MAHATMA GANDHI UNIVERSITY
of
MEDICAL SCIENCES & TECHNOLOGY
JAIPUR

Syllabus

MD – Human Anatomy (MD02)

(3 Years Post Graduate Degree Course)

Edition - 2022-23

Notice

1. Amendment made by the NMC Rules/Regulations of Post Graduate Medical Courses shall automatically apply to the Rules/Regulations of the Mahatma Gandhi University of Medical Sciences & Technology (MGUMST), Jaipur.

2. The University reserves the right to make changes in the syllabus/books/guidelines, fees-structure or any other information at any time without prior notice. The decision of the University shall be binding on all.

3. The Jurisdiction of all court cases shall be Jaipur Bench of Hon'ble Rajasthan High Court only.

RULES & REGULATIONS

MD Human Anatomy
(3 Years Post Graduate degree course)

TITLE OF THE COURSE:
It shall be called Doctor of Medicine.

ELIGIBILITY FOR ADMISSION:
No candidate of any category (including Management quota) shall be eligible for admission to MD/MS courses, if he or she has not qualified NEET PG (MD/MS) conducted by National Board of Examinations or any other Authority appointed by the Government of India for the purpose.

(1) General Seats

(a) Every student, selected for admission to postgraduate medical course shall possess recognized MBBS degree or equivalent qualification and should have obtained permanent Registration with the NMC, or any of the State Medical Councils or should obtain the same within one month from the date of his/her admission, failing which the admission of the candidate shall be cancelled;

(b) Completed satisfactorily one year's rotatory internship or would be completing the same before the date announced by the University for that specific year as per NMC rules after passing 3rd professional MBBS Part II Examination satisfactorily.

CRITERIA FOR SELECTION FOR ADMISSION:

1. Out of total seats available for admission to the postgraduate courses 50% seats shall be ear marked for All India Quota and 50% shall be state Quota seats.

2. Out of total seats available for admission to the postgraduate courses 15% shall be management Quota seats. Theses seats shall be part of All India Quota seats.

3. Remaining 35% seats shall be of All India Quota nature.

4. Preference shall be given to state domicile candidates on all categories of seats.

5. Reservation shall be applicable on all category of seats as per the state government policy.

Admissions to the Postgraduate MD/MS Courses shall be made on the basis of the merit obtained at the NEET conducted by the National Board of Examinations or any other Authority appointed by the Government of India for the purpose.

The admission policy may be changed according to the law prevailing at the time of admission.

COUNSELING/INTERVIEW:

(1) Candidates in order of merit will be called for Counseling/Interview and for verification of original documents and identity by personal appearance.

(2) Counseling will be performed and the placement will be done on merit-cum-choice basis after application of roster by the Admission Board.

(3) RESERVATION:

Reservation shall be applicable as per policy of the State Government in terms of scheduled

caste, scheduled tribe, back ward class, special back ward class, women and person with disability & EWS

ELIGIBILITY AND ENROLMENT:

Every candidate who is admitted to MD/MS course in Mahatma Gandhi Medical College & Hospital shall be required to get himself/herself enrolled and registered with the Mahatma Gandhi University of Medical Sciences & Technology after paying the prescribed eligibility and enrolment fees.

The candidate shall have to submit an application to the MGUMST through Principal of College for the enrolment/eligibility along with the following original documents and the prescribed fees within the prescribed period without late fees. Then after, students will have to pay applicable late fees as per prevailing University Rules –

(a) MBBS pass Marks sheet/Degree certificate issued by the University (Ist MBBS to Final MBBS)
(b) Certificate regarding the recognition of medical college by the Medical Council of India.
(c) Completion of the Rotatory Internship certificate from a recognized college.
(d) Migration certificate issued by the concerned University.
(e) Date of Birth Certificate
(f) Certificate regarding registration with Rajasthan Medical Council / NMC/ Other State Medical Council.

REGISTRATION

Every candidate who is admitted to MD/MS course in Mahatma Gandhi Medical College & Hospital shall be required to get himself/herself registered with the Mahatma Gandhi University of Medical Sciences & Technology after paying the prescribed registration fees.

The candidate shall have to submit application to the MGUMST through Principal of College for registration with the prescribed fees within the prescribed period without late fees. Then after, students will have to pay applicable late fees as per prevailing University Rules.

DURATION OF COURSE:

The course shall be of 3 years duration from the date of commencement of academic session.

PERIOD OF TRAINING:

(1) The period of training for obtaining Post graduate degrees (MD/MS) shall be three completed years including the period of examination.

MIGRATION:

No application for migration to other Medical Colleges will be entertained from the students already admitted to the MD/MS course at this Institute.

METHODS OF TRAINING FOR MD/MS:

Method of training for MD/MS courses shall be as laid down by the NMC.

ONLINE COURSE IN RESEARCH METHODS

i. All postgraduate students shall complete an online course in Research Methods to be conducted by an Institute(s) that may be designated by the NMC by way of public notice, including on its website and by Circular to all Medical Colleges. The students shall have to register on the portal of the designated institution or any other institute as indicated in the public notice.

ii. The students have to complete the course by the end of their 2nd semester.
iii. The online certificate generated on successful completion of the course and examination thereafter, will be taken as proof of completion of this course
iv. The successful completion of the online research methods course with proof of its completion shall be essential before the candidate is allowed to appear for the final examination of the respective postgraduate course.
v. This requirement will be applicable for all postgraduate students admitted from the academic year 2019-20 onwards

ATTENDANCE, PROGRESS AND CONDUCT:

(1) Attendance:

(a) 80% attendance in t h e s u b j ect is compulsory. Any one failing to achieve this, shall notbe allowed to appear in the University examination.

(b) A candidate pursuing MD/MS course shall reside in the campus and work in the respective department of the institution for the full period as a full time student. No candidate is permitted to run a clinic/work in clinic/laboratory/ nursing home while studying postgraduate course. No candidate shall join any other course of study or appear for any other examination conducted by this university or any other university in India or abroad during the period of registration. Each year shall be taken as a unit for the purpose of calculating attendance.

(c) Every candidate shall attend symposia, seminars, conferences, journal review meetings, grand rounds, CPC, CCR, case presentation, clinics and lectures during each year as prescribed by the department and not absent himself / herself from work without valid reasons. Candidates should not be absent continuously as the course is a full time one.

(2) Monitoring Progress of Studies- Work diary/Log Book:

(a) Every candidate shall maintain a work diary in which his/her participation in the entire training program conducted by the department such as reviews, seminars, etc. has to be chronologically entered.

(b) The work scrutinized and certified by the Head of the Department and Head of the Institution is to be presented in the University practical/clinical examination.

(3) Periodic tests:

There shall be periodic tests as prescribed by the NMC and/ or the Board of Management of the University, tests shall include written papers, practical/clinical and viva voce.

