

# **CHETTINAD ACADEMY OF RESEARCH & EDUCATION**

(Deemed to be University under section 3 of the U.G.C. Act 1956)



## **REGULATIONS & SYLLABUS**

**M.D. PHYSIOLOGY**

**2011 – 12 onwards**

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# **CHETTINAD ACADEMY OF RESEARCH AND EDUCATION**

## **Regulations for M.D. Pre and Para Clinical Courses**

### **1. INTRODUCTION:**

M.D. Pre and Para Clinical course is a three year post graduate program under the Faculty of Medicine for students with an Under Graduate Degree in Medicine. This program is a taught course that covers relevant topics and a research project in the area of specialization. This program shall be competence based and learning shall be essentially autonomous and self-directed and supplemented with practical and laboratory work. The curriculum shall have modular approach to learning. The research component is through original exploration and experiments culminating in the research project. This program shall impart advanced theoretical and practical aspects of subjects previously studied in a more generalized manner at the undergraduate level.

These courses are aimed at imparting higher level of training to qualified under graduate medical students in various branches of M.D. Pre and Para Clinical subjects and to utilize this learning to the needs of community.

In exercise of the powers conferred under sub rule (a) and (g) of Rule 8 (b) of Memorandum of Association and Clause 2.1, Chapter III of Bye-laws of Chettinad Academy of Research and Education, the Academic Council hereby makes the following regulations:

### **2. SHORT TITLE AND COMMENCEMENT:**

These Regulations shall be called the "Regulations for M.D. Pre and Para Clinical Courses of Chettinad Academy of Research and Education. These regulations are subject to modifications as may be approved by the Academic Council from time to time.

### **3. GOAL:**

The goal of postgraduate medical education shall be to produce competent specialists and/or medical teachers:

- i) who shall recognize the health needs of the community and carry out professional obligations ethically and in keeping with the objectives of the national health policy
- ii) who shall have mastered most of the competencies, pertaining to the specialty, that are required to be practiced at the secondary and the tertiary levels of the health care delivery system.

- iii) who shall be aware of the contemporary advance and developments in the discipline concerned.
- iv) who shall have acquired a spirit of scientific inquiry and is oriented to the principals of research methodology and epidemiology and
- v) who shall have acquired the basic skills in teaching of the medical and paramedical professionals.

#### **4. AIMS AND OBJECTIVES:**

At the end of the Post Graduate training in the discipline concerned the student shall be able to:

- i) Recognize the importance of the concerned speciality in the context of the health needs of the community and the national priorities in the health sector.
- ii) Practice the speciality concerned ethically and in step to the principles of primary health care.
- iii) Demonstrate sufficient understanding of the basic sciences relevant to the concerned speciality.
- iv) Identify social, economic, environmental, biological and emotional determinants of health in a given case, and take them into account while planning therapeutic, rehabilitating, preventive measures/ strategies.
- v) Diagnose and manage majority of the conditions in the speciality concerned on the basis of clinical assessment, and appropriately selected and conducted investigations.
- vi) Plan and advise measures for the prevention and rehabilitation of patients suffering from disease and disability related to the speciality.
- vii) Demonstrate skills in documentation of individual case details as well as morbidity and mortality rate relevant to the assigned situation.
- viii) Demonstrate empathy and human approach towards patients and their families and exhibit interpersonal behavior in accordance with the societal norms and expectations.
- ix) Play the assigned role in the implementation of National Health Program effectively and responsibly.
- x) Organize and supervise the chosen/assigned health care services demonstrating adequate managerial skills in the clinic/hospital or the field situation.
- xi) Develop skills as a self-directed learner, recognize continuing education needs: select and use appropriate learning resources.
- xii) Demonstrate competence in basic concepts of Research Methodology and epidemiology, and be able to critically analyze relevant published research literature.
- xiii) Develop skills in using educational methods and techniques as applicable to the teaching of Medical/ Nursing students, General Physicians and Paramedical Health Workers.
- xiv) Function as an effective leader of a health team engaged in health care, research or training.

