REGULATIONS AND CURRICULUM GOVERNING

MD ANATOMY PROGRAM

(2024-25)

Name of the Constituent Unit/Centre: Yenepoya Medical College



Deralakatte, Mangalore, Karnataka.

NOTIFICATION FROM THE UNIVERSITY

YENEPOYA
(DEEMED TO BE UNIVERSITY)
Recognized under Sec 3(A) of the UGC Act 1956
Accredited by NAAC with 'A' Grade

NOTIFICATION – 34-ACM/2019 dtd. 20.02.2019

Sub:- Implementation of Competency Based Medical Education PG Curriculum

Ref. : Resolution of the Academic Council at its 34th Meeting held on 08.02.2019 vide Agenda 33

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The Academic Council at its 34th Meeting held on 08.02.2019 and subsequently the 45th meetings of Board of Management held on 09.02.2019 have accepted the proposal for implementation of Competency Based Medical Education (CBME) for the PG Curricula of the following programs as per the MCI Norms.

1. MD in Pathology
2. MD in General Medicine
3. MD in Anaesthesiology
4. MD in Paediatrics
5. MD in Respiratory Medicine
6. MD in Radio-diagnosis
7. MD in Anatomy
8. MD in Physiology
9. MD in Biochemistry
10. MD in Microbiology
11. MD in Pharmacology
12. MD in Forensic Medicine
13. MD in Psychiatry
14. MD in Dermatology
15. MD in Community Medicine
16. MS in General Surgery
17. MS in OBG
18. MS in Otorhinolaryngology
19. MS in Ophthalmology
20. MS in Orthopaedics

This revised curriculum shall come into effect from the academic year 2019-2020 onwards.

REGISTRAR

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YENEPOYA
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MD IN HUMAN ANATOMY

Introduction to 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.

Goal

The Goal of MD Anatomy is to train a doctor to become a competent teacher and researcher in Anatomy who is aware of contemporary advances and developments in the field of Anatomy. He/she should acquire the competencies pertaining to the subject of Anatomy that is required to be practiced at all levels of the health system. Must be oriented to the principles of research methodology. He must acquire skills in educating medical and paramedical professionals and effectively communicate with students and colleagues from various fields. He must acquire qualities of a good teacher capable of innovating teaching methodology and developing skills of integrating anatomy with other disciplines as and when needed. He should adequate management skills to function as an effective leader of the team engaged in teaching and research.

Learning Objectives

After completing the three years course in MD Anatomy, the student should have achieved 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 information technology.

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.

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. 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.
3.	**Histochemical Methods** Practical classes for staining of glycogen, mucopolysaccharides, alkaline phosphatase, acid phosphatase and calcium
4.	**Cytogenetic** 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

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:

Year	Department	Period	Focus areas
	General Surgery	15 days	1. Laparoscopic and endoscopic visualization of viscera and clinical Anatomy
	Radiology	15 days	1. Principles and recent advances in the following CT, MRI, USG Plain & contract radiography 2. Interpret normal radiographs of all regions of the human body in various standard views. 3. Identify and describe normal skeletal and soft tissue anatomical landmarks visible on plain X-rays. 4. List and explain different contrast radiographic studies and interpret them based on their underlying anatomical principles. 5. Analyze normal CT and MRI images of different body regions and accurately identify major anatomical structures in sectional planes. **6.** Recognize and identify anatomical structures using ultrasonography 7. Describe the principles, indications, and basic techniques of commonly used

	Pathology	15 days	1. Special staining techniques at least one hands on experience: Connective tissue, Nerve tissue, PAS- mucinogen 2. Principle of Frozen microtomy or Cryostat, Electron microscopy 3. (Where feasible - one day visit to an electroscopy labeg. In medical colleges located within city limits or nearby
	ENT	7 days	1. Apply anatomical knowledge and identify different structures encountered in operative or clinical procedures including endoscopy. 2. Comprehend anatomical basis of functional alterations or clinical presentations
	Ophthalmology	7 days	1. Apply anatomical knowledge and identify different structures encountered in operative or clinical procedures of the orbit and eyeball. 2. Comprehend anatomical basis of functional alterations or clinical presentations.
	Obstetrics & Gynecology	7 days	1. Apply Anatomical review of clinical examination, procedures and planning part of operative interventions. 2. Develop inquisitiveness to explore possible justification of developmental defects in babies or gestational tissues.
	Pediatrics	7 days	1. Congenital anomalies related to development of the system

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.