(4) Records:

Records and marks obtained in tests will be maintained by the Head of the Department and will be made available to the University when called for.

THESIS:

(1) Every candidate pursuing MD/MS degree course is required to carry out work on research project under the guidance of a recognized post graduate teacher. Then such a work shall be submitted in the form of a Thesis.

(2) The Thesis is aimed to train a postgraduate student in research methods & techniques.

(3) It includes identification of a problem, formulation of a hypothesis, designing of a study, getting acquainted with recent advances, review of literature, collection of data, critical analysis, comparison of results and drawing conclusions.

(4) Every candidate shall submit to the Registrar of the University in the prescribed format a Plan of Thesis containing particulars of proposed Thesis work within six months of the date of commencement of the course on or before the dates notified by the University.

(5) The Plan of Thesis shall be sent through proper channel.
(6) Thesis topic and plan shall be approved by the Institutional Ethics Committee before sending the same to the University for registration.
(7) Synopsis will be reviewed and the Thesis topic will be registered by the University.
(8) No change in the thesis topic or guide shall be made without prior notice and permission from the University.
(9) The Guide, Head of the Department and head of the institution shall certify the thesis. Three printed copies and one soft copy of the thesis thus prepared shall be submitted by the candidate to the Principal. While retaining the soft copy in his office, the Principal shall send the three printed copies of the thesis to the Registrar six months before MD/MS University Examinations. Examiners appointed by the University shall evaluate the thesis. Approval of Thesis at least by two examiners is an essential pre-condition for a candidate to appear in the University Examination.
(10) Guide: The academic qualification and teaching experience required for recognitionby this University as a guide for thesis work is as laid down by Medical Council of India/Mahatma Gandhi University of Medical Sciences & Technology, Jaipur.
(11) Co-guide: A co-guide may be included provided the work requires substantial contribution from a sister department or from another institution recognized for teaching/training by Mahatma Gandhi University of Medical Sciences & Technology, Jaipur/Medical Council of India. The co-guide shall be a recognized postgraduate teacher.
(12) Change of guide: In the event of a registered guide leaving the college for any reasonor in the event of death of guide, guide may be changed with prior permission from the University.

ELIGIBILITY TO APPEAR FOR UNIVERSITY EXAMINATION:

The following requirements shall be fulfilled by every candidate to become eligible to appear for the final examination:

(1) Attendance: Every candidate shall have fulfilled the requirement of 80% attendance prescribed by the University during each academic year of the postgraduate course. (as per NMC rules)
(2) Progress and Conduct: Every candidate shall have participated in seminars, journal review meetings, symposia, conferences, case presentations, clinics and didactic lectures during each year as designed by the department.
(3) Work diary and Logbook: Every candidate shall maintain a work diary for recording his/her participation in the training program conducted in the department. The work diary and logbook shall be verified and certified by the Department Head and Head of the Institution.
(4) Every student would be required to present one poster presentation, to read one paper at a National/State Conference and to have one research paper which should be published/accepted for publication/ sent for publication to an indexed journal during the period of his/her post graduate studies so as to make him/her eligible to appear at the Post Graduate Degree Examination.
(5) Every student would be required to appear in and qualify the Pre-University Post graduate degree Mock examination. Post graduate students who fail to appear in or do not qualify the Pre-University Post graduate degree Mock examination shall not be permitted to appear in the final examination of the University.

The certification of satisfactory progress by the Head of the Department/ Institution shall be based on (1), (2), (3), (4) and (5) criteria mentioned above.

ASSESSMENT:

(1) The progress of work of the candidates shall be assessed periodically by the respective

guides and report submitted to the Head of the Institution through the Head of the Department at the end of every six months. The assessment report may also be conveyed in writing to the candidate who may also be advised of his/her shortcomings, if any.

(2) In case the report indicate that a candidate is incapable of continuing to do the work of the desired standard and complete it within the prescribed period, the Head of the Institution may recommend cancellation of his/her registration at any time to the University.

(3) Formative Assessment:

(a) General Principles

i. The assessment is valid, objective, constructive and reliable.
ii. It covers cognitive, psychomotor and affective domains.
iii. Formative, continuing and summative (final) assessment is also conducted.
iv. Thesis is also assessed separately.

(b) Internal Assessment

i. The internal assessment is continuous as well as periodical. The former is based on the feedback from the senior residents and the consultants concerned. Assessment is held periodically.
ii. Internal assessment will not count towards pass/fail at the end of the program, but will provide feedback to the candidate.
iii. The performance of the Postgraduate student during the training period should be monitored throughout the course and duly recorded in the log books as evidence of the ability and daily work of the student.
iv. Marks should be allotted out of 100 as under

1) Personal Attributes - 20 marks
   a. Behavior and Emotional Stability: Dependable, disciplined, dedicated, stable in emergency situations, shows positive approach.
   b. Motivation and Initiative: Takes on responsibility, innovative, enterprising, does not shirk duties or leave any work pending.
   c. Honesty and Integrity: Truthful, admits mistakes, does not cook up information, has ethical conduct, exhibits good moral values, loyal to the institution.
2) Clinical Work - 20 marks
   a Availability: Punctual, available continuously on duty, responds promptly on calls and takes proper permission for leave.
   b Diligence: Dedicated, hardworking, does not shirk duties, leaves no work pending, does not sit idle, competent in clinical case work up and management.
   c Academic Ability: Intelligent, shows sound knowledge and skills, participates adequately in academic activities and performs well in oral presentation and departmental tests.
   d Clinical Performance: Proficient in clinical presentations and case discussion during rounds and OPD work up. Preparing Documents of the case history/examination and progress notes in the file (daily notes, round discussion, investigations and management) Skill of performing bed side procedures and handling emergencies.
3) Academic Activities - 20 marks
   Performance during presentation at Journal club/ Seminar/Case discussion/Stat meeting and other academic sessions. Proficiency in skills as mentioned in job responsibilities.
4) End of term theory examination - 20 marks
   End of term theory examination conducted at end of 1st, 2nd year and after 2 years 9 months.
5) End of term practical examination - 20 marks

a. End of term practical/oral examinations after 2 years 9 months.
b. Marks for personal attributes and clinical work should be given annually by all the consultants under whom the resident was posted during the year. Average of the three years should be put as the final marks out of 20.
c. Marks for academic activity should be given by the all consultants who have attended the session presented by the resident.
d. The Internal assessment should be presented to the Board of examiners for due consideration at the time of Final Examinations.
e. Yearly (end of 1st, 2nd & 3rd year) theory and practical examination will be conducted by internal examiners and each candidate will enter details of theory paper, cases allotted (2 long & 2 short) and viva.
f. Log book to be brought at the time of final practical examination.