#### **5. COMPONENTS OF THE POSTGRADUATE CURRICULUM:**

The major components of the Postgraduate curriculum shall be:

- Theoretical knowledge
- Practical and clinical skills
- Writing Thesis/Research articles
- Attitudes including communication skills
- Training in research methodology, Medical Ethics and Medico legal aspects.

## **6. NOMENCLATURE OF POSTGRADUATE COURSES:**

The nomenclature of Post Graduate Degree should be as laid down in the Post Graduate Medical Education Regulations prescribed by the Medical Council of India.

## **7. ELIGIBILITY FOR ADMISSION:**

Every student, selected for admission to a post graduate medical course in Chettinad University on acquiring M.B.B.S degree or an equivalent qualification thereto shall have obtained permanent registration with the Medical Council of India, or any of the State Medical Council(s) or shall obtain the same within a period of one month from the date of his/her admission, failing which his/her admission shall stand cancelled.

Provided that in the case of a foreign national, the Medical Council of India may, on payment of the prescribed fee for registration, grant temporary registration, for the duration of the post graduate course limited to the medical college/institution to which the candidate is admitted for the time being exclusively for pursuing post graduate studies.

Provided further the temporary registration to such foreign national shall be subject to the condition that such person is duly registered with appropriate registering authority in his own country wherefrom he has obtained his basic medical qualification and is duly recognized by the corresponding Medical Council or concerned authority.

## **8. RECOGNITION FEE AND ELIGIBILITY CERTIFICATE:**

Candidates who have passed the M.B.B.S Degree Examination other than that conducted by Chettinad Academy of Research and Education shall obtain Eligibility Certificate from this University at the time of admission and also remit recognition fee as prescribed.

## **9. REGISTRATION:**

A candidate admitted to the Post Graduate Course shall register with the University by submitting the prescribed application form for registration, duly filled in along with the prescribed fee, through the Head of the Institution.

## **10. PERIOD OF TRAINING /DURATION OF THE COURSE:**

The duration of certified study and training for the M.D. Pre and Para Clinical Courses shall be three completed years including the period of examination.

Provided that in the case of students possessing a recognized two year postgraduate diploma course in the same subject, the period of training, including the period of examination, shall be two years.

**11. COMMENCEMENT OF THE COURSE:**

The course shall ordinarily commence from 2<sup>nd</sup> May of the Academic year.

**12. CUT OFF DATES FOR ADMISSION:**

Candidates admitted up to 31<sup>st</sup> May of the Academic year shall be registered for the same Academic Year and shall be eligible to take up the final examination along with others students admitted prior to their admission. There shall be no admission of students in respect of any academic session beyond 31<sup>st</sup> May for postgraduate courses under any circumstances. The University shall not register any student admitted beyond the said date.

**13. SYLLABUS:**

The Syllabus for the course shall be as specified in the annexure to these Regulations.

**14. MEDIUM OF INSTRUCTION:**

English shall be the medium of instruction for all the subjects of study and for examination.

**15. WORKING DAYS / ATTENDANCE \***

All the candidates joining the Post Graduate training programme shall work as "Full Time Residents" during the period of training and shall attend not less than 85% (Eighty Five percent) of the imparted training during each academic year including assignments, assessed full time responsibilities and participation in all facets of the educational process as per MCI norms. 85% attendance is compulsory for all the Post Graduate students for every academic year. The Attendance details may be submitted to the Controller of Examinations at the end of every academic year. The student should also be intimated quarterly regarding the lack of attendance.

**16. CONDONATION FOR LACK OF ATTENDANCE \***

The discretionary power of condonation of shortage of attendance to appear for University Examination rests with the Vice Chancellor.

Lack of attendance can be condoned up to a maximum of 5% of the minimum attendance Required in the following exceptional circumstances:

- (i) Any illness/ accident (for which Medical certificate from a registered medical practitioner must be produced)
- (ii) Any unforeseen tragedy in the family (should produce the letter from the parent/guardian)

- (iii) Participation in NCC/NSS and other co-curricular activities representing the Institution / University. (Certificate from competent authority is required)

For any of the above reasons, request shall be made by the candidate with prescribed fees to the Controller of Examination through proper channel, ten days prior to the commencement of the theory examination. Based on the recommendation of the Head of the Institution, the Controller of Examination shall obtain the approval of the Vice Chancellor for admission of the candidate to the University Examination.

