MAHATMA GANDHI UNIVERSITY
of
MEDICAL SCIENCES & TECHNOLOGY
JAIPUR

Syllabus

MS – ORTHOPAEDICS

(3 Years Post Graduate Degree Course)

Notice

1. Amendment made by the Medical Council of India in 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
MS ORTHOPAEDICS (9230)
(3 Years Post Graduate degree course)

TITLE OF THE COURSE:
It shall be called Master of Surgery.

ELIGIBILITY FOR ADMISSION:
No candidate of any category (including NRI 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 Medical Council of India, 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 MCI rules after passing 3rd professional MBBS Part II Examination satisfactorily.

(c) In the case of a foreign national, the Medical Council of India may, on payment of the prescribed fee for registration, grant temporary registration for the duration of the postgraduate training restricted to the medical college/institution to which he/she is admitted for the time being exclusively for postgraduate studies; however temporary registration to such foreign national shall be subject to the condition that such person is duly registered as medical practitioner in his/her own country from which he has obtained his basic medical qualification and that his degree is recognized by the corresponding Medical Council or concerned authority.

(2) **NRI Seats**

(a) Students from other countries should possess passport, visa and exchange permits valid for the period of their course of study in this Institution and should also observe the regulations of both central and state governments regarding residential permits and obtain no-objection certificate from the same.

(b) The candidate should have a provisional "Student Visa". If he comes on any other visa and is selected for admission, he will have to first obtain a student visa from his country and then only he will be allowed to join the course. Therefore it is imperative to obtain provisional student visa before coming for Counseling.

(c) This clause is applicable to NRI/Foreign Students only.

CRITERIA FOR SELECTION FOR ADMISSION:

(1) **NRI Quota**

15% of the total seats are earmarked for Foreign National / PIO / OCI/ NRI / Ward of NRI/NRI sponsored candidates who would be admitted on the basis of merit obtained in NEET PG or any other criteria laid down by Central Government/MCI.

(2) **Remaining Seats (Other than NRI Quota Seats)**

(a) Admissions to the remaining 85% of the seats 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.

(b) 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 by the Admission Board appointed by the Government of Rajasthan.

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 handicapped persons.

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 for the enrolment/eligibility along with the following original documents with the prescribed fees (upto November 30 of the year of admission without late fees and upto December 31 of the year of admission with late fees) –

(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 / Medical Council of India / 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 an application to the MGUMST for registration with the prescribed fees (upto November 30 of the year of admission without late fees upto December 31 of the year of admission with late fees).

DURATION OF COURSE:

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

PERIOD OF TRAINING:

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 Medical Council of India.

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 Medical Council of India 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 each course is compulsory. Any one failing to achieve this, shall not be 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 Medical Council of India 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 recognition by 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 reason or 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 MCI 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 Medical Council of India.

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.

ii. Out of these, one shall be of Basic Sciences and one shall be of Recent Advances.

iii. Each theory paper examination shall be of three hours duration.

iv. Each theory paper shall carry maximum 100 marks.

v. The question papers shall be set by the External Examiners.

vi. There will be a set pattern of question papers.
Every question paper shall contain three questions. All the questions shall be compulsory, 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 required to be answered in detail.
Question No. 3 shall be of five short notes carrying 10 marks each.

vii. 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.

viii. 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 can apply for scrutiny of the answer books as per University Rules.

GUIDELINES FOR COMPETENCY BASED POSTGRADUATE TRAINING PROGRAMME FOR MS IN ORTHOPAEDICS (9230)

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.

A postgraduate undergoing training MS in Orthopaedics should be trained to identify and recognize various congenital, developmental, inflammatory, infective, traumatic, metabolic, neuromuscular, degenerative and oncologic disorders of the musculoskeletal systems. She/he should be able to provide competent professional services to trauma and orthopaedic patients at a primary/ secondary/tertiary healthcare centres.

