Differences between Transudate and Exudate
- § Shock - definition, types, pathogenesis, clinical manifestations and examples
  - F] Storage disorders and Amyloidosis - ( 3 classes)
- § Classification of storage diseases
- § Familial hypercholesterolemia, Lysosomal storage disease, Glycogen storage disease - an overview
- § Amyloidosis - definition, classification, pathogenesis, staining, clinical manifestations
  - G] Disorders of Growth - ( 2 classes)
- § Definitions of Hyperplasia, Hypertrophy, Atrophy, Metaplasia, Dysplasia, Hypoplasia with examples.
- § Differences between - Hypertrophy and Hyperplasia, Atrophy and Hypoplasia
  - H] Neoplasia - ( 10 classes)
- § Definition (Willis') and classification
- § Characteristics of a malignant neoplasm
- § Differences between - Benign and Malignant neoplasm, Carcinoma and Sarcoma
- § Spread of a malignant tumor - Routes with example, Mechanism of spread
- § Carcinogenesis - what is a carcinogen? Why carcinogenesis is a genetic event?
- § Different types of carcinogens and their mechanism of action
- § Molecular biology and genetics of carcinogenesis
- § Systemic changes due to neoplasia - paraneoplastic syndrome
- § Diagnosis of neoplasia
  - I] Metabolic disorders- ( 6 classes)
- § Jaundice - definition, bilirubin metabolism, classification, lab. Diagnosis,
- § Diabetes Mellitus - Definition, Classification, Physiology of insulin metabolism, Pathophysiology, Complications, Diagnosis
- § Gout - definition, classification, pathophysiology, diagnosis
  - J] Others - (10 classes)
- § Genetics and chromosomal disorders - DNA structure, mutations, Mendelian disorders, chromosomal structural alterations, karyotype, cytogenetic disorders, diagnosis of genetic diseases
- § Immune diseases - Hypersensitivity reactions, graft rejection,
- § Autoimmune disorders - mechanism, SLE, Rheumatoid arthritis
- § Immunodeficiency conditions - overview
- § AIDS - pathophysiology, clinical manifestations, diagnosis
- § Environmental pathology - tobacco, alcohol, air pollution
- § Radiation pathology -
- Hematology:
  - A] Red Cell disorders - ( 12 classes)
- § Definition, Classification of anemia- morphological & etiological
- § Iron deficiency anemia - causes, pathogenesis, clinical manifestations and lab diagnosis
- § Megaloblastic anemia - causes, pathogenesis, clinical manifestations and lab diagnosis
- § Aplastic anemia - causes, pathogenesis, clinical manifestations and lab diagnosis

§ Hemolytic anemia - causes, pathogenesis, clinical manifestations and lab diagnosis

§ Thalassemia- types, pathogenesis, genetics, clinical features, lab diagnosis

§ Structural hemoglobinopathies - Sickle cell disease, G6PD deficiency

§ Other red cell disorders - polycythemia

B] Leucocyte disorders - ( 8 classes)

§ Definition, Classification of Leukemia(FAB & WHO)

§ Acute leukemia - causes, morphology, diagnosis

§ Chronic leukemia - causes, morphology, diagnosis

§ Leukemoid reaction - types, morphology, differentiation from leukemia

§ Myelodysplastic syndrome - definition, classification and morphology

§ Benign disorders - leucocytosis, leucopenia etc.

C] Bleeding disorders - ( 6 classes)

§ Thrombocytopenia - causes, common types, approach for lab diagnosis

§ ITP - causes, types, lab diagnosis

§ Coagulation disorders - causes, approach for lab diagnosis

§ Hemophilia - cause, types, lab diagnosis

§ DIC - causes, pathogenesis, features

D] Other hematological diseases - ( 4 classes)

§ Plasma cell disorders

§ Hematological manifestations of some important diseases

E] Blood groups and Blood Transfusion - ( 6 classes)