*\*Sl.No.15 & 16 Amended vide XVIII meeting of Academic Council dated 15.04.2014*

*and to be replaced as detailed below; -*

*In the existing regulations for M.D. Pre – Para and clinical courses, it has been stipulated that 85% attendance is compulsory for all the Post graduate students for every academic year. This has been modified to 80% attendance in keeping with Statutory Body norms. There shall be no condonation for attendance. The attendance criteria will hence read as follow as in MCI regulations.*

*"All the candidates joining the Post Graduate training program shall work as 'Full Time Residents' during the period of training and shall attend not less than 80% (Eighty percent) of the imparted training during each academic year including assignments, assessed full time responsibilities and participation in all facets of the educational process."*

*The Attendance details shall be submitted to the Controller of Examinations at the end of each academic year. The student should also be intimated quarterly regarding the lack of attendance.*

#### **16 (a) STIPEND AND GRANT OF LEAVE**

The Post Graduate students undergoing Post Graduate Degree / Diploma/Super-Specialty course shall be paid stipend on par with the stipend being paid to the Post Graduate students of State Government Medical Institutions / Central Government Medical Institutions, in the State / Union Territory where the institution is located. Similarly, the matter of grant of leave to Post Graduate students shall be regulated as per the respective State Government rules.

#### **17. MIGRATION / TRANSFER OF CANDIDATES:**

Under no circumstances, Migration/transfer of student undergoing any Post Graduate degree course shall be permitted by the University/Authority

#### **18. TRAINING PROGRAMME:**

The training given with due care to the Post Graduate students in the recognised institutions for the award of various Post Graduate medical degrees shall determine the expertise of the specialist and / or medical teachers produced as a result of the educational program during the period of stay in the institution.

Every institution undertaking Post Graduate training program shall set up an Academic cell or a curriculum committee, under the chairmanship of a senior faculty member, which shall work out the details of the training program in each speciality in consultation with other department faculty staff and also coordinate and or the implementation of these training Programs.

The training programmes shall be updated as and when required. The structured training programme shall be written up and strictly followed, to enable the examiners to determine the training undergone by the candidates and the Medical Council of India inspectors to assess the same at the time of inspection.

During the training for Post Graduates to be awarded, there shall be proper training in basic medical sciences related to the disciplines concerned; during the training for the degree to be awarded in basic medical sciences, there shall be training in applied aspects of the subject; and there shall be training in allied subjects related to the disciplines concerned. In all Post Graduate training programmes, both clinical and basic medical sciences, emphasis is to be laid on preventive and social aspects and emergency care facilities for autopsies, biopsies, cytopsies, endoscopic and imaging etc. also be made available for training purposes. The Post Graduate students shall be required to participate in the teaching and training programme of undergraduate students and interns.

Training in Medical Audit, Management, Health Economics, Health Information System, basics of statistics, exposure to human behaviour studies, knowledge of pharmaco – economics and introduction to non- liner mathematics shall be imparted to the Post Graduate students.

Implementation of the training programmes for the award of various Post Graduate Degree shall include the following:

### **Basic Medical Sciences**

- (i) Lectures, Seminars, Journal Clubs, Group Discussions, Participation in laboratory and experimental work, and involvement in research studies in the concerned speciality and exposure to the applied aspects of the subject relevant to clinical specialities.

### **(ii) Clinical disciplines**

In service training, with the students being given graded responsibilities in the management and treatment of patients entrusted to their care: participation in seminars, journal clubs, group discussions, clinical Meetings, Grand rounds, and Clinico - Pathological Conferences; practical training in Diagnosis and medical and Surgical treatment; training in the Basic Medical Sciences, as well as in allied clinical specialities.