APPOINTMENT OF EXAMINERS:

Appointment of paper setters, thesis evaluators, answer books evaluators and practical & viva voce examiners shall be made as per regulations of the National Medical Commission .

SCHEME OF EXAMINATION:

Scheme of examination in respect of all the subjects of MD/MS shall be as under :

(1) The examination for MD/MS shall be held at the end of three Academic Years.
(2) Examinations shall be organized on the basis of marking system.
(3) The period of training for obtaining MD/MS degrees shall be three completed years including the period of examination.
(4) The University shall conduct not more than two examinations in a year for any subject with an interval of not less than 4 months and not more than 6 months between the two examinations.
(5) The examinations shall consist of:
   (a) Thesis :
      i. Thesis shall be submitted at least six months before the main Theory examinations.
      ii. 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/Practical.
      iii. In departments where besides the two earmarked practical/clinical examiners no one else is a qualified P.G. teacher, in that case the Thesis shall be sent to the third external examiner who shall actually be in place of the internal examiner.
      iv. Only on the acceptance of the thesis by any two examiners, the candidate shall be eligible to appear for the final examination.
      v. A candidate whose thesis has been once approved by the examiners will not be required to submit the Thesis afresh, even if he/she fails in theory and/or practical of the examination of the same branch.
      vi. In case the Thesis submitted by a candidate is rejected, he/she should be required to submit a fresh Thesis.
   (b) Theory papers:
      i. There shall be four theory papers, as below:

Paper I: Gross Anatomy, Embryology, Microscopic Anatomy of human body abovethe diaphragm with Radiological Anatomy & Body Preservation

Paper II: Gross Anatomy, Embryology, Microscopic Anatomy of human body belowthe diaphragm with General (Embryology & Microscopic) Anatomy.

Paper III: Neuroanatomy & Genetics
Paper IV: Recent advances and applied Anatomy in medical sciences

ii. Each theory paper examination shall be of three hours duration.
iii. Each theory paper shall carry maximum 100 marks.
iv. The question papers shall be set by the External Examiners.
v. There will be a set pattern of question papers.

Every question paper shall contain three questions. All the questions shall becompulsory, having no choice.

Question No. 1 shall be of long answer type carrying 20 marks.

Question No. 2 shall have two parts of 15 marks each. Each part will be requiredto be answered in detail.

Question No. 3 shall be of five short notes carrying 10 marks each.

vi. The answer books of theory paper examination shall be evaluated by two External and two internal examiners. Out of the four paper setters, the two paper setters will be given answer books pertaining to their papers and the answer books of the remaining two papers will be evaluated by two Internal Examiners. It will be decided by the President as to which paper is to be assigned to which Internal Examiner for evaluation.

vii. A candidate will be required to pass theory and practical examinations separately in terms of the governing provisions pertaining to the scheme of examination in the post graduate regulations. The examinee should obtain minimum 40% marks in each theory paper and not less than 50% marks cumulatively in all the four papers for degree examination to be cleared as "passed" at the said Degree examination.

(c) Clinical/ Practical & Oral examinations:

i. Clinical/Practical and Oral Examination of 400 marks will be conducted by at least four examiners, out of which two (50%) shall be External Examiners.
ii. A candidate will be required to secure at least 50% (viz. 200/400) marks in the Practical including clinical and viva voce examinations.

(6) If a candidate fails in one or more theory paper(s) or practical, he/she shall have to reappear in the whole examination i.e. in all theory papers as well as practical.

GRACE MARKS

No grace marks will be provided in MD/MS examinations.

REVALUATION / SCRUTINY:

No Revaluation shall be permitted in the MD/MS examinations. However, the student canapply for scrutiny of the answer books as per University Rules.

GUIDELINES FOR COMPETENCY BASED POSTGRADUATE TRAINING PROGRAMME FOR MD IN HUMAN ANATOMY

Preamble

The purpose of PG education is to create specialists who would provide high quality health care and advance the cause of science through research & training.

These guidelines would help to achieve a uniform level of training of postgraduates in MD Anatomy throughout the country. The student, after undergoing the training, should be able to deal effectively with the needs of the medical community and should be competent to handle all problems related to the specialty of Anatomy and recent advances in the subject. The postgraduate student should also acquire skills in teaching anatomy to medical and para-medical students and be able to integrate teaching of Anatomy with other relevant subjects, while being aware of her/his limitations.

The purpose of this document is to provide teachers and learners comprehensive guidelines to achieve defined outcomes through learning and assessment. This document has been prepared by subject-content specialists of the National Medical Commission. The Expert Group of the National Medical Commission had attempted to render uniformity without compromise to the purpose and content of the document. Compromise in purity of syntax has been made in order to preserve the purpose and content. This has necessitated retention of "domains of learning" under the heading "competencies.

SUBJECT SPECIFIC LEARNING OBJECTIVES

The **Goal** of MD Anatomy is to train a doctor to become a competent teacher and researcher in Anatomy who has acquired competence / skills in:

1. *contemporary advances and developments* in the field of Anatomy.
2. *competencies* pertaining to the subject of Anatomy that are required to be practiced at all levels of the health system.
3. *educating* medical and paramedical professionals.
4. *effectively communicating* with the students and colleagues from various medical and paramedical fields.
5. integrating anatomy with other disciplines as and when needed.

6. being good teacher capable of innovations in teaching methodology**.**
7. being effective leader of the team engaged in teaching and research.

After completing the three year course in MD in Human Anatomy, the student should have achieved competence in the following:

1. Knowledge of Anatomy

1.1 Acquire competencies in gross anatomy, surface anatomy, neuroanatomy, embryology, genetics, histology, radiological anatomy, applied aspects and recent advances of the above mentioned branches of anatomy to clinical practice. These are given in detail in subsequent sections.

2. Practical and Procedural skills

2.1 Acquire mastery in dissection skills, embalming, tissue processing, staining and museum preparation / techniques, bone procurement and its tissue preparation.

3. Acquire training skills in Research Methodology

3.1 Acquire skills in teaching, research methodology, epidemiology & basic informationtechnology.

3.2 Acquire knowledge in the basic aspects of Biostatistics and research methodology.

3.3 Has knowledge to plan the protocol of a thesis, carry out review of literature, execution of research projects and preparation of reports.

3.4 Has ability to use computer applications, Microsoft office (Microsoft word, excel, power point), Internet, Searching scientific databases (e.g. PubMed, Medline, Cochrane reviews).