The purpose of this document is to provide teachers and learners illustrative guidelines to achieve defined outcomes through learning and assessment. This document was prepared by various subject-content specialists. The Reconciliation Board of Academic Committee has attempted to render uniformity without compromise to 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

This will be dealt with under the following headings:

- Theoretical knowledge (Cognitive domain)
- Practical and clinical skills (psychomotor domain)
- Attitudes including communication skills (Affective domain)
- Writing thesis / Reviewing Research activities (Scholarly activity)
- Training in Research Methodology (Practice based learning, Evidence based practice)
- Professionalism
- Teaching skills

SUBJECT SPECIFIC COMPETENCIES

A. Cognitive domain

At the end of the M.S. Orthopaedics programme, the post graduate student should be able to:

- Demonstrate sufficient understanding of the basic sciences relevant to orthopaedic speciality through a problem based approach.
- Describe the Principles of injury, its mechanism and mode, its clinical presentation, plan and interpret the appropriate investigations, and institute the management of musculoskeletally injured patient.
- Identify and describe the surface anatomy and relationships within of the various bones, joints, ligaments, major arteries, veins and nerves of the musculoskeletal system of the spine, upper limb, lower limb and the pelvis, chest, abdomen and head & neck.
- Define and describe the pathophysiology of shock (circulatory failure).
- Define and describe the pathophysiology of Respiratory failure
- Describe the principles and stages of bone and soft tissue healing
- Understand and describe the metabolic, nutritional, endocrine, social impacts of trauma and critical illness.

- Enumerate, classify and describe the various bony/soft tissue injuries affecting the axial and appendicular skeletal system in adults and children.
- Describe the principles of internal and external fixation for stabilization of bone and joint injuries.
- Describe the mechanism of homeostasis, fibrinolysis and methods to control haemorrhage
- Describe the physiological coagulation cascade and its abnormalities
- Describe the pharmacokinetics and dynamics of drug metabolism and excretion of analgesics, anti inflammatory, antibiotics, disease modifying agents and chemotherapeutic agents.
- Understanding of biostatistics and research methodology
- Describe the clinical presentation, plan and interpret investigations, institute management and prevention of the following disease conditions
    - Nutritional deficiency diseases affecting the bones and joints
    - Deposition arthropathies
    - Endocrine abnormalities of the musculoskeletal system
    - Metabolic abnormalities of the musculoskeletal system
    - Congenital anomalies of the musculoskeletal system
    - Developmental skeletal disorder of the musculoskeletal system
- Describe the pathogenesis, clinical features plan and interpret investigations and institute the management in adults and children in -
    - Tubercular infections of bone and joints (musculoskeletal system)
    - Pyogenic infections of musculoskeletal system
    - Mycotic infections of musculoskeletal system
    - Autoimmune disorders of the musculoskeletal system
    - Rheumatoid arthropathy, Ankylosing spondylitis, seronegative arthropathy
    - Osteoarthrosis and spondylosis
- Describe the pathogenesis, clinical presentation, plan and interpret investigations and institute appropriate treatment in the following conditions:
    - Post polio residual paralysis
    - Cerebral palsy
    - Muscular dystrophies and myopathies
    - Nerve Injuries
    - Entrapment neuropathies
- Identify the diagnosis and describe management of musculoskeletal manifestation of AIDS and HIV infection
- Describe the aetiopathogenesis, identify, plan and interpret investigation and institute the management of osteonecrosis of bones.
- Identify situations requiring rehabilitation services and prescribe suitable orthotic and prosthetic appliances and act as a member of the team providing rehabilitation care
- Identify a problem, prepare a research protocol, conduct a study, record observations, analyse data, interpret the results, discuss and disseminate the findings.
- Identify and manage emergency situation in disorders of musculoskeletal system
- Understanding of the basics of diagnostic imaging in orthopaedics like:
    - Plain x-ray
    - Ultrasonography
    - Computerised axial tomography
    - Magnetic resonance imaging
    - PET scan
    - Radio Isotope bone scan

- Digital Subtraction Angiography (DSA)
- Dual energy x-ray Absorptiometry
- Arthrography

- Describe the aetiopathogenesis, clinical presentation, Identification, Plan investigation and institute treatment for oncologic problems of musculoskeletal system both benign and malignancies, primary and secondary.
- Understand the basics, principles of biomaterials and orthopaedic metallurgy
- Describe the principles of normal and abnormal gait and understand the biomedical principles of posture and replacement surgeries.
- Describe social, economic, environmental, biological and emotional determinants of health in a given patient with a musculoskeletal problem.

B. Affective Domain:

- Should be able to function as a part of a team, develop an attitude of cooperation with colleagues, and interact with the patient and the clinician or other colleagues to provide the best possible diagnosis or opinion.
- Always adopt ethical principles and maintain proper etiquette in dealings with patients, relatives and other health personnel and to respect the rights of the patient including the right to information and second opinion.
- Develop communication skills to word reports and professional opinion as well as to interact with patients, relatives, peers and paramedical staff, and for effective teaching.