The training program shall be on the same pattern as for M.D. / M.S. in clinical disciplines; practical training including advanced Diagnostic, Therapeutic and Laboratory techniques, relevant to the subject of specialization.



## **19. MAINTENANCE OF LOG BOOK**

- a) Every Post Graduate student shall maintain a record (Log) book containing skills, the candidate as acquired during the training period certified by the various heads of department where the candidate as undergone training including outside the institution.
- b) The students shall maintain a Record Book (Log Book) of the work carried out by them & training program undergone during the period of training including details of procedures carried out independently or assisted by the candidate. The log book will be checked by the faculty members imparting the training.
- c) At the end of the course, the candidate should summarize the contents and get the record (Log) book certified by the Head of the Department.
- d) The record (Log) book should be submitted at the time of practical examination for the scrutiny of the Board of Examiners.

## **20. THESIS / DISSERTATION AND EVALUATION**

- a) All Candidates admitted to undergo M.D. Pre and Para Clinical Courses shall be assigned a topic for dissertation / thesis by the Head of the concerned unit and the title of the topic assigned to the candidates be intimated to the Controller of Examination of the University by the Head of the Department through the Head of the Institution before end of the First year.
- b) The dissertation / thesis shall be a bound volume of minimum 50 pages and not exceeding 75 pages of typed matter (double line spacing and on one side only) excluding certification, acknowledgements, annexure and bibliography.
- c) Four copies of dissertation shall be submitted six months prior to the commencement of the examination on the prescribed date to the controller of examination of the University.
- d) Two copies are to be submitted as an electronic version of the entire dissertation in a standard C.D. format mentioning the details and technicalities used in the C.D. format.
- e) The concerned Professors / Readers are to supervise and to see that the dissertation is done properly utilising the clinical materials of their own department / institution. The students must learn the design and interpretation of research studies, responsible use of informed consent and research methodology and interpretation of data and statistical analysis. They should seek the help of qualified staff members in the conduct of research. They must learn to use library and the computer-based research. This training will help them to develop skills in planning, designing and conduct of research studies.
- f) All candidates on admission will be allotted one of the department faculties who have fulfilled the requirement to be guides for purposes of guiding Dissertation/thesis. The topic for dissertation shall be finalized and discussed in the departmental faculty meeting and allotted to the individual candidates before the completion of 3 months after admission. The purpose of dissertation is to develop in the candidate the ability

to perform an independent study keeping the principles and research methodology in mind. The candidate will therefore work on the prospective problem either within the department or in collaboration with other departments. There will be continuous monitoring of the dissertation work by the guides and co-guide and by the other department staff throughout the course. The candidate will present the progress of the dissertation to the faculty on the completion of 1 ½ years for monitoring and feedback. The completed dissertation should be submitted not later than 6 months before final examination.

- g) The theory examinations shall be held sufficiently earlier than the Clinical and Practical examination, so that the answer books can be assessed and evaluated before the start of the Clinical/Practical and Oral examination.
- h) The thesis shall be examined by a minimum of three examiners; one internal and two external examiners, who shall not be the examiners for Theory and Clinical. A candidate shall be allowed to appear for Theory and Practical/Clinical examination only after the acceptance of thesis by the examiners. The thesis shall be evaluated under the following heading:
  - 1) Approved
  - 2) Not approved

In all cases the approval shall be given before 3 months of the date of appearing for the examination and this will be essential before the candidate is allowed to appear for the written examination.

## **21.SCHEDULE OF EXAMINATIONS:**

The examination for M.D. Pre and Para Clinical courses shall be held at the end of 3rd academic year. An academic term shall mean six month's training period."

## **22.SCHEME OF EXAMINATIONS \***

Post Graduate Examinations shall consist of Dissertation/Thesis, Written Paper (Theory), Practical and Viva voce.

The examinations shall be organised on the basis of "Marking system" to evaluate and to certify candidate's level of knowledge, skill and competence at the end of the training.