3.5 Acquire skills in paper & poster preparation, writing research papers and thesis.

4. Professionalism, attitude and communication skills:

4.1 Develop work ethics and empathetic behavior with students and colleagues.

4.2 Acquire capacity of not letting his/her personal beliefs, prejudices, and limitations come in the way of duty.

4.3 Acquire attitude and communication skills to interact with colleagues, teachers, and students, body donors and family members of the donors

5. Teaching Anatomy

5.1 Acquire skills in teaching undergraduate students, (Lecture, Small Group Discussion, SDL, assessment and feedback.

5.2 Making power point presentation of subject topics.

6. Problem solving: The post graduate students should be able to demonstrate the ability to:

6.1 Identify applied implications of the knowledge of anatomy and discuss information relevant to the problem, using consultation, texts, archival literature and electronic media.

6.2 Correlate the clinical conditions to the anatomical / embryological / hereditary factors and explain anatomical basis of diseases.

6.3 Evaluate scientific/ clinical information and critically analyze conflicting data and hypotheses.

6.4 Prepare Scenario-based MCQs.

SUBJECT SPECIFIC COMPETENCIES

At the end of the course, the student should have acquired competencies with following predominant domains:

A. Predominant in Cognitive domain:

1. Describe gross anatomy of the entire body (including upper limb, lower limb, thorax, abdomen, head & neck and brain).
2. Explain the normal disposition of gross structure, and their interrelationship in the human body. She / He should be able to analyze the integrated functions of organs systems and locate the site of gross lesions according to deficits encountered.
3. Describe the process of gametogenesis, fertilization, implantation and placenta formation in early human embryonic development along with its variation and applied anatomy.
4. Demonstrate knowledge about the sequential development of organs and systems along with their clinical anatomy, recognize critical stages of development and effects of common teratogens, genetic mutations and environmental hazards. She / He should be able to explain developmental basis of variations and congenital anomalies.
5. Explain the principles of light, transmission and scanning, compound, electron, fluorescent and virtual microscopy.

6. Describe the microscopic structure of various tissues & organs and correlate structure with functions as a prerequisite for understanding the altered state in various disease processes.
7. Demonstrate knowledge about cell and its components, cell cycle, cellular differentiation and proliferation.
8. Describe structure, number, classification, abnormalities and syndromes related to human chromosomes.
9. Describe important procedures in cytogenetics and molecular genetics with its application.
10. Demonstrate knowledge about single gene pattern inheritance, intermediate pattern and multiple alleles, mutations, non-Mendelian inheritance, mitochondrial inheritance, genome imprinting and parental disomy.
11. Describe multifactorial pattern of inheritance, teratology, structure gene, molecular screening, cancer genetics and pharmacogenetics.
12. Explain the concept of reproduction genetics, infertility, assisted reproduction, prenatal diagnosis, genetic counseling and ethics in genetics.
13. Explain principles of gene therapy and its applied knowledge.
14. Describe the immune system and cell types involved in defense mechanisms of the body. Explain the gross features, cytoarchitecture, function, development and histogenesis of various primary and secondary lymphoid organs in the body.
15. Demonstrate knowledge about common techniques employed in cellular immunology and histocompatibility testing.
16. Demonstrate application of knowledge of structure & development of tissue-organ system to comprehend deviations from normal.
17. Demonstrate knowledge about recent advances in medical sciences which facilitate comprehension of structure function correlations and applications in clinical problem solving.
18. Explain collection, maintenance and application of stem cells, cryobanking and principles of organ donation from recently dead bodies.
19. Demonstrate knowledge about surface marking of all regions of the body.
20. Able to interpret various radiographs of the body, normal CT scan, ultrasound and MRI.
21. Demonstrate knowledge about different anthropological traits and use of related instruments.

22. Demonstrate knowledge about outline of comparative anatomy of whole body and basic human evolution.
23. Demonstrate knowledge about identification of human bones, determination of sex, age, and height for medico legal application of anatomy.

B. Predominant in Affective domain

1. Demonstrate self-awareness and personal development in routine conduct (*Self-awareness*).
2. Communicate effectively with peers, students and teachers in various teaching-learning activities (*Communication*).
3. Demonstrate -
    a. Due respect in handling human body parts & cadavers during dissection (*Ethics & Professionalism*)
    b. Humane touch while demonstrating living surface marking in subject/patient (*Ethics & Professionalism*).
4. Acquire the capacity of not letting his/her personal beliefs, prejudices and limitations come in the way of duty.
5. Appreciate the issues of equity and social accountability while exposing students to early clinical exposure (*Equity and social accountability*).
6. Ability to communicate with the registered body donors and family of donors.

C. Predominant in Psychomotor domain

1. Identify, dissect, locate and demonstrate surface marking of clinically important structures in the cadaver and correlate it with living anatomy.
2. Acquire mastery in dissection skills, embalming, tissue preparation, staining and museum preparation.
3. Locate and identify clinically relevant structures in dissected cadavers.
4. Locate and identify cells and tissues under the microscope.
5. Identify the anatomical structures visualized by imaging techniques, specifically radiographs, computerized tomography (CT) scans, MRI and ultrasonography in normal individuals.
6. Demonstrate various movements at the important joints and actions of various groups of muscles in the human body.

7. Demonstrate anatomical basis of common clinical procedures expected to be performed by a basic medical doctor.
8. Demonstrate different methods of teaching-learning and make presentations of the subject topics and research outputs.

Specific practice based competencies:

Name/Description of practice based competencies
1. Gross anatomy: 1.1 Procurement, Embalming and Preservation of human cadavers 1.2 Preparation of tanks for preserving bodies 1.3 Dissection of cadaver 1.4 Window dissection of important regions 1.5 Preparation of specimens for museum with display a) soft parts b) Hard Parts c) models d) charts 1.6 Preparation and preservation of human bones / skeleton as assigned by the faculty 1.7 Gross anatomy file in which labelled diagrams of important structures of upper limb, lower limb, thorax, abdomen, head & neck and brain should be drawn.
2. Histology **2.1** Preparation of common fixatives for embalming fluid, 10% formalin, Bouin's fluid etc**.** **2.2** Making paraffin blocks and section cutting and mounting**.** **2.3** Preparation of staining set for H and E staining and staining paraffin sections with the stain**.** **2.4** Making celloidin, araldite, gelatin blocks and their section cutting. **2.5** Processing hard tissues, decalcification of bones, block making and sectioning, preparation of ground sections of calcified bones.

2.6 Frozen section cutting on freezing microtome and cryostat**.**

2.7 Honing and stropping of microtome knives, including sharpening by automatic knife sharpener.

2.8 Histology file in which LM pictures of all the organs and tissues of the body should be drawn and a small description of salient features written**.**

3. Histochemical Methods

Practical classes for staining of glycogen, mucopolysaccharides, alkaline phosphatase, acid phosphatase and calcium

4. Cytogenetics

4.1 Preparation of media, different solutions, stains etc.

4.2 Preparation of buccal smear for sex chromatin

4.3 Human chromosome preparation from peripheral blood and karyotyping.

4.4 Banding techniques (G and C)

4.5 Making of Pedigree charts for study of patterns of inheritance.

4.6 Chromosomal analysis.

5. Neuroanatomy

5.1 Dissection of brain and spinal cord for teaching and learning purpose

5.2 Preparation of brain and spinal cord macroscopic and microscopic sections and identification of different parts in them.

