

Notice

1. Amendment made by the NMC 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
(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 Management quota) shall be eligible for admission to MD/MS courses, if he or she has not qualified NEET PG (MD/MS) conducted by National Board of Examinations or any other Authority appointed by the Government of India for the purpose.

(1) General Seats

- (a) Every student, selected for admission to postgraduate medical course shall possess recognized MBBS degree or equivalent qualification and should have obtained permanent Registration with the NMC, or any of the State Medical Councils or should obtain the same within one month from the date of his/her admission, failing which the admission of the candidate shall be cancelled;
- (b) Completed satisfactorily one year's rotatory internship or would be completing the same before the date announced by the University for that specific year as per NMC rules after passing 3rd professional MBBS Part II Examination satisfactorily.

CRITERIA FOR SELECTION FOR ADMISSION:

1. Out of total seats available for admission to the postgraduate courses 50% seats shall be earmarked for All India Quota and 50% shall be state Quota seats.
2. Out of total seats available for admission to the postgraduate courses 15% shall be management Quota seats. These seats shall be part of All India Quota seats.
3. Remaining 35% seats shall be of All India Quota nature.
4. Preference shall be given to state domicile candidates on all categories of seats.
5. Reservation shall be applicable on all category of seats as per the state government policy.

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

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

COUNSELING/INTERVIEW:

- (1) Candidates in order of merit will be called for Counseling/Interview and for verification of original documents and identity by personal appearance.
- (2) Counseling will be performed and the placement will be done on merit-cum-choice basis after application of roster by the Admission Board.

(3) RESERVATION:

Reservation shall be applicable as per policy of the State Government in terms of scheduled caste, scheduled tribe, back ward class, special back ward class, women and person with disability & EWS

ELIGIBILITY AND ENROLMENT:

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

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

- (a) MBBS pass Marks sheet/Degree certificate issued by the University (1st MBBS to Final MBBS)
- (b) Certificate regarding the recognition of medical college by the Medical Council of India.
- (c) Completion of the Rotatory Internship certificate from a recognized college.
- (d) Migration certificate issued by the concerned University.
- (e) Date of Birth Certificate
- (f) Certificate regarding registration with Rajasthan Medical Council / NMC/ Other State Medical Council.

REGISTRATION

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

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

DURATION OF COURSE:

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

PERIOD OF TRAINING:

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

MIGRATION:

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

METHODS OF TRAINING FOR MD/MS:

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

ONLINE COURSE IN RESEARCH METHODS

- i. All postgraduate students shall complete an online course in Research Methods to be conducted by an Institute(s) that may be designated by the NMC by way of public notice, including on its website and by Circular to all Medical Colleges. The students shall have to register on the portal of the designated institution or any other institute as indicated in the public notice.
- ii. The students have to complete the course by the end of their 2nd semester.
- iii. The online certificate generated on successful completion of the course and examination there after, 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 the subject 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 NMC and/ or the Board of Management of the University, tests shall include written papers, practical/clinical and viva voce.

(4) Records:

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

THESIS:

- (1) Every candidate pursuing MD/MS degree course is required to carry out work on research project under the guidance of a recognized post graduate teacher. Then such a work shall be submitted in the form of a Thesis.
- (2) The Thesis is aimed to train a postgraduate student in research methods & techniques.
- (3) It includes identification of a problem, formulation of a hypothesis, designing of a study, getting acquainted with recent advances, review of literature, collection of data, critical analysis, comparison of results and drawing conclusions.
- (4) Every candidate shall submit to the Registrar of the University in the prescribed format a Plan of Thesis containing particulars of proposed Thesis work within six months of the date of commencement of the course on or before the dates notified by the University.
- (5) The Plan of Thesis shall be sent through proper channel.
- (6) Thesis topic and plan shall be approved by the Institutional Ethics Committee before sending the same to the University for registration.
- (7) Synopsis will be reviewed and the Thesis topic will be registered by the University.
- (8) No change in the thesis topic or guide shall be made without prior notice and permission from the University.
- (9) The Guide, Head of the Department and head of the institution shall certify the thesis. Three printed copies and one soft copy of the thesis thus prepared shall be submitted by the candidate to the Principal. While retaining the soft copy in his office, the Principal shall send the three printed copies of the thesis to the Registrar six months before MD/MS University Examinations. Examiners appointed by the University shall evaluate the thesis. Approval of Thesis at least by two examiners is an essential pre-condition for a candidate to appear in the University Examination.
- (10) Guide: The academic qualification and teaching experience required for 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. (asper NMC rules)
- (2) Progress and Conduct: Every candidate shall have participated in seminars, journal review meetings, symposia, conferences, case presentations, clinics and didactic lectures during each year as designed by the department.
- (3) Work diary and Logbook: Every candidate shall maintain a work diary for recording his/her participation in the training program conducted in the department. The work diary and logbook shall be verified and certified by the Department Head and Head of the Institution.
- (4) Every student would be required to present one poster presentation, to read one paper at a National/State Conference and to have one research paper which should be published/accepted for publication/ sent for publication to an indexed journal during the period of his/her post graduate studies so as to make him/her eligible to appear at the Post Graduate Degree Examination.
- (5) Every student would be required to appear in and qualify the Pre-University Post graduate degree Mock examination. Post graduate students who fail to appear in or do not qualify the Pre-University Post graduate degree Mock examination shall not be permitted to appear in the final examination of the University.