- a. **Dissertation/Thesis:** Every candidate shall carry out and submit a Dissertation/Thesis as explained and approval of Dissertation/Thesis shall be a precondition for a candidate to appear for the final examination.
- b. A postgraduate student of a postgraduate degree course would be required to present one poster presentation, to read one paper at a national/state conference and to present one research paper which should be published/accepted for publication/sent for publication during the period of his postgraduate studies so as to make him eligible to appear at the postgraduate degree examination.

- c. **Theory:** A Written Examination shall consist of four theory papers each of three hours duration. Each paper carries 100 marks (Total 400 marks). Out of these one shall be of Basic Medical Sciences and one shall be of Recent advances. The theory examinations shall be held well before the Practical examination, so that the answer books can be assessed and evaluated well before the commencement of the Practical and Oral examination.
- d. **Practical Examination:** Practical Examination shall be conducted to test the knowledge and competence of the candidates for making valid and relevant observations based on the experimental / laboratory studies and ability to perform such studies as are relevant to the subject.
- e. **Oral Examination:** The Oral examination shall be thorough and shall aim at assessing the candidate's knowledge and competence about the subject, investigative procedures, therapeutic technique and other aspects of the speciality, which form a part of the examination.
- f. **Pedagogy:** Pedagogy to evaluate the communication and teaching skills, and subject knowledge of the student. The topic for Pedagogy will be given at the end of 1<sup>st</sup> day of the Practical Examination.

<b>THEORY</b>	
No. of Theory Papers	4
Marks for each Theory Paper	*100
Total marks for Theory Papers	400
Passing Minimum for Theory	200/400
Total marks for PRACTICAL	300
Passing Minimum for Practical	150/300
Viva voce	50
Pedagogy	50
Passing minimum for Practical including Viva voce / Pedagogy	200/400

- i) If any candidate fails even under one head, he/she has to re-appear for whole examination.
- ii) Theory papers consist of 2 essay questions of 25 marks each (2 X 25 = 50) & 5 short notes of 10 marks each (5 X 10 = 50). Total =100 marks each.

**\*Sl.No.22 (ii) Amended vide XVIII meeting of Academic Council Dated**

**15.04.2014 and to be replaced as detailed below:**

**Resolved to approve 2 Essay Questions (2 x 20 marks ) and 10 short notes (10 x 6 marks) for all post graduate medical / broad and higher speciality courses which will take effect for the students appearing for first time examination from March 2015 .**

**Resolved to approve 2 essays (2 x 20 marks) and 6 short notes (6 x 10 marks) for theory paper in all M. D/ M.S. courses by the Academic Council in its XX meeting held on 25.03.2015.**

**\*Resolved to approve that an examinee should obtain minimum 40% marks in each theory paper and not less than 50% marks cumulatively in all the four papers in P.G. degree examination to be cleared as passed which will be implemented prospectively. (Academic Council in its XX meeting held on 25.03.2015).**

### **23.EXAMINERS:**

All the Post Graduate Examiners shall be recognized Post Graduate Teachers holding recognized post graduate qualification in the subject concerned. For all Post Graduate Examinations, the Minimum number of examiners shall be Four, out of which at least two (50%) shall be external examiners who shall be invited from other recognized universities from outside the state / outside university. The remaining two will be internal examiners.

The qualification and teaching experience for appointment of examiner shall be as detailed below and by the guidelines of Medical Council of India issued from time to time.

No person shall be appointed as an internal examiner in any subject unless he/she has three years experience as recognized PG teacher in the concerned subject. For external examiners, he/she should have minimum six years of experience as recognized PG teacher in the concerned subject'. "An examiner shall ordinarily be appointed for not more than two consecutive terms"

Under exceptional circumstances, examinations may be held with 3 (three) examiners provided two of them are external and Medical Council of India is intimated for the justification of such action prior to publication of result for approval. Under no circumstances, result shall be published in such cases without the approval of Medical Council of India.

### **24. MAXIMUM NUMBER OF CANDIDATES:**

The maximum number of candidates to be examined in clinical/practical and oral on any day shall not exceed eight for M.D. Pre and Para Clinical Courses.