Attitudes including Communication skills and Professionalism

- **Communication skills:**
  - Exhibits participation in honest, accurate health related information sharing in a sensitive and suitable manner
  - Recognizes that being a good communicator is essential to practice effectively
  - Exhibits effective and sensitive listening skills
  - Recognises the importance and timing of breaking bad news and knows how to communicate
  - Exhibits participation in discussion of emotional issues
  - Exhibits leadership in handling complex and advanced communication
  - Recognizes the importance of patient confidentiality and the conflict between confidentiality and disclosure
  - Able to establish rapport in therapeutic bonding with patients, relatives and other stakeholders through appropriate communication
  - Able to obtain comprehensive and relevant history from patients/relatives
  - Able to counsel patients on their condition and needs
- **Teamwork**: Seek cooperation. Coordination and communication among treating **specialties and paramedical staff**
- **Counseling of relatives: regarding patients condition, seriousness, bereavement and** counseling for organ donation in case of brain stem death
- **Leadership**: Trauma prevention, education of the public, paramedical and medical persons.
  - **Advocacy**: with the government and other agencies towards cause of trauma care
- **Ethics**: The Code of Medical Ethics as proposed by Medical Council of India will be learnt and observed.

C. Psychomotor domain

- At the end of the first year of M.S. Orthopaedics programme, the student should be able to:
  - Elicit a clinical history from a patient, do a physical examination, document in a case record, order appropriate investigations and make a clinical diagnosis
  - Impart wound care where applicable
  - Apply all types of POP casts/slabs, splints and tractions as per need
  - Identify shock and provide resuscitation
  - Perform aspiration of joints and local infiltration of appropriate drugs
  - Perform appropriate wound debridement
  - Perform arthrotomy of knee joint
  - Perform incision and drainage of abscess
  - Perform split thickness skin grafting
  - Perform fasciotomes
  - Apply external fixators
  - Apply skeletal tractions including skull tongs
  - Triage a disaster situation and multiple trauma patients in an emergency room
  - Perform on bone models, interfragmentary compression screws, external fixation, Tension band wiring and Broad plating
  - Perform closed reduction of common dislocations like shoulder and common fractures like collar fracture, supracondylar fracture.
  - Perform on a cadaver standard surgical approaches to the musculo skeletal system

- At the end of the second year of M.S. Orthopaedics course, the student should be able to:
  - Take an informed consent for standard orthopaedic procedures
  - Perform closed/open biopsies for lesions of bone, joints and soft tissues
  - Perform split thickness skin grafting and local flaps
  - Perform on bone models, internal fixation with k-wires, screws, plates. Dynamic hip/condylar screws/nailing.
  - Perform sequestrectomy and saucerisation
  - Perform arthrotomy of joints like hip/shoulder, ankle, elbow
  - Perform repair of open hand injuries including tendon repair
  - Perform arthodesis of small joints
  - Perform diagnostic arthroscopy on models and their patients
  - Perform carpal tunnel/tarsal tunnel release
  - Apply ilizarov external fixator
  - Perform soft tissue releases in contractures, tendon lengthening and correction of deformities
  - Perform amputations at different levels
  - Perform corrective surgeries for CTEV, DDH, perthes/ skeletal dysplasia

- At the end of the third year of M.S. Orthopaedics programme, the student should be able to:
  - Assist in the surgical management of polytrauma patient
  - Assist in Arthroplasty surgeries of hip, knee, shoulder and the ankle
  - Assist in spinal decompressions and spinal stabilizations
  - Assist in operative arthroscopy of various joints
  - Assist /perform arthrodesis of major joints like hip, knee, shoulder, elbow
  - Assist in corrective osteotomes around the hip, pelvis, knee, elbow, finger and toes

- Assist in surgical operations on benign and malignant musculoskeletal tumour including radical excision and custom prosthesis replacement.
- Assist in open reduction and internal fixations of complex fractures of acetabular, pelvis, IPSI lateral floating knee/elbow injuries, shoulder girdle and hand
- Assist in spinal deformity corrections
- Independently perform closed/open reduction and internal fixation with DCP, LCP, intrameduallary nailing, LRS
- Assist in limb lengthening procedures
- Assist in Revision surgeries
- Provide pre and post OP care
- Perform all clinical skills as related to the speciality.

