# FINAL EXAM QUESTIONS ON PATHOLOGY (PATHOPHYSIOLOGY)

General pathophysiology

1. Cell injury: causes, types. Progression of cell injury. Specific and unspecific manifestations of injury.
2. Mechanisms of cell injury. Depletion of ATP, membrane damage, oxidative stress, ions and fluid imbalance, endoplasmic reticulum stress, DNA damage. Selected examples of cell injury.
3. Compensatory and adaptive mechanisms in cell injury. Cellular and subcellular adaptation.
4. Cell death: classification. Distinctive features of apoptosis, necrosis, necroptosis, autophagy, cornification, NETosis, pyroptosis.
5. Apoptosis: definition, causes, types, pathways, stages. Role of apoptosis in physiological and pathological conditions.
6. Necrosis: definition, causes, mechanisms, role in human diseases. Cornification.
7. Definition, mechanisms, role in human diseases of other important cell death types: autophagy, NETosis, necroptosis, pyroptosis.
8. Acid-base balance: pH, definition, buffer systems, regulatory mechanism of lungs, kidneys, gastrointestinal tract and bones in pH control.
9. Acidosis (acute and chronic, respiratory and metabolic). Diagnostic criteria, causes, symptoms.
10. Alkalosis (acute and chronic, respiratory and metabolic) Diagnostic criteria, causes, symptoms.
11. Hypohydration: causes, types, pathogenesis, clinical manifestations.
12. Hyperhydration: causes, types, pathogenesis, clinical manifestations.
13. Alterations in calcium, potassium, magnesium and phosphate balance.
14. Hypoglycemia: etiology, pathogenesis, diagnosis, treatment.
15. Diabetes mellitus: definition, types, risk factors. Etiology, pathogenesis of type 1, type 2 and other types of diabetes. Clinical manifestations of hyperglycemia in diabetes.
16. Acute complications of diabetes mellitus: causes, mechanisms, clinical manifestations. Chronic complications of diabetes mellitus: causes, mechanisms, clinical manifestations.
17. Proteins metabolism disorders: causes, pathogenesis, clinical manifestations. Nucleic acids metabolism disorders: causes, pathogenesis, clinical manifestations of hyperuricemia and gout.
18. Lipids metabolism disorders. Typical forms of lipids deficiency and lipids exceed. Dyslipoproteinemia. Obesity: definition, types, risk factors, causes, pathogenesis, obesity as a cause of other diseases.
19. Atherosclerosis: causes, risk factors, pathogenesis, clinical manifestation in different organs, complications, diagnostic principles.
20. Vitamin deficiencies and excess: causes, clinical manifestations.
21. Arterial hyperemia: definition, causes, mechanisms, symptoms, features of microcirculation and outcomes of arterial hyperemia.
22. Venous hyperemia (congestion): definition, causes, mechanisms, symptoms, features of microcirculation and outcomes of venous hyperemia.
23. Ischemia: definition, causes, mechanisms, symptoms, features of microcirculation and outcomes of ischemia.
24. Reperfusion injury (syndrome): causes, pathogenesis, features of cell injury, role in clinical practice after revascularization.
25. Stasis: definition, causes, mechanisms, symptoms, features of microcirculation and outcomes of stasis.
26. Thrombosis: definition, causes, mechanisms, Virchow’s triad. Types of the thrombi. Features of microcirculation and outcomes of thrombosis.
27. Embolism: definition, causes, mechanisms of emboli formation. Types of embolisms. Microcirculation in embolism.
28. Edemas: definition, causes, mechanisms, clinical types of edemas, features of different types (e.g.nephrotic syndrome, hypothyroidism, liver insufficiency, inflammatory edema, heart failure).
29. Inflammation: definition, classification, etiology, phases. Recognition of microbes and damaged cells. Outcomes of acute inflammation.
30. Primary and secondary alteration in inflammation: local metabolic changes at the site of inflammation.
31. Mediators of inflammation: classification, effects, role in local and systemic symptoms.
32. Leukocytes recruitment to site of inflammation: adhesion, transmigration and chemotaxis.