**25.\*NUMBER OF EXAMINATIONS:**

The University shall conduct not more than two examinations in a year, for any subject, with an interval of not less than 4 and not more than 6 months between the two examinations. The examination shall be conducted in September and March.

**\*SI. No.25 Amended in XXI meeting of Academic Council dated 22.07.2015**

**Resolved to approve the commencement of M.D. /M.S. University examination in April (for Regular Batch) and October (for Supplementary Batch).**

**26. REVALUATION OF ANSWER PAPERS:**

There shall be no revaluation of answer papers. However, re-totaling is allowed in the failed subjects with the payment of required fee fixed by the University within 15 days from the date of receipt of statement of marks.

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## SYLLABUS FOR M.D PHYSIOLOGY

### GOALS:

- To enable the candidate to be a competent Physiologist (Teaching & Research)
- To design, conduct and draw inferences from research in Physiology

### OBJECTIVES:

- Demonstrate comprehensive understanding of physiology
- Teach undergraduates and postgraduates of Medical & Paramedical students in physiology
- Plan and conduct research
- Organize and equip physiology laboratories
- Design, fabricate and use indigenous gadgets for experimental purposes
- Interact with the allied departments by rendering services in advanced laboratory investigations.
- Acquire skills in conducting collaborative research in the field of physiology & allied sciences.
- Must be able to demonstrate to the students how the knowledge of physiology can be used in a variety of clinical settings to solve diagnostic and therapeutic problems

### Training Period: 3 years

#### First Year

Learns the basics in Physiology in the Department of Physiology

Training in handling theory & Practical classes for Medical & Paramedical Courses (Power point presentation)

Weekly seminars and Journal club

**1-3 Months:** Basic orientation course which includes Ethics, Biostatistics & Research Methodology, Teacher's Training, Computer Training etc

Identifies Dissertation Topic.

**4-7 months:** Posting in the clinical & other basic Science Department

(To provide the students concrete living examples of the application of physiology in diagnosis and management of disease. The students will be posted in the various clinical departments to learn and observe the work going on)

Details of the training in the Clinical & other Basic Science Departments for one week each

- Anatomy
- Biochemistry

- Clinical pathology
- Medicine
- Blood Bank
- Cardiology
- Psychiatry
- Chest Medicine
- ENT
- Ophthalmology
- Medical Gastroenterology
- Obstetrics & Gynaecology
- Clinical Embryology
- Neurology
- Radiology
- Nephrology

***The Post Graduate students shall attend the clinical postings/ Basic Science Departments in the forenoon session and attend to his / her Departmental work in the afternoon session***

**8 – 12 months:** All regular activities in the department of Physiology as mentioned above.

Attends CMEs Workshops, conferences etc

### **Second Year**

Works on the Dissertation

Journal clubs, Seminars

### **Pedagogy**

Takes theory & Practical classes for Medical & Paramedical Courses Training in Paper presentation, publication etc

Seminars, Group discussions & Journal Club. Attends CMEs Workshops, conferences etc

### **Third Year**

Actively involves in Physiology teaching– Theory & Practicals.

Compilation of Dissertation work and writing of the Thesis

Prepares for the University Examinations

Dissertation to be submitted by each candidate 6 months before the date of commencement of the theory examination.

**ASSESSMENT:** The post graduate students will be assessed periodically based on written, practical and viva voce examination **in all the three years**. The assessment also includes their performance and participation in seminars, journal clubs, and teaching assignment

**Log Book:** All academic activities of the students have to be maintained in a log book for all three years. This has to be submitted during the final examination.

## **Syllabus**

### **1. General & Cellular Physiology**

Cell as the living unit of the body, the internal environment, Homeostasis, Control Systems, Organization of a cell, Physical structure of a cell, Transport across cell membranes, Functional systems in the cell, Genetic Code, its expression, and regulation of gene expression, Cell cycle and its regulation. Body Fluids, Aging

### **2. Hematology**

Blood composition & functions, plasma proteins

Erythrocytes: Erythropoiesis, structure and function of RBCs, Formation of hemoglobin, Destruction & fate of RBCs, Anemias, Polycythemia, jaundice

Leucocytes: General characteristics, genesis & life span of WBCs, Classification & functions of each type of WBC, Leukopenia, and Leukemia.