5.3 Discussions on clinical problems related to neurological disorders and anatomical explanation for the same.

SYLLABUS

A postgraduate student, after three years of training in M.D. (Human Anatomy) should have acquired knowledge in the following aspects of anatomy:

A: Cognitive domain:

Section – 1

Gross anatomy

Gross Anatomy of the entire body including general anatomy, upper limb, lower limb, thorax, abdomen, pelvis, perineum, head and neck, brain and spinal cord and osteology, cross sectional anatomy and embalming procedures.

Section - 2

Developmental anatomy/embryology

- General embryology: gametogenesis, fertilization, implantation and placenta, early human embryonic development.
- Systemic embryology: development of organ systems and associated common congenital abnormalities with teratogenesis.
- Anatomical basis of congenital anomalies.

Section - 3

Histology and histochemistry

Cell Biology

- Cytoplasm - cytoplasmic matrix, cell membrane, cell organelles, cytoskeleton, cell inclusions, cilia and flagella.
- Nucleus - nuclear envelope, nuclear matrix, DNA and other components of chromatin, protein synthesis, nucleolus, nuclear changes indicating cell death.
- Cell cycle - mitosis, meiosis, cell renewal.
- Cellular differentiation and proliferation.

Microscopic structure of the body

- Principles of light, transmission and scanning, electron, fluorescent, confocal and virtual microscopy.
- The systems/organs of the body - Cellular organization, light and electron microscopic features, structure - function correlations, and cellular organization.

- Various histo-techniques and museum preparation techniques.

Section - 4

Neuroanatomy

- Brain and its environment, Development of the nervous system, Neuron and Neuroglia, Somatic sensory system, Olfactory and optic pathways, Cochleo-vestibular and gustatory pathways, Motor pathways, Central autonomic pathways, Hypothalamo-hypophyseal system, Limbic system, Basal ganglia, Reticular system, Ventricular system of brain, study of cross sectional anatomy of the brain and spinal cord and its applied anatomy.

Section - 5

Genetics

- Human Chromosomes - Structure, number and classification, methods of chromosome preparation and banding patterns. Chromosome abnormalities, Autosomal and Sex chromosomal abnormalities syndromes, Molecular and Cytogenetics.
- Single gene pattern inheritance: Autosomal and Sex chromosomal pattern of inheritance, Intermediate pattern and multiple alleles, Mutations, Non-Mendelian inheritance, Mitochondrial inheritance, Genome imprinting, parental disomy.
- Multifactorial pattern of inheritance: Criteria for multifactorial inheritance, Teratology, Structure gene, Molecular Screening, Cancer Genetics - Haematological malignancies, Pharmacogenetics.
- Reproduction Genetics - Male and Female Infertility, Abortuses, Assisted reproduction, Preimplantation genetics, Prenatal diagnosis, Genetic Counseling and Ethics of Genetics.
- Principles of Gene therapy and its applied knowledge.

Section - 6

Immunology

- Immune system and the cell types involved in defense mechanisms of the body. Gross features, cytoarchitecture, functions, development and histogenesis of various primary and secondary lymphoid organs in the body.
- Biological and clinical significance of the major histocompatibility complex of man including its role in transplantation, disease susceptibility/resistance and genetic control

of the immune response.

- Various techniques employed in cellular immunology and histocompatibility testing.
- Principles of Molecular hybridization and PCR technology in immunology research particularly mechanism of antigen presentation, structural and functional relevance of the T cell receptor, genetic control of the immune response, molecular basis of susceptibility to disease.

Section - 7

Applied anatomy and recent advances

- Clinical correlations of structure and functions of the human body. Anatomical basis and explanations for clinical problems.
- Applications of knowledge of development, structural (microscopy), neuro-anatomy to comprehend deviations from normal.
- Recent advances in medical sciences which facilitate comprehension of structure function correlations and applications in clinical problem solving.
- Collection, maintenance and application of stem cells, cryobanking and principles of organ donation from recently procured.

Section – 8

Surface Marking and Radiology

- Surface marking of all regions of the body. Interpretation of normal radiographs of the body including special contrast procedures including barium studies, cholecystography, pyelography, and salpingography. Normal CT Scan, MRI and ultrasonography.

Section – 9

Anthropology and Comparative Anatomy

- Different anthropological traits, Identification and use of Anthropological instruments.
- Outline of comparative anatomy of the whole body and basic human evolution.

Section – 10

Forensic Medicine

- Identification of human bones from their remains and determination of sex, age, and height. for medico legal application of Anatomy.

B - PSYCHOMOTOR DOMAIN:

Demonstrate following predominant Psychomotor domain competencies		
Sr. No	**Competency**	**Perform under supervision / perform Independently/ Observation only**
1.	Identify, locate and demonstrate surface marking of clinically important structures in the cadaver and correlate it with living anatomy	Independently
2.	Acquire mastery in dissection skills including window dissection of important regions	Independently
3.	Acquire mastery in embalming the human body	Independently
4.	Prepare tanks for preserving bodies	Observation
5.	Tissue preparation for histology and staining techniques	Independently
6.	Honing and Stropping of microtome knives, including sharpening by automatic knife sharpener	Independently
7.	Preparation of common fixatives embalming fluid 10% formalin, Bouin's fluid etc.	Independently
8.	Demonstrate the mounting of specimen in the museum	Independently
9.	Locate and identify clinically relevant structures in dissected cadavers.	Independently
10.	Locate, identify and demonstrate cells & tissues under the microscope.	Independently
11.	Identify the anatomical structures visualized by imaging techniques, specifically radiographs, computerized tomography (CT) scans, MRI and ultrasonography in normal individuals	Independently
12.	Demonstrate various movements at the important joints and actions of various groups of muscles in the human body.	Independently
13.	Demonstrate anatomical basis of common clinical procedures expected to be performed by a basic medical doctor.	Under supervision
14.	Demonstrate different methods of teaching-learning and assessments. Independently	Independently
15.	Make presentations of the subject topics for teaching and research outputs. independently	Independently
16.	Prepare buccal smear for sex chromatin. independently	Independently
17.	Prepare Human chromosome from peripheral blood and karyotyping. Under supervision	Under supervision
18.	Demonstrate Banding techniques (G and C) and Chromosomal Analysis Under supervision	Under supervision
19.	Demonstrate use of different anthropological instruments	Under supervision

Departmental Resources:

It is mandatory for the Department of Anatomy to develop at least three of the following laboratories, in addition to the other facilities. The laboratory should be involved in active research in at least one well defined field.