33. Phagocytosis: definition, stages, chemoattractants, opsonization, role in local and systemic response. Neutrophil extracellular traps.
34. Vascular reactions in acute inflammation. Blood flow changes, phases and mechanisms.
35. Exudation. Mechanisms of inflammatory edema. Types and contents of exudates.
36. Tissue repair: cell and tissue regeneration, connective tissue deposition, abnormalities in tissue repair.
37. Local and systemic symptoms of inflammation.
38. Wound healing: phases, mechanisms, clinical features.
39. Fever: definition and classification. Pyrogens: origin, types and mechanism of action. Fever stages and thermoregulation at the different stages of fever.
40. Role of fever. Positive and negative effects of fever. Differences between fever and hyperthermia. Principles of antipyretic therapy.
41. Hypothermia: definition, causes, pathophysiology, stages, clinical aspects.
42. Hyperthermia: definition, causes, pathophysiology, stages, clinical aspects.
43. Immunodeficiency: definition, classification. Primary immunodeficiency: classification, clinical presentation, consequences.
44. Secondary immunodeficiency: causes, clinical manifestation, diagnosis. HIV/AIDS-infection.
45. Hypersensitivity reactions, type I. Stages, mediators, mechanisms. Clinical manifestation, examples.
46. Hypersensitivity reactions, type II. Stages, mediators, mechanisms. Clinical manifestation, examples.
47. Hypersensitivity reactions, type III. Stages, mediators, mechanisms. Clinical manifestation, examples.
48. Hypersensitivity reactions, type IV. Stages, mediators, mechanisms. Clinical manifestation, examples.
49. Autoimmune diseases: definition, classification, etiology, pathogenesis. Mechanisms of tissue injury: cell-mediated, immunoglobulin-mediated, role of innate immune response. Examples.
50. Rejection of tissue transplants: causes, mechanisms, clinical manifestations.
51. Neoplasia: definition, characteristics of benign and malignant neoplasms. Cancerogenic agents (etiology). Stages of malignant transformation: initiation, promotion, progression.
52. Mechanisms of malignant transformation: role of genetics and epigenetics alterations. Proto-oncogenes, oncogenes, tumor suppressor genes.
53. Hallmarks of cancer: monoclonality, genomic instability, immortalization, limitless replication, avoiding immune destruction, cancer-enabling inflammation, metabolic alterations, angiogenesis.
54. Invasion and metastasis: routes of metastasis, stages, mechanisms.
55. Clinical aspects of neoplasia: clinical manifestations, laboratory diagnosis of cancer
56. Chromosomal disorders: examples with clinical manifestations and karyotype. Multigenic (polygenic) disorders: examples with clinical manifestations.
57. Autosomal dominant disorders, X-linked disorders: examples with clinical manifestations.
58. Autosomal recessive disorders, single-gene disorders with nonclassic inheritance: examples with clinical manifestations.

## Pathophysiology of organs and systems

1. Primary (essential) arterial hypertension: prevalence, etiology, pathogenesis, diagnostic criteria. Hypertension-induced end-organs damage.
2. Secondary arterial hypertensions: prevalence, etiology, pathogenesis, diagnostic criteria.
3. Arterial hypotension, shock and collapse: etiology, pathogenesis diagnostic criteria.
4. Coronary artery disease. Etiology, pathogenesis, diagnostic criteria of stable angina, vasospastic angina, microvascular angina.
5. Coronary artery disease. Etiology, pathogenesis, diagnostic criteria of unstable angina, myocardial infarction with and without ST elevation.
6. Pathogenesis of myocardial infarction complications: arrhythmias, sudden cardiac death, acute heart failure, myocardial rapture.
7. Chronic heart failure: etiology, classification, pathogenesis, criteria of diagnosis, clinical manifestations of right- and left-sided heart failure.