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Method of training

The training of postgraduates shall be residency pattern with graded responsibilities in each academic year

Suggested guidelines for three year MD anatomy activities

	Academics/research/professionalism
1st year	• Orientation to the subject and departmental activities • Understand the Competency, syllabus and assessment of the PG curriculum in Anatomy as per the RGUHS requirement • Attend regular Undergraduate MBBS lectures and practical Dissection and Histology. Mandatory to attend all lecture/practical class • Start taking Undergraduate small group teaching /dissection/osteology/histology under supervision • Gross anatomy: Dissection of one whole human body and study of gross anatomy • Histology Basic techniques in tissue processing, preparation of blocks, microtome sections and H & E • Acquisition of embalming skills. • Start Journal clubs and seminars • Attend the PG research methodology training programme and mandatory to complete MCI/NMC prescribed online research methodology course • Attend the Post graduate Medical education training program (PG MET) • Selection of topic for thesis Synopsis • Preparation and submission of the synopsis • Maintain logbook entry of all activities • Internal assessment I-theory, practical & viva voce • Begin review and data collection for thesis • Attend CME/Conferences/training Workshops • Preparation for Poster/Oral Presentation in State / National conference/International • Submission of 1st year logbook to HOD for signature • Feedback from guide and HOD
2nd year	• Continue academic activities of teaching undergraduate's medical students • plan for rotational postings • continue journal clubs and seminars • complete record book • plan and prepare for oral/poster presentation in State/National conference/international conference • Submission of logbook entry of HOD signature with all entries of the teaching learning methods and training programmes • Internal assessment -II both theory, practical and viva voce • Review thesis preparation • Feedback from guide and HOD

3rd year	• Continue academic activities of teaching undergraduate's medical students • Complete thesis • Presentation of thesis • Complete log book entries • Practice pedagogy sessions • Preliminary examination (III IA - theory, practical and viva voce) three months prior to university examination • Feedback from guide and HOD

ASSESSMENT

FORMATIVE ASSESSMENT

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)

Formative Assessment - MD Anatomy

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

I Internal Assessment	II Internal Assessment	III Internal Assessment
Theory – 100 Marks Practical – 100 Marks	Theory – 100 Marks Practical – 100 Marks	Theory - 400 marks – (Paper I, II, III and IV) Practical - 400 marks 1. Long Experiment: 120 Marks 2. Short Experiment I: 60 Marks 3. Short Experiment II: 60 Marks 4. OSPE: 40 Marks 5. Thesis/Dissertation: 20 Marks 6. Grand Viva Voce: 100 Marks

Formative Assessment includes

I IA will be conducted at the end of First Year

b. II IA will be conducted at the end of Second Year

c. III IA will be conducted in the 10th month of Third Year. The pattern of examination will be same as Final University Examination.

d. Quarterly / Monthly departmental Test in Theory (chapter wise)

e. Monthly Practical/clinical skill Assessment by OSCE/ OSPE and DOPs

f. Grading of Teaching Programme like Seminar, Journal Club and Group discussion
g. Half yearly Thesis progress Review
h. Logbook maintenance

Internal assessment

1st Internals (at the end of 1st Year	2nd Internals (at the end of 2nd year)	Prelim University exam (at the end of the year)
Theory - 100 marks Practical - 100 marks	Theory - 100 marks Practical - 100 marks	Theory - 400 marks - 4 papers Practical - 400 marks

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.