Immunity: Innate immunity, acquired immunity, allergy, hypersensitivity and immunodeficiency

Hemostasis: Components of hemostasis mechanisms of coagulation, coagulation tests, anticoagulants.

Blood Groups: Classification, Rh incompatibility, Blood transfusion

Lymph-composition circulation & functions

### **3. Nerve and Muscle Physiology**

Resting membrane potential, Action Potential, Neurons, Neuroglia, SD Curve, Classification of nerve fibers, Myelination Nerve conduction, Degeneration and regeneration in nerves, functional anatomy & structure of skeletal muscle, neuromuscular transmission, blockers & NM disorders. Excitation – contraction coupling, Mechanisms of muscle contraction, Thermal & Chemical changes during Muscle contraction, Smooth muscle.

### **4. Renal Physiology**

Functional Anatomy of Kidney -Urine formation and concentration, Regulation of extracellular sodium & osmolarity. Renal mechanisms for the control of blood volume, blood pressure & ionic composition, regulation of acid-base balance, extracellular fluid Composition & volume, Micturition, Cystometrogram, Diuretics, Renal Failure, Renal Function Test, Principles of artificial kidney, Kidney as an endocrine organ.

Structure & Functions of Skin, Regulation of Body Temperature.



## 5. **Gastrointestinal System**

Functional Anatomy of GIT, General Principles of GI function, GI movements & their regulation, Motility Disorder. Salivary secretion, functions regulation. - Secretions of stomach, small intestine and large intestine, their functions & regulation. Pancreatic and biliary secretion, functions & regulation Liver functions, Digestion and absorption, Pathophysiology of GI tract, Methods of investigation of GI functions, GI hormones.

## 6. **Endocrine System** Classification of hormones, Mechanism of hormone action, Measurement

of hormones in blood, All Major endocrine glands (Hypothalamus, Pituitary, Thyroid, Parathyroid, Adrenal, Pancreas etc) their secretion, actions, regulations with hyper and

and hypo secretion of the glands, Minor endocrine Glands- pineal, Heart, Kidney & thymus

## 7. **Reproductive System**

Sex differentiation and determination - structure of male and female reproductive organs, male sex hormones, Spermatogenesis, Menstrual Cycle, Female Sex hormones, Pregnancy & Lactation, foetoplacental unit. Functions of Placenta, Parturition, Lactation Composition of breast milk Fetal & Neonatal Physiology, Physiological basis of contraceptive methods. Male & Female infertility, Menopause

## 8. **Cardiovascular Physiology**

Functional anatomy of heart, Properties of cardiac muscle, conducting system of heart, Principles of electro cardiography, Changes in cardiac cycle, Physiological variation & Factors regulating Cardiac Output, measurement of cardiac output in Man Physiological variations, regulatory mechanisms of heart rate and blood pressure. Pathophysiology of Hypertension Regional Circulations, Cardiopulmonary resuscitation. Microcirculation, Haemodynamics, shock, cardiac failure and coronary artery disease. Changes in CVS during exercise

## 9. **Respiration**

Function anatomy of respiratory system, Mechanics of normal respiration, Physical principles governing flow of air in respiratory passages. Lung compliance, alveolar ventilation, ventilation perfusion ratio, oxygen and carbon dioxide transport, diffusing capacity, pulmonary function tests, Regulation of respiration, respiratory acidosis and alkalosis, pulmonary blood flow. Hypoxia, cyanosis, asphyxia, Dyspnoea, Oxygen therapy & toxicity. Respiratory adjustments during muscular exercise, Hyperbaric oxygen, principles of oxygen therapy, artificial respiration, Surfactant, Hyaline membrane disease. Pathophysiology of obstructive and restrictive disorders. Pulmonary oedema. Decompression sickness, High altitude physiology.