SYLLABUS

Course contents:

- **Basic Sciences**
  - Anatomy and function of joints
  - Bone structure and function
  - Growth factors and facture healing
  - Cartilage structure and function
  - Structure and function of muscles and tendons
  - Tendon structure and function
  - Metallurgy in Orthopaedics
  - Stem Cells in Orthopaedic Surgery
  - Gene Therapy in Orthopaedics

- **Diagnostic Imaging in Orthopaedics**
  (Should know the interpretation and Clinical Correlation of the following): -
  - Digital Subtraction Angiography (DSA)
  - MRI and CT in Orthopaedics
  - Musculoskeletal USG
  - PET Scan
  - Radio-isotope bone scan

- **Metabolic Bone Diseases**
  - Rickets and Osteomalacia
  - Osteoporosis
  - Scurvy
  - Mucopolysaccharoidoses
  - Fluorosis
  - Osteopetrosis

- **Endocrine Disorders**
  - Hyperparathyroidism
  - Gigantism, Acromegaly

- **Bone and Joint Infections**
  - Pyogenic Haematogenous Osteomyelitis - Acute and Chronic
  - Septic arthritis
  - Fungal infections

- Miscellaneous infections
- Gonococcal arthritis
- Bone and joint brucellosis
- AIDS and the Orthopaedic Surgeon (universal precautions)
- Musculoskeletal Manifestations of AIDS
- Pott's spine
- Tubercular synovitis and arthritis of all major joints

- **Poliomyelitis**
  - General considerations
  - Polio Lower limb and spine
  - Management of Post Polio Residual Palsy (PPRP)

- **Orthopaedic Neurology**
  - Cerebral Palsy
  - Myopathies

- **Peripheral Nerve Injuries**
  - Traumatic
  - Entrapment Neuropathies

- **Diseases of Joints**
  - Osteoarthrosis
  - Calcium Pyrophosphate Dihydrate (CPPD), Gout
  - Collagen diseases

- **Systemic Complications in Orthopaedics**
  - Shock
  - Crush syndrome
  - Disseminated Intravascular Coagulation (DIC)
  - Acute Respiratory Distress Syndrome (ARDS)

- **Bone Tumors**
  - Benign bone tumors
  - Malignant bone tumors
  - Tumor like conditions
  - Metastatic bone Tumors

- **Miscellaneous Diseases**
  - Diseases of muscles
  - Fibrous Dysplasia
  - Unclassified diseases of bone
  - Paget's disease
  - Peripheral vascular disease
  - Orthopaedic manifestations of bleeding disorders

- **Regional Orthopaedic Conditions of Adults and Children**
  - The spine
  - The shoulder
  - The elbow
  - The hand
  - The wrist

- The hip
- The knee
- The foot and ankle
- The pelvis

- **Biomaterials**
  - Orthopaedic metallurgy
  - Bio-degradable implants in Orthopaedics
  - Bone substitutes
  - Bone Banking

- **Fracture and Fracture-Dislocations**
  General considerations
  - Definitions, types, grades, patterns and complications
  - Pathology of fractures and fracture healing
  - Clinical and Radiological features of fractures and dislocations
  - General principles of fracture treatment
  - Recent advances in internal fixation of fractures
  - Locking plate osteosyntheses
  - Less Invasive Stabilisation System (LISS)
  - Ilizarov technique
  - Bone grafting and bone graft substitutes
  - Open fractures and soft tissue coverage in the lower extremity
  - Compartment syndrome
  - Fractures of the upper extremity and shoulder girdle
  - Fractures of the lower extremity
  - Fractures of the hip and pelvis
  - Malunited fractures
  - Delayed union and non union of fractures
  - Fractures/dislocations and fracture - dislocations of spine

- **Dislocations and Subluxations**
  - Acute dislocations
  - Old unreduced dislocations
  - Recurrent dislocations

- **Traumatic Disorders of Joints (Sports Injuries)**
  - Ankle injuries
  - Knee injuries
  - Shoulder and elbow injuries
  - Wrist and hand injuries

- **Arthrodesis**
  - Arthrodesis of lower extremity and hip
  - Arthrodesis of upper extremity
  - Arthrodesis of spine