§ Different blood groups and their Clinical significance

§ Determination of blood groups

§ Significance of reverse grouping and cross-matching

§ Blood donation - collection, preservation, tests performed

§ Indications of Blood Transfusion

§ Transfusion reactions - diagnosis

§ Rational use of blood - including component therapy

### **Practical classes – 80 hours**

**Each practical class will be of 2 hours duration. The procedures to be demonstrated and practiced are:-**

#### **A] Hematology**

1. How to draw blood – demonstration
2. Anticoagulants and their use
3. Drawing of blood film – practice
4. Staining (Leishman) – practice
5. Focussing the slide under microscope and identification of cells – practice
6. ESR by Westergreen pipette – practice
7. Total count of WBC by Neubauer chamber – practice
8. Packed cell volume by Wintrobe's tube – demonstration
9. Hemoglobin estimation by acid hematin method – practice
10. Hemoglobin estimation by Drabkin's method – demonstration
11. Bleeding time and Clotting time – demonstration
12. Prothrombin time – demonstration
13. Bone marrow – demonstration of stained slides – normal, ITP , Megaloblastic anemia
14. Blood grouping – ABO & Rh – practice

#### **B] Clinical Pathology**

1. Urine – noting the physical characters, how to measure specific gravity – practice
2. Urine – chemical tests for Protein, Reducing substances and Ketone bodies- practice
3. Use of different stix and their interpretation - demonstration
4. Microscopic examination of urine – practice
5. CSF – demonstration of cell type in a normal CSF sample and a case of pyogenic meningitis

C] Histopathology & Cytopathology

1. Techniques of histopathology & Cytopathology (including FNAC) – demonstration
2. H & E staining and other special staining – demonstration
3. Demonstration of HP & Cytology slides – along with tutorial classes in systemic pathology

D] Problem cards – along with tutorial classes in systemic pathology

**Tutorial classes – 120 hours**

**Entire systemic pathology will be learned in tutorial classes along with demonstration of HP slides and problem-based learning with the help of problem cards**

System	Topics	Specimens	HP slides
Cardio-Vascular	Heart failure Rheumatic heart disease Valvular heart disease Atherosclerosis Myocardial infarction Hypertensive heart dis. Infective endocarditis Pericarditis	Mitral stenosis Atheroma aorta Lt. ventricular hypertro. Fibrinous pericarditis	
Respiratory	Pneumonia Pulm. Tuberculosis COPD – Bronchial asthma, Bronchiectasis, Emphysema, Chr. Bronchitis Bronchogenic carcinoma	Lobar pneumonia Bronchiectasis Emphysema Pulm. Tuberculosis – fibrocaseous & miliary Bronchogenic carcinoma	Tuberculosis of lung Emphysema
Gastro-Intestinal	Salivary tumors- PSA Esophageal carcinoma Peptic ulcer Gastric carcinoma Intestinal ulcers Chron's disease & Ulcerative colitis Colorectal cancer	Peptic ulcer Gastric carcinoma Typhoid ulcer of S.I. Tubercular ulcer of S.I. Colorectal cancer	Pleomorphic sal. adenoma Adenocarcinoma TB intestine Acute appendicitis
Renal	Glomerulonephritis – an overview with nephritic & nephrotic syndrome, Pyelonephritis Renal arteriosclerosis Hydronephrosis Renal cell carcinoma	Granular contracted kid. Large white kidney Hydronephrosis Real cell carcinoma Adult polycystic kidney	Clear cell carcinoma
Bone	Pyogenic Osteomyelitis Tubercul. Osteomyelitis Classification of bone tumors Osteogenic Sarcoma, Euing's Sarcoma Giant cell tumor Osteoporosis & Rickets	Osteomyelitis-sequestrum TB spine Osteogenic sarcoma Giant cell tumor	Osteogenic sarcoma Giant cell tumor
Female Genital	Endometrium in health and disease – TB, Menorrhagia, Hormone Uterine leiomyoma Cervical carcinoma Ovarian tumors -overview	Fibroid uterus Carcinoma cervix Dermoid tumor of ovary	Proliferative endo. Secretory endo. Leiomyoma Mucinous cystadenoma