1. Histology
2. Immunology
3. Electron microscopy / Fluorescence microscopy / confocal and other forms of microscopy laboratories
4. Developmental anatomy
5. Anthropometry
6. Neuroanatomy
7. Cytogenetics
8. Imaging technique for Radiological Anatomy

TEACHING AND LEARNING METHODS:

General principles

Acquisition of competencies being the keystone of doctoral medical education, such training should be skills oriented. Learning in the program, essentially autonomous and self-directed, and emanating from academic and clinical work, shall also include assisted learning. The formal sessions are meant to supplement this core effort.

All students joining the postgraduate (PG) courses shall work as full-time (junior) residents during the period of training, attending not less than 80% of the training activity during the calendar year, and participating in all assignments and facets of the educational process. They shall maintain a log book for recording the training they have undergone, and details of the procedures done during laboratory and clinical postings in real time.

Teaching-Learning methods

This should include a judicious mix of demonstrations of dissections, symposia, journal clubs, seminars, small group discussion, case-based learning, simulation-based teaching, self-directed learning, integrated learning, interdepartmental meetings and any other collaborative activity with the allied departments. Methods with exposure to the applied aspects of the subject should also be used. **The suggested examples of teaching-learning methods are given below but are not limited to these.**

A. Lectures: Didactic lectures should be used sparingly. A minimum of 10 lectures per year is suggested. All postgraduate trainees will be required to attend these lectures. Some examples of topics which can be covered in lecture are:

1. Topics in gross, surface and cross sectional anatomy, microanatomy, embryology, neuroanatomy, histochemistry, and genetics.
2. Recent advances in microanatomy, embryology, neuroanatomy, histochemistry, and genetics.
3. Research methodology and biostatistics.
4. **Salient features of** Undergraduate/Postgraduate medical curriculum.
5. Teaching and assessment methodology.

Topic numbers 3, 4, 5 can be done during research methodology/biostatistics and medical education workshops in the institute.

B. Journal club: Minimum of once in 1-2 weeks is suggested.

Topics will include presentation and critical appraisal of original research papers published in peer reviewed indexed journals. The presenter(s) shall be assessed by faculty and grades recorded in the logbook.

C. Student Seminar: Minimum of once every 1-2 weeks is suggested.

Important topics should be selected and allotted for in-depth study by a postgraduate student. A teacher should be allocated for each seminar as faculty moderator to help the student prepare the topic well. It should aim at comprehensive evidence-based review of the topic. The student should be graded by the faculty and peers.

D. Student Symposium: Minimum of once every 3 months.

A broad topic of significance should be selected, and each part shall be dealt by one postgraduate student. A teacher moderator should be allocated for each symposium and moderator should track the growth of students. The symposium should aim at an evidence-based exhaustive review of the topic. All participating postgraduates should be graded by the faculty and peers.

E. Laboratory work: Minimum - once every 1-2 weeks.

Laboratory work/ Skills lab teaching should be coordinated and guided by faculty from the department. Various methods like DOAP (Demonstrate, Observe, Assist, Perform), simulations in skill lab, and case-based discussions etc. are to be used. Faculty from the department should participate in moderating the teaching-learning sessions. Hands-on experience on various techniques and procedures in microanatomy, histochemistry, genetics, embalming & preparation of museum specimens should be acquired.

F. Interdepartmental colloquium

Faculty and students must attend monthly meetings between the main Department and other department/s on topics of current/common interest.

G. a. Rotational clinical / community / institutional postings

Depending on local institutional policy and the subject specialty needs, postgraduate trainees may be posted in relevant departments/ units/ institutions. The aim would be to acquire more in-depth knowledge as applicable to the concerned specialty. Postings would be rotated between various units/departments and details to be included in the specialty-based Guidelines.

The postings schedule with duration is given below:

- Surgery -2 weeks
- Radiology -2 weeks
- Pathology -2 weeks
- ENT -1 week
- Ophthalmology -1 week
- Obstetrics & Gynecology -1 week
- Pediatrics -1week
- Medical Education Unit -1 week (Optional & can be done in common with other department PGs

Every posting should have its defined learning objectives. It is recommended that the departments draw up objectives and guidelines for every posting offered in conjunction with the collaborating department/s or unit/s. This will ensure that students acquire expected competencies and are not considered as an additional helping hand for the department / unit in which they are posted. The PG student must be tagged along with those of other relevant departments for bedside case discussion/basic science exercises as needed, under the guidance of an assigned faculty.

G b. Posting under "District Residency Programme" (DRP):

All postgraduate students pursuing MS/MS in broad specialities in all Medical Colleges/Institutions shall undergo a compulsory rotation of three months in District Hospitals/District Health System as a part of the course curriculum, as per the Postgraduate Medical Education (Amendment) Regulations (2020). Such rotation shall take place in the 3rd or 4th or 5th semester of the Postgraduate programme and the rotation shall be termed as "District Residency Programme" and the PG medical student undergoing training shall be termed as "District Resident".

H. Teaching research skills

Writing a thesis should be used for inculcating research knowledge and skills. All postgraduate students shall conduct a research project of sufficient depth to be presented to the University as a postgraduate thesis (if so mandated) under the supervision of an eligible faculty member of the department as guide and one or more co-guides who may be from the same or other departments.

In addition to the thesis project, every postgraduate trainee shall participate in at least one additional research project that may be started or already ongoing in the department. It is preferable that this project will be in an area different from the thesis work. For instance, if a clinical research project is taken up as thesis work, the additional project may deal with community/field/laboratory work. Diversity of knowledge and skills can thereby be reinforced.

I. Training in teaching skills

MEU/DOME should train PG students in education methodologies and assessment techniques. The PG students shall conduct UG classes in various courses and a faculty shall observe and provide feedback on the teaching skills of the student.

J. Log book

During the training period, the postgraduate student should maintain a Log Book indicating the duration of the postings/work done in labs, dissection hall, skill labs and other areas of posting. This should indicate the procedures assisted and performed and the teaching sessions attended. The log book entries must be done in real time. The log book is thus a record of various activities by the student like: (1) Overall participation & performance, (2) attendance, (3) participation in sessions, (4) record of completion of pre-determined activities, and (5) acquisition of selected competencies.

The purpose of the Log Book is to:

a) help maintain a record of the work done during training,
b) enable Faculty/Consultants to have direct information about the work done and intervene, if necessary,
c) provide feedback and assess the progress of learning with experience gained periodically.

The Log Book should be used in the internal assessment of the student, should be checked and assessed periodically by the faculty members imparting the training. The PG students will be required to produce completed log book in original at the time of final practical examination.