- **Arthroplasty**
  - Biomechanics of joints and replacement of the following joints.
  - Knee
  - Ankle

- Shoulder
- Elbow

- **Minimally Invasive Surgery (MIS)**
  Arthroscopy
  - General principles of Arthroscopy
  - Arthroscopy of knee and ankle
  - Arthroscopy of shoulder and elbow

- **Amputations and Disarticulations**
  - Amputations and disarticulations in the lower limb
  - Amputations and disarticulations in the upper limb

- **Rehabilitation - Prosthetics and Orthotics**

- **Pediatric orthopaedics**:
  - Fractures and dislocations in children
  - Perthes' disease
  - Slipped capital femoral epiphysis
  - Congenital Dislocation of Hip (CDH)
  - Neuromuscular disorders

- **Spine**
  - **Spinal trauma**: diagnosis and management including various types of fixations
    - Rehabilitation of paraplegics/quadriplegics
    - Management of a paralyzed bladder
    - Prevention of bed sores and management of established bed sores
    - Exercise programme and Activities of Daily Living (ADL)
    - Psychosexual counseling
  - **Degenerative disorders of the spine**
    - Prolapsed Inter Vertebral Disc (PIVD)
    - Lumbar Canal Stenosis (LCS)
    - Spondylolysis/Spondylolisthesis
    - Lumbar Spondylosis
    - Ankylosing Spondylitis
    - Spinal fusion: various types and their indications.

- **Triage, Disaster Management, BTLS and ATLS**

- **Recent advances in orthopaedics**
  - Autologous chondrocyte implantation
  - Mosaicplasty
  - Video assisted Thoracoscopy (VATS)
  - Endoscopic spine surgery
  - Metal on metal arthroplasty of hip
  - Surface replacements of joints
  - Microsurgical techniques in Orthopaedics
  - Designing a modern orthopaedic operation theatre
  - Sterilization
  - Theatre Discipline
  - Laminar air flow
  - Modular OTs

TEACHING AND LEARNING METHODS

- Emphasis should be given to various small group teachings rather than didactic lectures.
- CASE PRESENTATION once a week in the ward, in the outpatient department and special clinics.
- Seminars / Symposia – Twice a month; Theme based student centered
- Journal club/ Review : Twice a month
- Academic grand ward rounds: Twice a month presentation of cases by residents and clinically applicable discussions.
- **ORTHO RADIOLOGY MEETS:** Twice a month discussions amongst Ortho & Radiology Residents under facilitation of faculty on various imaging modalities used and its interpretation
- **ORTHO SURGICAL PATHOLOGICAL MEET**: Special emphasis on the surgical pathology radiological aspect of the case in the pathology department. Clinician (Ortho resident) presenting the clinical details of the case, radiology PG student describes the Radiological findings and its interpretation and Pathology student describes the morbid anatomy and histopathology of the same case.
- **SKILLS LAB SESSIONS:** Once a fortnight for all two years.
- **Clinical teaching** in the OPD, Emergency room, ICU, OR as per the situation.
- **Mortality & Morbidity meetings with SURGICAL AUDIT:** Once a month
- Maintenance of log book: to be signed by the faculty in charge
- The post graduate students shall be required to participate in the teaching and training programme of undergraduate students and interns.
- A post graduate student of a postgraduate degree course in broad specialities/super specialities would be required to present one poster presentation, to read one paper at a national/state conference and to present one research paper which should be published/accepted for publication/sent for publication during the period of his postgraduate studies so as to make him eligible to appear at the post graduate degree examination.
- Should have attended two conferences/CMEs/Workshops during his tenure as a postgraduate
- Department should encourage e-learning activities.

Rotations

- **Clinical postings**
  A major portion of posting should be in Orthopaedics department. It should include in-patients, out-patients, ICU, trauma, emergency room and speciality clinics.
- **Rotation of posting**
  - Inter-unit rotation in the department should be done for a period of up to one year.
  - Rotation in appropriate related subspecialties for a total period not exceeding 06 months.
- **Clinical meetings:**
  There should be intra- and inter- departmental meetings for discussing the uncommon /interesting cases involving multiple departments.

- **Log book:** Each student must be asked to present a specified number of cases for clinical discussion, perform procedures/tests/operations/present seminars/review articles from various journals in inter-unit/interdepartmental teaching sessions. They should be entered in a Log Book. The Log books shall be checked and assessed periodically by the faculty members imparting the training.