Distribution of marks for Theory examination

Item	**Marks**
No. of Theory Papers	4
Marks for each Theory Paper	100
Total marks for Theory Paper	**400**
Passing Minimum for Theory	200/400 (40% minimum in each paper) Theory – aggregate 50% (In addition, in each Theory paper a candidate has to secure minimum of 40%)

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 inclu ded. 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.

Distribution of marks for Practical examination

MD- Anatomy

LONG EXERCISES	1. 3 hours Window dissection of the allotted gross anatomy topic on human cadaver 2. Display and discussion of the allotted dissection exercise on a human cadaver	100 Marks
	3. Surface anatomy	20 marks
	Total	**120 marks**
SHORT EXERCISES	**HISTOLOGY** 1. Identification and discussion of 10 stained sections which includes Histology, Neuroanatomy, Embryology	60 marks
	i) Histology processing and section cutting ii) Embedding and Preparation of a paraffin block Taking serial sections from blocks provided iii) Staining of given section with H & E and discussion	10 marks 10 marks 20 marks 40 marks
	PEDAGOGY Demonstration of teaching skill/ techniques	20 marks
	Total	**120 marks**
OSPE	Gross Anatomy, Clinical Anatomy, Genetics, Embryology, Radiology	40 marks
Dissertation		20 marks
	Total	**300 marks**

VIVA VOCE	• All the components of the syllabus along with specimens • Embryology models, teratology • Skeletal system including short bones • Embalming techniques Radiographs, MRI, CT & ultrasonography	100 marks
	Total	**400 marks**

Recommended 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

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ANNEXURES

Blueprint for the four theory papers
(Content weightage paper-wise)- MD Anatomy

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

SL. NO		Q. NO'S	MARKS	%
1	UPPER LIMB	3	30 marks	30%
2	HEAD & NECK	2	20 marks	20%
3	THORAX	1	10 marks	10%
4	HISTOLOGY	1	10 marks	10%
5	RADIOLOGY	1	10 marks	10%
6	EMBALMING	1	10 marks	10%
7	EMBRYOLOGY	1	10 marks	10%

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

SL. NO		Q. NO'S	MARKS	%
1	ABDOMEN	1	10 marks	10%
2	PELVIS	1	10 marks	10%
3	LOWER LIMB	2	20 marks	20%
4	EMBRYOLOGY	2	10 marks	20%
5	SYSTEMIC HISTOLOGY	1	10 marks	10%
6	GENERAL ANATOMY	1	10 marks	10%
7	GENERAL HISTOLOGY	1	10 marks	10%
8	MICROSCOPIC TECHNIQUES	1	10 marks	10%

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PAPER – III: Neuroanatomy and Genetics

SL. NO		Q. NO'S	MARKS	%
1	SPINAL CORD	1	10 marks	10%
2	BRAINSTEM	1	10 marks	10%
3	CEREBELLUM	1	10 marks	10%
4	DIENCEPHALON	2	20 marks	20%
5	CEREBRUM	2	20 marks	20%
6	CRANIAL NERVE	1	10 marks	10%
7	GENETICS	2	20 marks	20%

PAPER – IV: Applied Human Anatomy and Recent Advances in Medical Science

SL. NO		Q. NO'S	MARKS	%
1	APPLIED/SURGICAL ANATOMY	7	70 Marks	70%
2	RECENT ADVANCES	2	20 marks	20%
3	ANTHROPOLOGY/COMPARATIVE ANATOMY	1	10 marks	10%

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YENEPOYA (DEEMED TO BE UNIVERSITY) M.D DEGREE- MODEL QUESTION PAPER ANATOMY-PAPER- I

Max Marks: 100
Time: 3 Hours

Gross Anatomy, Embryology, Microscopic Anatomy of human body above diaphragm with Radiological Anatomy & Body Preservation

- Your answers should be specific to the questions asked.
- Draw neat labelled diagrams wherever necessary.