Hepato-Biliary	Viral hepatitis Fatty liver Portal cirrhosis Hepatic failure Hepatocellular carcinoma Metastatic deposit in liver Gall stones	Micro-nodular cirrhosis Fatty liver Metastatic liver Gall stones	Portal cirrhosis Fatty liver Chr. Cholecystitis
Female Breast	Non-neoplastic diseases – an overview Fibroadenoma Carcinoma breast	Carcinoma breast	Fibroadenoma Duct carcinoma
Male Genital	Carcinoma penis Testicular tumors – classification, Seminoma BHP Prostatic carcinoma – an overview	Carcinoma Penis Seminoma of testis Benign hyperplasia of Prostate	Seminoma Benign hyperplasia of Prostate
Lymph Node	Reactive hyperplasia- an overview TB lymph node Metastatic lymph node Hodgkin's disease NHL – an overview		Metastatic deposit TB lymph node
Endocrine	Thyroid – Goitre Hashimoto's thyroiditis Addison's disease		Colloid goiter
Skin	Melanoma Basal cell carcinoma		Papilloma Melanoma Basal cell carcinoma
Soft Tissue	Soft tissue tumors – an overview		Lipoma Capillary hemangioma Cavernous hemangioma
Central Nervous System	Meningitis – pyogenic & Tuberculous CNS tumors – an overview Meningioma		

**Syllabus for 1<sup>st</sup> Periodical I.A. examination:**

**Theory** - General Pathology upto Disorders of growth (Item A to G)

**Practical** - Hematology upto hemoglobin estimation (Item 1 to 10)

**Syllabus for 2<sup>nd</sup> Periodical I.A. examination:**

**Theory** – Rest of General Pathology (Item H. I. J), Hematology (Item A, B, C)

**Practical** – Rest of Hematology (Item 11-13), Clinical Pathology (Item 1-5)

Problem cards on Hematology and Clinical Pathology

**Syllabus for 3<sup>rd</sup> Periodical I.A. examination:**

**Theory** - Systemic Pathology

**Practical** – Histological & Cytological techniques (including stains), HP slides (spotting)

Problem card on systemic pathology

**Practical Note Book will have to be submitted during Item and Part clearance**

**Model Question for 2<sup>nd</sup> Prof. MBBS Exam. In Pathology**

**Time : 2 hours**

**Paper – I**

**Total marks – 40**

**There are four groups of questions. Answer each group in separate answer papers provided.**

**Group – A**

1. A male child of 2 years age presents with recurrent swelling of knees which occur even after trivial trauma. The family history shows that his maternal uncle also suffered from same conditions.
  - a) What may be the possible diagnosis ?
  - b) How will you proceed to investigate this patient to come to a diagnosis ? 1+9=10

**Group – B**

2. Define shock. Enumerate the major types of shock that we encounter in our day to day practice Describe the pathogenesis of shock in burns. 2+2+6=10

Or

Define necrosis. Enumerate different morphological types of necrosis with two examples each. How necrosis differs from apoptosis ? 2+5+3=10

**Group – C**

3. Define neoplasia. Enumerate different types of carcinogens with two examples each. Explain with example that carcinogenesis is a multi-step phenomena. 2+4+4=10

Or

Mention the criteria for diagnosis of Diabetes Mellitus. Describe the pathogenesis of Type 2 Diabetes. What is glycosylated Hemoglobin ? 4+4+2=10

**Group – D**

4. Write short notes (any five of the following) 5x2 = 10
  - a) Significance of Reticulocyte count
  - b) Poikilocytosis
  - c) Peripheral blood smear findings in Chronic Myeloid Leukemia
  - d) Phlebothrombosis
  - e) Neutrophilic Alkaline Phosphatase
  - f) Definition and two examples of Metaplasia

**Paper – II**

**Time : 2 hours**

**Total marks – 40**

**There are four groups of questions. Answer each group in separate answer papers provided.**

**Group – A**

1. A 45-year-old man was rushed to the hospital following an episode of crushing substernal chest pain with breathing difficulty. An urgent ECG was done which showed elevation of ST segment with deep Q wave.
  - a) What may be the possible diagnosis ?
  - c) What other investigations will you suggest for evaluation of this case ?
  - d) Enumerate the common complications that may arise in this case 1+7+2 = 10



**Group – B**

2. Classify Glomerulonephritis. Describe the morphological changes in the kidney in a child of 10 years of age suffering from Nephrotic syndrome 4+6 =10

Or

Enumerate the viruses that can cause hepatitis. Discuss the significance of serological study in a case of hepatitis B. Enumerate the common complications of hepatitis B infection 2+6+2=10

**Group – C**

3. Classify lung tumors. Describe the morphological changes in any one of them. Enumerate the steps of investigations to arrive at a diagnosis. 3+4+3=10

Or

Enumerate the morphological types of gastric carcinoma. Describe the Microscopical features of any one of them. What are the common sites of spread of a gastric carcinoma ? Enumerate the steps of diagnosis in a suspected case of gastric cancer. 2+3+2+3 =10

**Group – D**

4. Write short notes (any five of the following) 5x2 = 10
- a) Involucrum
  - b) Ghon's focus
  - c) CSF in pyogenic meningitis
  - d) Morphology of Dermoid cyst of ovary
  - e) PSA
  - f) Reed-Sternberg cell

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### Model Problem Cards:

I.