It should be signed by the Head of the Department. A proficiency certificate from the Head of Department regarding the clinical competence and skillful performance of procedures by the student will be submitted by the PG student at the time of the examination.

The PG students shall be trained to reflect and record their reflections in log book particularly of the critical incidents. Components of good teaching practices must be assessed in all academic activity conducted by the PG student and at least two sessions dedicated for assessment of teaching skills must be conducted every year of the PG program. The teaching faculty are referred to the MCI Logbook Guidelines uploaded on the Website.

K. Course in Research Methodology: All postgraduate students shall complete an online course in Research Methodology within six months of the commencement of the batch and generate the online certificate on successful completion of the course.

Other aspects:

- The Postgraduate trainees must participate in the teaching and training program of undergraduate students and interns attending the department.
- Trainees shall attend accredited scientific meetings (CME, symposia, and conferences) at least once a year.
- Department shall encourage e-learning activities.
- The Postgraduate trainees should undergo training in Basic Cardiac Life Support (BCLS) and Advanced Cardiac Life Support (ACLS).
- The Postgraduate trainees must undergo training in information technology and use of computers.

During the training program, patient safety is of paramount importance; therefore, relevant clinical skills are to be learnt initially on the models, later to be performed under supervision followed by independent performance. For this purpose, provision of skills laboratories in medical colleges is mandatory.

ASSESSMENT

FORMATIVE ASSESSMENT, ie., assessment to improve learning

Formative assessment should be continual and should assess medical knowledge, patient care, procedural & academic skills, interpersonal skills, professionalism, self-directed learning and ability to practice in the system.

During the three-year training period,

- A record of all theoretical, practical and experimental work done by the post graduate student and its assessment will be kept and shall be available for examiners at the time of the final practical and viva voce examination.
- There will be periodical examinations during the course of training. The pre-final theory and practical examination will be conducted by the faculty of the concerned college.

General Principles

Internal Assessment should be frequent, cover all domains of learning and used to provide feedback to improve learning; it should also cover professionalism and communication skills.

The Internal Assessment should be conducted in theory and practical/clinical examination, should be frequent, cover all domains of learning and used to provide feedback to improve learning; it should also cover professionalism and communication skills.

Quarterly assessment during the MD training should be based on:

- Dissection presentation : once a week
- Laboratory performance : twice a week
- Journal club : once a week
- Seminar : once a fortnight
- Case discussions : once a fortnight/month
- Interdepartmental case or seminar : once a month

Note: These sessions may be organized and recorded as an institutional activity for all postgraduates.

- Attendance at Scientific meetings, CME programmes (at least 02 each)

The student to be assessed periodically as per categories listed in the preclinical postgraduate student appraisal form (Annexure I).

SUMMATIVE ASSESSMENT, ie., assessment at the end of training

Essential pre-requisites for appearing for examination include:

1. **Log book** of work done during the training period including rotation postings, departmental presentations, and internal assessment reports should be submitted.

2. At least **two presentations** at national level conference. One research paper should be published / accepted in an indexed journal**. (It is suggested that the local or University Review committee assess the work sent for publication).**

The summative examination would be carried out as per the Rules given in the latest POSTGRADUATE MEDICAL EDUCATION REGULATIONS. The theory examination shall be held in advance before the Clinical and Practical examination, so that the answer books can be assessed and evaluated before the commencement of the clinical/Practical and Oral examination**.**

The postgraduate examination shall be in three parts**:**

1. **Thesis**

   Thesis shall be submitted at least six months before the Theory and Clinical / Practical examination. 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 examination. A post graduate student in broad specialty shall be allowed to appear for the Theory and Practical/Clinical examination only after the acceptance of the Thesis by the examiners**.**

2. **Theory examination**

   The examinations shall be organized on the basis of 'Grading'or 'Marking system' to evaluate and to certify post graduate student's level of knowledge, skill and competence at the end of the training, as given in the latest POSTGRADUATE MEDICAL EDUCATION REGULATIONS. Obtaining a minimum of 50% marks in 'Theory' as well as 'Practical' separately shall be mandatory for passing examination as a whole. The examination for M.D./ M.S shall be held at the end of 3rd academic year.

   There shall be four theory papers (as per PG Regulations).

   Paper I: Gross Anatomy, Embryology, Microscopic Anatomy of human body above the diaphragm with Radiological Anatomy & Body Preservation

   a) Gross Anatomy of human body above the diaphragm i.e. upper limb, thorax, head and neck.

   b) Embryology & Microscopic anatomy of tissues and organs above the diaphragm.

   c) Methods of preservation of human body and its parts, radiological anatomy, sectional anatomy

Paper II: Gross Anatomy, Embryology, Microscopic Anatomy of human body below the diaphragm with General (Embryology & Microscopic) Anatomy

a) Gross Anatomy of human body below the diaphragm i.e. lower limb, abdomen, pelvis.

b) Embryology & Microscopic anatomy of tissues and organs below the diaphragm.

c) General Histology, General Embryology

d) Principles of light, transmission and scanning electron microscopy, confocal, virtual microscopy.

Paper III: Neuroanatomy & Genetics

a) Neuroanatomy - gross and applied aspects.

b) General principles of genetics, cytogenetics as applicable to medicine and different genetic disorders, gene therapy.

Paper IV: Recent advances and applied Anatomy in medical sciences

a) Comparative and evolutionary anatomy

b) Clinical and applied aspect of Anatomy

c) Recent advances in the application of knowledge of anatomy on human body

d) Basics of principles of organ donation from recently dead bodies.

3. Practical/clinical and Oral/viva voce examination

Practical examination

Practical examination should be spread over **two** days and include various major components of the syllabus focusing mainly on the psychomotor domain.

- **First Day Practical:** To submit the duly signed gross anatomy file, histology file & the log book and thesis
  - **a) Gross Anatomy**
    Dissection and related viva voce, Major and minor dissections to be included.
  - **b) Histology**
    Spotting (10 spots) and viva voce
    Techniques of tissue processing, paraffin block making, section cutting and staining (H and E stain) with related viva
- **Second Day Practical:**
  - **a)** Microteaching of a short topic to assess teaching skills
  - **b)** A short synopsis of the thesis work should be presented by the post graduate student
  - **c)** Grand viva including Gross anatomy, cross sectional anatomy, radiological Anatomy, Surface Anatomy, Embryology**.**

Oral/Viva voce examination on defined areas should be conducted by each examiner separately. Oral examination shall be comprehensive enough to test the post graduate student's overall knowledge of the subject focusing on psychomotor and affective domain.