I. SHORT ESSAYS (10x10-100Marks)

1. Give a detailed account of arrangement of Axillary lymph nodes, their arca of drainage and applied aspects.
2. Describe the parts and gross anatomy of internal ear in detail
3. Describe the development of chambers of heart in detail along with applied aspects
4. Describe the microscopic anatomy of Tongue. Correlate its development with sensory nerve supply.
5. Describe the sectional anatomy of thoracic region and correlate the same with CT images.
6. Describe the extent, parts, coverings, relations and blood supply of Thyroid gland. Add a note on the surgical importance of arteries during Thyroidectomy.
7. Describe the formation, branches and applied anatomy of brachial plexus
8. Describe the readio ulnar joints and the functional importance of the movements in detail
9. Describe the medico-legal aspects in connection with procurement and embalming of cadavers.
10. Describe the origin, branches and areas of supply of the coronary arteries. Add a note on the clinical importance of these arteries.

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YENEPOYA (DEEMED TO BE UNIVERSITY) M.D DEGREE- MODEL QUESTION PAPER ANATOMY-PAPER- II

Max Marks: 100
Time: 3 Hrs

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

- Your answers should be specific to the questions asked.
- Draw neat labelled diagrams wherever necessary.

SHORT ESSAYS **10x10=100Marks)**

1. Describe the microscopic anatomy ovary in detail
2. Describe the embryology and anomalies of kidney development
3. Discuss the principles of scanning electron microscopy and virtual microscopy.
4. Describe the position, relations, blood supply of duodenum in detail
5. Give a detailed account of the deep fascia of thigh and its Functional significance.
6. Describe the urinary bladder under the following headingsposition, surfaces, relations, supports and innervation.
7. Describe the development of inferior venecava. Add a note on its congenital anomalies
8. Discuss the micro scopic structure of bone. Add a note on the differences between structure of compact and cancellous bone
9. Give an account of the main veins of lower limb. Mention the factors that facilitate the venous return in lower limb
10. Describe the origin, course, distribution, applied anatomy of tibial nerve in detail

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YENEPOYA (DEEMED TO BE UNIVERSITY)
M.D DEGREE- MODEL QUESTION PAPER
ANATOMY-PAPER- III

Max Marks: 100
Time: 3 Hrs

(Neuroanatomy and Genetics)

- Your answers should be specific to the questions asked.
- Draw neat labelled diagrams wherever necessary,

SHORT ESSAYS **(10x10-100 Marks)**

1. Describe the association tracts of the brain stem
2. Describe the parts, relations, Fibrecomponents, blood supply and applied aspects of internal capsule.
3. Give an account of the anatomical basis of the optic pathway. Mention the effects of lesions at different levels of the pathway.
4. Describe the cortical areas in detail around the central sulcus of cerebral hemisphere
5. Describe Thalamus under the following headings Nuclei, Connections, Function and Applied aspects
6. Describe the boundaries and communications of 4^{th} ventricle in detail
7. Describe the Hypothalamo-hypophyseal tract and Hypothalamo-hypophyseal portal system.
8. Discuss the coverings of spinal cord. State the differences between the coverings of spinal cord and brain.
9. Describe the sex linked disorders
10. Discuss the phylogenetic and functional classification of cerebellum

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M.D DEGREE- MODEL QUESTION PAPER
ANATOMY-PAPER-IV

Max Marks 100
Time: 3 Hrs

(Applied Human Anatomy and Recent Advances in Medical Science)

- Your answers should be specific to the questions asked.
- Draw neat labelled diagrams wherever necessary.

SHORT ESSAYS **(10x10 =100Marks)**

1. Describe the fascial spaces of palmand digits. Add a note on the effects of infection of these spaces and sites of incision fordrainage
2. Give an account of the effects of injury of Median nerveat different levels of its course in upper limb
3. Describe the surgical anatomy of ano-rectal junction
4. Describe the vascular segments of kidney and their applied importance
5. Describe the evolution facial skeleton from quadruped's to humans
6. Give an account of cadaveric organ transplantation
7. Describe the surgical spaces in the neck region in detail
8. Explain the functional and surgical importance of the supports of uterus
9. Describe the core components of competency based medical education
10. Describe peritoneal recesses in relation to Liver and their clinical Importance