8. Polycythemia: primary (polycythemia vera), secondary. Etiology, pathogenesis, clinical manifestations; qualitative and quantitative changes in the blood test, blood test example.
9. Anemias of blood loss: etiology, stages and mechanisms of compensation, clinical manifestations; qualitative and quantitative changes in the blood test, blood test example.
10. Hereditary hemolytic anemias: hereditary spherocytosis, sickle cell anemia, thalassemia, glucose-6-phosphate dehydrogenase deficiency. Etiology, pathogenesis, clinical manifestations; qualitative and quantitative changes in the blood test, blood test example.
11. Acquired hemolytic anemias: paroxysmal nocturnal hemoglobinuria, immunohemolytic anemias, hemolytic anemias resulting from mechanical trauma to red cells, malaria. Etiology, pathogenesis, clinical manifestations; qualitative and quantitative changes in the blood test, blood test example.
12. Iron deficiency anemia, anemia of inflammation or chronic disease. Etiology, pathogenesis, clinical manifestations; qualitative and quantitative changes in the blood test, blood test example.
13. Megaloblastic anemias: $B_{12}$- and folic deficiency anemias. Etiology, pathogenesis, clinical manifestations; qualitative and quantitative changes in the blood test, blood test example.
14. Aplastic anemia and other forms of bone marrow failure. Etiology, pathogenesis, clinical manifestations; qualitative and quantitative changes in the blood test, blood test example.
15. Leucopenia. Neutropenia, agranulocytosis. Definition, etiology, pathogenesis, clinical manifestations; clinical criteria, qualitative and quantitative changes in the blood test, blood test example.
16. Leukocytosis. Definition, etiology, mechanisms, pathogenesis, clinical manifestations, types of leukocytosis; clinical criteria, qualitative and quantitative changes in the blood test, blood test example.
17. Lymphoid neoplasms: acute lymphoblastic leukemia, chronic lymphocytic leukemia, Hodgkin lymphoma. Definition, etiology, mechanisms, pathogenesis, clinical manifestations; qualitative and quantitative changes in the blood test, blood test example.
18. Myeloid neoplasms: acute myeloid leukemia, chronic myeloid leukemia, essential thrombocytosis, primary myelofibrosis. Definition, etiology, mechanisms, pathogenesis, clinical manifestations; qualitative and quantitative changes in the blood test, blood test example.
19. Bleeding disorders related to vessel wall abnormalities, thrombocytopenia and platelet dysfunction. Definition, etiology, pathogenesis, clinical manifestations; changes in the blood clotting tests.
20. Bleeding disorders related to abnormalities in clotting factors. Definition, etiology, pathogenesis, clinical manifestations; changes in the blood clotting tests.
21. Disseminated intravascular coagulation: etiology, pathogenesis, clinical manifestations, changes in the blood clotting tests.

22. Pulmonary hypertension and hypotension: etiology, pathogenesis, clinical manifestations.
23. Pulmonary embolism: risk factors, pathogenesis, clinical manifestation, diagnostic.
24. Obstructive lung diseases: bronchial asthma. Classification, etiology, pathogenesis, clinical manifestations. Lung volumes and capacities.
25. Obstructive lung diseases: chronic obstructive pulmonary disease. Classification, etiology, pathogenesis, clinical manifestations. Lung volumes and capacities.
26. Restrictive lung diseases: idiopathic pulmonary fibrosis, pneumoconiosis. Extrapulmonary causes of restriction. Classification, etiology, pathogenesis, clinical manifestations. Lung volumes and capacities.
27. Acute lung injury and acute respiratory distress syndrome: etiology, pathogenesis, clinical manifestations.

28. Esophageal disorders: gastroesophageal reflux disease, esophagitis, obstruction, achalasia. Etiology, pathogenesis, clinical manifestations.
29. Gastritis: risk factors, etiology, pathogenesis, clinical manifestations. Gastric motor dysfunction. Gastric hyper- and hyposecretory states.
30. Peptic ulcer: risk factors, etiology, pathogenesis, clinical manifestations. Hypertrophic gastropathies. Symptomatic ulcers.
31. Small intestine and colon disorders: ischemic bowel disease, celiac disease.
32. Inflammatory bowel disease: Crohn disease and ulcerative colitis: etiology, pathogenesis, clinical manifestations, differential features.
33. Liver disorders: etiology, mechanisms of injury and repair. Inherited liver diseases.