Practical Examination to be organized as per details given below:

- Dissection on cadaver
- Histology spotting
- Histological techniques
- Surface Marking
- Radiology
- Teaching ability
- Thesis presentation

Oral / Viva-voce Examination

Grand viva

On dissected parts of the whole human body including nervous system, and Embryology models, teratology, skeletal system including short bones, embalming techniques and genetics, radiographs, MRI, CT & ultrasonography.

Recommended reading:

Books (latest edition)

Gross Anatomy:

- Susan Strandring: Gray's Anatomy: The anatomical basis of clinical practice, Churchill Livingstone Elsevier.
- Keith and Moore Clinically Oriented Anatomy. Lippincot Williams and Wilkins.
- R.J. Last. Anatomy Regional and Applied. Churchill Livingston.
- Frank H. Netter. Atlas of Human Anatomy. Saunders Elsevier.
- ML Ajmani. Embalming: Principles and Legal Aspects. Jaypee Brothers.

Histology

- Young B. and Heath J. Wheater's Functional Histology. Churchill Livingstone.
- M.H. E Ross. Histology: A textbook and atlas. Williams and Wilkins.
- Harold A Davenport. Histological and Histochemical Techniques. W.B Saunders Company.

Genetics

- J.S Thompson and Thompson. Genetics in medicine. W.B. Saunders and Co. Philadelphia, London.

Embryology

- TW Sadler. Langman's Medical Embryology. Lippincotts, Williams and Wilkins
- Keith L Moore and T.V.N. Persaud. The Developing Human. Saunders.

Neuroanatomy

- Richard S. Snell. Clinical Neuroanatomy for Medical Students. Williams and Wilkins.

Statistics

- David E. Matthews and Vernon T. Farewell. Using and Understanding Medical Statistics. Karger.

Radiology

- J.B. Walter et.al. Basic Atlas of Sectional Anatomy with correlated imaging. Saunders Elsevier.

Surface anatomy

- SP John, Lumley editors. Surface Anatomy, The Anatomical basis of clinical examination. London: Churchill Livingstone.

Journals

03-05 international Journals and 02 national (all indexed) journals

Annexure I

Student appraisal form for MD in Human Anatomy

	Elements	Less than Satisfactory			Satisfactory			More than satisfactory			Comments
		1	2	3	4	5	6	7	8	9	
1	**Scholastic aptitude and learning**										
1.1	Has knowledge appropriate for level of training										
1.2	Participation and contribution to learning activity (e.g., Journal Club, Seminars, CME etc)										
1.3	Conduct of research and other scholarly activity assigned (e.g Posters, publications etc)										
1.4	Documentation of acquisition of competence (eg Log book)										
1.5	Performance in work based assessments										
1.6	Self-directed Learning										
2	**Work related to training**										
2.1	Practical skills that are appropriate for the level of training										
2.2	Respect for processes and procedures in the work space										
2.3	Ability to work with other members of the team										
2.4	Participation and compliance with the quality improvement process at the work environment										

2.5	Ability to record and document work accurately and appropriate for level of training										
3	**Professional attributes**										
3.1	Responsibility and accountability										
3.2	Contribution to growth of learning of the team										
3.3	Conduct that is ethically appropriate and respectful at all times										
4	**Space for additional comments**										
5	**Disposition**										
	Has this assessment pattern been discussed with the trainee?	Yes	No								
	If not explain.										
	Name and Signature of the assesse										
	Name and Signature of the assessor										
	Date										

Subject Expert Group members for preparation of REVISED Guidelines for competency based postgraduate training programme for MD in Human Anatomy

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MODEL PAPER

MD02301 **Hum. Ana-I**

MD Examination Month, Year

HUMAN ANATOMY

Paper - I

(Gross Anatomy, Embryology, Microscopic Anatomy of human body abovethe diaphragm with Radiological Anatomy & Body Preservation)

Time: Three Hours Maximum

Marks: 100

Attempt all questions

All the parts of one question should be answered at one place in sequential order.

Draw diagrams wherever necessary

Q.1 Trace the pathways of eight cranial nerve. 20

Q.2 Write in detail 2x15 = 30

a) Anatomical basis of ape thumb deformity

a) Changes in epithelium and cartilage of respiratory tract from trachea to alveoli.

Q.2 Write short notes on - 5x10 = 50

a) Deep cervical fascia

b) Congenital diaphragmatic hernia

c) Sialography

d) Kiesselbach plexus

e) Embalming fluids

MODEL PAPER

MD02302 **Hum. Ana-II**

MD Examination Month, Year

HUMAN ANATOMY

Paper - II

(Gross Anatomy, Embryology, Microscopic Anatomy of human body belowthe diaphragm with General (Embryology & Microscopic) Anatomy)

Time: Three Hours

Maximum Marks: 100

Attempt all questions

All the parts of one question should be answered at one place in sequential order.

Draw diagrams wherever necessary

Q.1 Describe the anatomical basis of locking and unlocking of knee joint 20

Q.2 Write in detail 2x15 = 30

a) Vertical and horizontal disposition of peritoneum

b) Various types of connective tissue with functional correlation

Q.3 Write short notes on - 5x10 = 50

a) Meckel's diverticulum

b) Marginal artery of Drummond

c) Perineal body

d) Couinauds segment

e) Mullerian duct

MODEL PAPER

MD02303 **Hum. Ana-III**

MD Examination Month, Year

HUMAN ANATOMY

Paper - III

(Neuroanatomy & Genetics)

Time: Three Hours

Maximum Marks: 100

Attempt all questions

All the parts of one question should be answered at one place in sequential order.

Draw diagrams wherever necessary

Q.1 Describe the parts, gross relations, major nuclei and connections of thalamus 20

Q.2 Write in detail 2x15 = 30

a) Limbic lobe and its connections.

b) Mid brain syndromes

Q.3 Write short notes on - 5x10 = 50

a) Efferent nuclei of brainstem

b) Brown Sequard syndrome

c) Recombinant DNA technology

d) Polymerase chain reaction

e) Methods of prenatal diagnosis

MODEL PAPER

MD02304 **Hum. Ana-IV**

MD Examination Month, Year

HUMAN ANATOMY

Paper - IV

(Recent advances and applied Anatomy in medical sciences)

Time: Three Hours

Maximum Marks: 100

Attempt all questions

All the parts of one question should be answered at one place in sequential order.

Draw diagrams wherever necessary

Q.1 Give a detailed account in favour and against claims of discovery of new salivary gland by scientists 20

Q.2 Write in detail 2x15 = 30

a) Comparative anatomy and its significance

b) Evolutionary changes in the anatomy of heart in vertebrates

Q.3 Write short notes on - 5x10 = 50

a) Pudendal nerve block

b) Significance of Brodel's line in segmental resection of kidney

c) New technologies applied to the study of digital anatomy

d) Principles of organ donation.

e) Trendelenburg sign