## 10. **Nervous System**

Organisation of nervous system, Interneuronal communication, Classification of Somatic Senses, Sensory receptors, Synaptic transmission, sensory transduction,

information processing, Organization of spinal cord, motor sensory tracts, Incomplete & complete transection of spinal cord & their effects, Reflexes and reflex arc, Somatosensory cortex, motor cortex, somatosensory association areas, brain stem, control of motor function, Physiology of Thalamus, Hypothalamus, Limbic System, Cerebellum and Basal ganglia. Maintenance of posture and equilibrium, Autonomic nervous system, Sleep and EEG, Higher functions of brain, Formation, Circulation & Functions of CSF, Blood brain barrier.

### **11.Special Senses**

Optics of vision, Receptors & Neural functions of retina, Color Vision, Perimetry, visual pathways, Cortical Visual Function, Functions of external and middle ear, cochlea, semicircular canals, auditory pathways, cortical auditory function, deafness and hearing aids, primary taste sensations, taste buds, Transduction & transmission of taste signals, Perception of taste, Peripheral olfactory mechanisms, Olfactory pathways, Olfactory perception

## **PRACTICAL**

### **Hematology**

#### **Major Experiments**

Total RBC Count,  
Total WBC Count,  
Differential Count,  
Arneeth Count,  
Absolute Eosinophil Count,  
Platelet Count,  
Reticulocyte Count

**Minor Experiments** ESR, Bleeding time, Clotting time, Blood Group, Hb Estimation, Specific Gravity of blood, Osmotic fragility

#### **Clinical and Recording**

**Clinical:** Measurement of blood pressure, Effect of Posture and exercise on BP, Clinical examination of cardiovascular system. Respiratory Efficiency test, measurement of lung volumes and capacities, Clinical examination of respiratory system. Clinical examination of nervous system & Cranial nerves Examination

**Recordings:** ECG, Radial Pulse recording, stethography, Genesis of fatigue using Mosso's ergograph, hand grip dynamometry, Perimetry, etc

#### **SCHEME OF EXAMINATIONS:**

Paper – I	General & Cellular Physiology, Blood, Nerve – Muscle Physiology
Paper – II	Gastrointestinal system, Renal Physiology, Endocrine system, Reproductive System
Paper – III	Cardiovascular Physiology, Respiration, Environmental Physiology
Paper – IV	Nervous System & Special Senses, Recent advances

1. **THEORY:** The written examination consists of four papers, with maximum marks of 100 for each paper of 3 hours duration. Total marks 400. Passing minimum 200.

2. **VIVA VOCE: 50 marks**

3. **DISSERTATION:** Acceptance by the Examiners.

4. **PRACTICAL: 300Marks. Passing marks 50% in practical examination (Minimum 150 marks)**

1. Haematology	50 Marks
2. Clinical Exam	100 Marks
3. Recordings	50 Marks
4. Chart/case Discussion	50 Marks
5. Comments/calculation	50 marks

5. **Pedagogy: 50 marks**

**PRACTICAL SCHEDULE:**

**Day 1:** Hematology + Clinical + Charts + Calculation

**Day 2:** Recordings + Pedagogy + Viva voce

### **Text Books**

- Text book of Medical Physiology – Guyton C
- Review of Medical Physiology – Ganong WF
- Best and Taylor Physiological Basis of Medical Practice
- Samson Wright's Applied Physiology
- Medical Physiology edited by WB Mount castle
- Physiology and Biophysics Edited by TC Ruch and HD Patten
- Understanding of Physiology – Bijlani

### **Books for Practical**

1. Clinical Haematology – Wintrobe
2. Hutchinson's clinical methods
3. Practical haematology – Dacie and Lewis
4. Text book of Practical physiology – Ranadae
5. Practical Physiology – Ghai
6. Textbook of Practical physiology – GK Pal and Pravati Pal

**Books Recommended. Only a short list is provided. The postgraduate student should widen their knowledge by exhaustive reading**

### **Journals list:**

Annual review of physiology

Journal of Stress physiology and biochemistry

Journal of Applied physiology