34. Liver failure: acute and chronic liver failure. Cirrhosis. Etiology, pathogenesis, clinical manifestations, laboratory tests.
35. Jaundice: types, causes, pathogenesis, clinical and laboratory differential features.
36. Portal hypertension: etiology, three main pathways, clinical manifestations. Portosystemic shunt. Hepatorenal, hepatopulmonary and hepotolienal syndromes.
37. Alcoholic and nonalcoholic fatty liver disease: etiology, pathogenesis, clinical manifestations.
38. Viral hepatitis: etiology, pathogenesis, diagnostic criteria, clinical manifestations.
39. Autoimmune hepatitis and drag-, toxin-induced liver injury: etiology, pathogenesis, clinical manifestations.
40. Gallbladder diseases: cholelithiasis, cholecystitis. Etiology, pathogenesis, clinical manifestations.
41. Pancreas disorders: acute and chronic pancreatitis. Risk factors, etiology, pathogenesis, clinical manifestations. Exocrine and endocrine impairments.

42. Urinary syndrome: physiological and pathological proteinuria, hematuria, leukocyturia, casts and crystals in urine. Mechanisms and clinical value.
43. Nephrotic syndrome: causes, mechanisms, clinical manifestations, pathogenesis of the symptoms, laboratory diagnostic tests, complications.
44. Nephritic syndrome: causes, mechanisms, clinical manifestations, pathogenesis of the symptoms, laboratory diagnostic tests, complications.
45. Tubulointerstitial nephritis and other tubulointerstitial diseases. Risk factors, etiology, pathogenesis, clinical manifestations, laboratory diagnostic tests.
46. Cystic disease of the kidney: types, etiology, pathogenesis, clinical manifestations, laboratory diagnostic tests.
47. Pyelonephritis and urinary tract infection, urolithiasis: risk factors, etiology, pathogenesis, clinical manifestations, laboratory diagnostic tests.
48. Acute kidney injury: definition, diagnostic criteria, classification. Causes and three main pathways. Clinical manifestations and outcomes of acute kidney injury.
49. Chronic kidney disease: definition, diagnostic criteria, classification, clinical manifestations, pathogenesis.

50. Endocrine disorders. Primary, secondary, tertiary endocrine disorders. Regulatory mechanisms of endocrine function. Positive and negative feedback loop in diagnosis.
51. Hyperpituitarism: hyperprolactinemia, acromegaly and gigantism, other pituitary hyperfunctions. Etiology, pathogenesis of clinical manifestations, diagnostic approaches.
52. Hypopituitarism. Etiology, pathogenesis of clinical manifestations, diagnostic approaches.
53. Hypothalamus and posterior pituitary syndromes: diabetes insipidus, syndrome of inappropriate ADH (SIADH) secretion. Etiology, pathogenesis of clinical manifestations, diagnostic approaches.
54. Hypothyroidism: definition, etiology, pathogenesis of clinical manifestations, diagnostic approaches.
55. Hyperthyroidism: definition, etiology, pathogenesis of clinical manifestations, diagnostic approaches.
56. Graves' disease and Hashimoto's disease: etiology, pathogenesis, clinical presentation, diagnostic approaches.
57. Hypocortisolism: acute and chronic adrenocortical insufficiency, hypoaldosteronism. Etiology, pathogenesis of clinical manifestations, diagnostic approaches.
58. Hypercortisolism: Cushing disease and syndrome, hyperaldosteronism. Etiology, pathogenesis, pathogenesis of clinical manifestations, diagnostic approaches.
59. Congenital adrenal hyperplasia (adrenogenital syndrome): classification, etiology, pathogenesis, clinical features, diagnostic approaches.
60. Pheochromocytoma: definition, etiology, pathogenesis, clinical features, diagnostic approaches.
61. Hyper- and hypoparathyroidism: definition, etiology, pathogenesis, clinical features, diagnostic approaches.