During the training programme, patient safety is of paramount importance; therefore, skills are to be learnt initially on the models, later to be performed under supervision followed by performing independently; for this purpose, provision of surgical skills laboratories in medical colleges is mandatory.

ASSESSMENT

Assessment should be comprehensive and objective assessing the competencies stated in the course. The assessment is both formative and summate. Formative is spread over the entire duration of the programme and the summative is as per university examination pattern.

FORMATIVE ASSESSMENT, during the training,

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.

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 clinical examination.

Quarterly assessment during the MS training should be based on following educational activities:

- Journal based / recent advances learning
- Patient based /Laboratory or Skill based learning
- Self directed learning and teaching
- Departmental and interdepartmental learning activity
- External and Outreach Activities / CMEs

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

SUMMATIVE ASSESSMENT, at the end of the course,

Post Graduate Examination

The summative examination would be carried out as per the Rules given in **POSTGRADUATE MEDICAL EDUCATION REGULATIONS, 2000.**

The Post Graduate examination shall be in three parts: -

1. **Thesis**
   Every post graduate student shall carry out work on an assigned research project under the guidance of a recognised Post Graduate Teacher, the result of which shall be written up and submitted in the form of a Thesis. Work for writing the Thesis is aimed at contributing to the development of a spirit of enquiry, besides exposing the post graduate student to the techniques of research, critical analysis, acquaintance with the latest advances in medical science and the manner of identifying and consulting available literature.

2. **Theory**:
   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. The examination for M.D./ MS shall be held at the end of 3rd academic year. An academic term shall mean six month's training period**.**

   There shall be four theory papers as follows:
   Paper I: Basic Sciences as applied to Orthopaedics
   Paper II: Traumatology and Rehabilitation
   Paper III: Orthopaedic diseases
   Paper IV: Recent advances in Orthopaedic surgery + General Surgery as applied to Orthopaedics

3. **Practical/Clinical**: The practical examination should consist of the following and should be spread over two days, if the number of post graduate students appearing is more than five.
   i. One long case: History taking, physical examination, interpretation of clinical findings, differential diagnosis, investigations, prognosis and management.
   ii. Short cases from various sections of the speciality (three)

4. **Oral/Viva-voce Examination**
   - Surgical Anatomy including Osteology
   - Instruments
   - Radiology
   - Surgical Pathology
   - Orthotics and prosthetics

Recommended Reading:

Books (latest edition)

- Campbell's Operative Orthopaedics, Vols 1,2,3 & 4
- Mercer's Orthopaedic Surgery
- Rockwood And Greens – Fractures In Adults, Vol 1& 2
- Fractures In Children – Rockwood & Wilkins
- Physiological Basis Of Medical Practice – Best And Taylor's
- Arthroscopic Surgery Of The Knee – Johannes
- PaediatricOrthopaedics – Tachidjian, Vol 4
- Concise System Of Orthopaedics And Fractures – Graham Apley
- Orthopaedics And Traumatology – Natarajan
- Outline Of Fractures Adams, Hamblen
- Textbook Of Orthopaedics And Trauma – Kulkarni, Vol 1

- B.D. Chaurasia's Human Anatomy, Vol1,Vol 2, Vol 3
- Pharmacology And Pharmacotherapeutics – Satoskar
- Orthopaedics Anatomy And Surgical Approaches Frederick Wreckling
- The Art Of Aesthetic Plastic Surgery – John R Levis, Vol 1
- Current Concepts In Orthopaedics Dr. D. K. Tareja
- Custom Mega Prosthesis & Limb Salvage Surgery Dr. Mayilvahanan
- Advances In Operative Orthopaedics
- Green's Operative Hand Surgery-Vol. 1&. 2, Green, David P; Hotchkiss, Robert N
- Tachdjian's Pediatric Orthopaedics-Vol. 1, Vol 2, Vol 3, Herring, John Anthony
- Surgical Exposures In Orthopedics:The Anatomic Approach, Hoppenfeld, Stanley; De Boer,Piet
- Adams's Outline Of Orthopaedics, Hamblen, David L; Simpson, Hamish R
- Text Book Of Ilizarov Surgical Techniques Bone Correction And Lengthening, Golyakhovsky, Vladimir; Frankel, Victor H
- Current Techniques In Total Knee Arthroplasty, Sawhney G S
- Applied Orthopaedic Biomechanics, Dutta, Santosh; Datta,Debasis
- Essential Orthopaedics And Trauma, Dandy, David J; Edwards, Dennis J
- Adams's Outlines Of Fractures;Including Joint Injuries, Hamblen, David L; Simpson, A Hamish R W
- Orthopedic Physical Assessment, Magee, David J
- Turek's Textbook Of Orthopaedics Vol 1 & 2, Turek's
- Orthoapedics Surgical Approach, Miller