Name: Mrs. S. Tarafdar  
 Age: 22 years Sex: Female  
 Address: 32/1 AJC Bose Road, Kolkata – 14

Report on examination of urine

Physical: Appearance: Hazy  
 Sp. Gravity: Q. I.  
 Odour: Fishy  
 Sediment: Present

Chemical: Reducing subst. Nil  
 Protein: Present  
 Ketone bodies: Nil

Microscopical: Epithelial cells: 3-4 cells / HPF  
 Pus cells: 10-15 cells / HPF  
 RBC: 2-3 cells / HPF  
 Casts: Nil  
 Crystals: Nil

Signature

- Q1. What is the patient likely to be suffering from? 1  
 Q2. What would be the specific gravity of urine in this case and why ? 1  
 Q3. How will you confirm the cause leading to this condition ? 1  
 Q4. What is the appearance of the kidney if the patient suffers for a prolonged time ? 1

II.

Name: P. Mudi  
 Age: 12 years Sex: Female

Report of examination of Blood

Hemoglobin: 9 g/dL  
 ESR: 12 mm at 1 hr.  
 TLC: 8600/Cu. mm  
 DLC: Neutrophil 53 %  
 Lymphocyte 39 %  
 Monocyte 03 %  
 Eosinophil 05 %

RBC: Microcytic hypochromic  
 Anisocytosis +  
 Poikilocytosis +

Platelets: Adequate

Signature

- Q1. What is the clinical condition of this patient ? 1  
 Q2. Mention two common causes that may lead to such blood picture. 1  
 Q3. Enumerate further tests you would like to do to come to a definite diagnosis 1  
 Q4. If you examine the stool of this patient what pertinent findings may be present ? 1

### III.

Name:	Hafiz Mondal
Age:	15 years
Sex:	Male
Patient is referred from the ENT OPD of NRS Medical College for FNAC of neck glands	
<u>Report on examination of FNAC of cervical lymph node</u>	
Smears show necrotic material and epithelioid cells in aggregate	
Signature	

- Q1. What is the provisional diagnosis ? 1
- Q2. How will you confirm the diagnosis ? 1
- Q3. Draw a labeled diagram of microscopic features of such lymph node 2

### IV

Name:	T. Ali
Age:	24 years
Sex:	Male
<u>Report on examination of CSF</u>	
Physical:	Appearance: Hazy
	Pressure: Coming out in jet flow
Chemical:	Glucose: 20 mg/dL
	Protein: 75 mg/dL
Microscopical:	Total cell count: 350 cells/cu mm
Signature	

- Q1. What is the condition this patient is suffering from ? 1
- Q2. What type of cells do you expect in microscopical examination of CSF ? 1
- Q3. What are the clinical features of this condition ? 1
- Q4. What further examination you would do to find out the cause ? 1

### Item Card

Name:	Roll No.	Year:	
Topic	Total Marks	Marks obtained	Signature of teacher
<b>Part I: Hematology</b>			
1. Blood collection, anticoagulants, staining	10		
2. TC, DC & ESR	10		
3. Hb estimation,	10		
4. PCV, Red cell indices, Morphological classification of anemia	10		
5. BT, CT, P Time	10		
6. CML, CLL, Eosinophilia, Marrow puncture needle	10		
7. Blood grouping & Rh typing	10		
<b>Part II: Clinical Pathology</b>			
1. Urine: Physical & Chemical tests	10		
2. Urine: Microscopical examination	10		
3. L. P. needle and CSF study	10		
<b>Part III: Histopathology &amp; Cytopathology</b>			
1. Histological techniques including staining	10		
2. Histopathology – Non-tumors	10		
3. Histopathology - Tumors	10		
4. Cytology: Exfoliative & FNAC	10		
<b>Part IV: Immunopathology</b>			
1. Pregnancy test in urine & other immunological testsd	10		
	150		

Marks to be computed for continuous Internal Assessment in Practical = Marks obtained / 20 =

Complete/Incomplete

Counter Signature

Signature of HOD