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POSTGRADUATE STUDENTS

APPRAISAL FORM Name of the PG student:

Period to training FROM ……..TO

Sl. No	Particulars	Not satisfactory			Satisfactory			More than Satisfactory			Remarks
1.	Journal based /recent advances leaning	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	
2.	Patient based/ laboratory or skill based learning										
3.	Self directed learning and teaching										
4.	Departmental and interdepartmental activity initiatives										
5.	External and outreach activities/CMEs										
6.	Thesis/Research work										
7.	Log book maintenance										

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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										

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JOURNAL CLUB ASSESSMENT

Name of Student: ……..… Name of Faculty/ Observer:

Date: ……

Article Reference (Vancouver Style):

……..……
……

***Rating:** <2 (Below Expectations - B); 2-3 (Meets Expectations – M); 4 (Exceeds Expectations – E)

Sl. No	Criteria	0	1	2	3	4
	Article Selection (Importance/ Relevance)					
	Background Knowledge & Introduction of Topic					
	Critical analysis of: Title, Abstract & Introduction of the article as per stud design (checklist)*					
	Critical analysis of: Methodology & Results) of the article as per study design (checklist)*					
	Critical analysis of: Discussion, Limitation & Conclusion) of the article as per study design (checklist)*					
	Whether cross references have been consulted					
	Effective use of Audio-Visual Aids					
	Ability to respond to questions on the paper / subject					

***http://www.equator-network.org/**
Major Positive Feature

Suggestions for improvement of criteria where score is <2

Criteria with Score <2	Comments	
Agreed Action Plan	Resident's Signature	Assessor's Signature

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SEMINAR ASSESSMENT

Name of Student: ……..… Name of Faculty/

Observer: …… Date: …… Topic:

……

***Rating:** <2 (Below Expectations - B); 2-3 (Meets Expectations – M); 4 (Exceeds Expectations – E)

Sl No	Criteria	0	1	2	3	4
1.	Content					
2.	Presentation Skills					
3.	Understanding of Subject					
4.	Communication					
5.	Handling Questions					
6.	Use of Audio-Visual Aids					
7.	Time Management					
8.	References					
Major Positive Feature						

Suggestions for improvement of criteria where score is <2

Criteria with Score <2	C	
Agreed Action Plan	Resident's Signature	Assessor's Signature

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MD ANATOMY UNIVERSITY PRACTICAL EXAMINATION

PREPARATION OF PARAFFIN BLOCK & SECTION CUTTING (OSPE)

Sl. No	Check list for block making of section cutting	Marks allotted	Marks obtained
1.	Placing the L blocks accurately	2	
2.	Placing the tissue appropriately and making of paraffin block	2	
3.	Placing the block in block holder	2	
4.	Fixing & adjusting the knife	2	
5.	Adjust the Microtome	2	
6.	Ribboning	4	
7.	Transfer to Tissue Floatation bath	2	
8.	Fixing the tissue ribbon to the slide smeared with egg albumin	4	

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MD -ANATOMY UNIVERSITY PRACTICAL EXAMINATION

STAINING OF GIVEN SECTION WITH H & E

SL. NO.	CHECK LIST FOR STAINING	MARKS ALLOTTED	MARKS OBTAINED
1.	Bring section(slide) to Xylene - 5 mins	1	
2.	Rinse in Absolute Alcohol, 90%, 70% Alcohol Alcohol	2	
3.	Rinse in distilled water	1	
4.	Stain with Haematoxylene - 3- 5 mins	2	
5.	Wash in water - 1 min	2	
6.	Observe under microscope Dip and take in Acid Alcohol (for excess stain)	2	
7.	Keep in Running tap water - 5 mins	2	
8.	Stain with Eosin - 2 mins	2	
9.	Following the steps of Dehydration, 90% Alcohol, Absolute Alcohol, Xylene	2	
10	Mount in DPX with cover slip	3	
11	Focusing the slide under the microscope	1	