Journals

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

Annexure - I

Postgraduate Students Appraisal Form
Pre / Para /Clinical Disciplines

Name of the Department/Unit :

Name of the PG Student :

Period of Training: **FROM.....TO.....**

Sr. No.	Particulars	Not satisfactory	Satisfactory	More Than Satisfactory	Remarks
		1 2 3	4 5 6	7 8 9	
1.	Journal based/recent advances learning				
2.	Patient based/Laboratory or Skill based learning				
3.	Self directed learning and teaching				
4.	Departmental and interdepartmental learning activity				
5.	External and Outreach Activities/CMEs				
6.	Thesis/Research work				
7.	Log Book Maintenance				

Publications Yes/ No

Remarks*_____
_____
_____
_____

*REMARKS: Any significant positive or negative attributes of a postgraduate student to be mentioned. For score less than 4 in any category, remediation must be suggested. Individual feedback to postgraduate student is strongly recommended.

SIGNATURE OF ASSESSEE | SIGNATURE OF CONSULTANT | SIGNATURE OF HOD

MODEL PAPER

MS-9231 **Ortho.-I**

MS Examination Month, Year

ORTHOPAEDICS

Paper- I

Basic Science as applied to Orthopaeedics

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 anatomy of elbow joint and management of terrible triad of elbow in a young patient of 30 years. 20

Q.2 Write notes on : 2x15=30

a) Clinical features and management of patients of 60 years with lumbar canal stenosis.
b) Clinical features of Hallux valgus and management of Hallux rigidus in a patient more than 60 years of age.

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

a) Write about PTH and its role in calcium homeostasis.
b) Write about anatomy of brachial plexus and surgical management of ulnar nerve palsy.
c) Write about role of MRI in orthopaedics.
d) Write about principle of bone harvesting for bone bank and management of bone bank.
e) What is crush syndrome ? Write about Management of crush syndrome.

MODEL PAPER

MS-9232 **Ortho.-II**

MS Examination Month, Year

ORTHOPAEDICS

Paper- II

Traumatology and Rehabilitation

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 Aetiopathology, classofocatopms, management of fracture upper end humerus in adults. 20

Q.2 Write notes on : 2x15=30

a) Fracture lateral condyle humerus in paediatric age group patient.
b) Fracture lower end tibia in adolescent age group of patient.

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

a) Diagnosis, management of radial nerve palsy above elbow.
b) Principles of intramedullary fixation of long bone fracture.
c) Acromio- Clavicular joint dislocation, diagnosis & management
d) Post traumatic mallet finger.
e) Classification of fracture felvis

MODEL PAPER

MS-9233 **Ortho.-III**

MS Examination Month, Year

ORTHOPAEDICS

Paper- III

Orthopaedics Diseases

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 Write about etiology, pathology types, differential diagnosis and management of osteosarcoma. 20

Q.2 Write notes on : 2x15=30

a) Write about types of crystal deposits, mechanism of uric acid synthesis and management of Gout.
b) What is developmental dysplasia of hip ? Write about conservative management of DDH for child up to 3 years.

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

a) Congenital Scoliosis
b) Idiopathic clubfoot and ponseti method
c) Teriparatide in osteoporosis.
d) Acute septic arthritis of hop in young adult.
e) Use of PRP in orthopaedics

MODEL PAPER

MS-9234 **Ortho.-IV**

MS Examination Month, Year

ORTHOPAEDICS

Paper- IV

Recent advances in Orthopaedics surgery + General surgery as applied to orthopaedics

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 Discuss the recent Classification of fracture of calcaneum and its current management. 20

Q.2 Write notes on : 2x15=30

a) Floating knee injuries.
b) Recent advances in bearings of total knee replacement.

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

a) Mangled extermity severity score (MESS)
b) Cubitus Varus
c) TEN Nail.
d) Lisfranc fracture.
e) Congenital Vertical talus