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

ASSESSMENT:

- (1) The progress of work of the candidates shall be assessed periodically by the respective guides and report submitted to the Head of the Institution through the Head of the Department at the end of every six months. The assessment report may also be conveyed in writing to the candidate who may also be advised of his/her shortcomings, if any.
- (2) In case the report indicate that a candidate is incapable of continuing to do the work of the desired standard and complete it within the prescribed period, the Head of the Institution may recommend cancellation of his/her registration at any time to the University.
 - (3) Formative Assessment:
 - (a) General Principles
 - i. The assessment is valid, objective, constructive and reliable.
 - ii. It covers cognitive, psychomotor and affective domains.
 - iii. Formative, continuing and summative (final) assessment is also conducted.
 - iv. Thesis is also assessed separately.
 - (b) Internal Assessment
 - i. The internal assessment is continuous as well as periodical. The former is based on the feedback from the senior residents and the consultants concerned. Assessment is held periodically.
 - ii. Internal assessment will not count towards pass/fail at the end of the program, but will provide feedback to the candidate.
 - iii. The performance of the Postgraduate student during the training period should be monitored throughout the course and duly recorded in the log books as evidence of the ability and daily work of the student.
 - iv. Marks should be allotted out of 100 as under
 - 1) Personal Attributes - 20 marks
 - a. Behavior and Emotional Stability: Dependable, disciplined, dedicated, stable in emergency situations, shows positive approach.
 - b. Motivation and Initiative: Takes on responsibility, innovative, enterprising, does not shirk duties or leave any work pending.
 - c. Honesty and Integrity: Truthful, admits mistakes, does not cook up information, has ethical conduct, exhibits good moral values, loyal to the institution.

- 2) Clinical Work - 20 marks
 - a Availability: Punctual, available continuously on duty, responds promptly on calls and takes proper permission for leave.
 - b Diligence: Dedicated, hardworking, does not shirk duties, leaves no work pending, does not sit idle, competent in clinical case work up and management.
 - c Academic Ability: Intelligent, shows sound knowledge and skills, participates adequately in academic activities and performs well in oral presentation and departmental tests.
 - d Clinical Performance: Proficient in clinical presentations and case discussion during rounds and OPD work up. Preparing Documents of the case history/examination and progress notes in the file (daily notes, round discussion, investigations and management) Skill of performing bed side procedures and handling emergencies.
- 3) Academic Activities - 20 marks
Performance during presentation at Journal club/ Seminar/Case discussion/Stat meeting and other academic sessions. Proficiency in skills as mentioned in job responsibilities.
- 4) End of term theory examination - 20 marks
End of term theory examination conducted at end of 1st, 2nd year and after 2 years 9 months.
- 5) End of term practical examination - 20 marks
 - a. End of term practical/oral examinations after 2 years 9 months.
 - b. Marks for personal attributes and clinical work should be given annually by all the consultants under whom the resident was posted during the year. Average of the three years should be put as the final marks out of 20.
 - c. Marks for academic activity should be given by the all consultants who have attended the session presented by the resident.
 - d. The Internal assessment should be presented to the Board of examiners for due consideration at the time of Final Examinations.
 - e. Yearly (end of 1st, 2nd & 3rd year) theory and practical examination will be conducted by internal examiners and each candidate will enter details of theory paper, cases allotted (2 long & 2 short) and viva.
 - f. Log book to be brought at the time of final practical examination.

APPOINTMENT OF EXAMINERS:

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

SCHEME OF EXAMINATION:

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

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

- submit the Thesis afresh, even if he/she fails in theory and/or practical of the examination of the same branch.
- vi. In case the Thesis submitted by a candidate is rejected, he/she should be required to submit a fresh Thesis.
- (b) Theory papers:
- i. There shall be four theory papers, as below:
Paper I: Basic sciences as applied to the subject
Paper II: Traumatology and Rehabilitation
Paper III: Orthopaedic diseases
Paper IV: Recent advances in Orthopaedic surgery & General Surgery as applied to Orthopaedics
 - ii. Each theory paper examination shall be of three hours duration.
 - iii. Each theory paper shall carry maximum 100 marks.
 - iv. The question papers shall be set by the External Examiners.
 - v. There will be a set pattern of question papers.
Every question paper shall contain three questions. All the questions shall 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.
 - vi. The answer books of theory paper examination shall be evaluated by two External and two internal examiners. Out of the four paper setters, the two paper setters will be given answer books pertaining to their papers and the answer books of the remaining two papers will be evaluated by two Internal Examiners. It will be decided by the President as to which paper is to be assigned to which Internal Examiner for evaluation.
 - vii. A candidate will be required to pass theory and practical examinations separately in terms of the governing provisions pertaining to the scheme of examination in the post graduate regulations. The examinee should obtain minimum 40% marks in each theory paper and not less than 50% marks cumulatively in all the four papers for degree examination to be cleared as “passed” at the said Degree examination.
- (c) Clinical/ Practical & Oral examinations:
- i. Clinical/Practical and Oral Examination of 400 marks will be conducted by at least four examiners, out of which two (50%) shall be External Examiners.
 - ii. A candidate will be required to secure at least 50% (viz. 200/400) marks in the Practical including clinical and viva voce examinations.
- (6) If a candidate fails in one or more theory paper(s) or practical, he/she shall have to reappear in the whole examination i.e. in all theory papers as well as practical.

GRACE MARKS

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

REVALUATION / SCRUTINY:

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

GUIDELINES FOR COMPETENCY BASED POSTGRADUATE TRAINING PROGRAMME FOR MS IN ORTHOPAEDICS

Preamble

Competency based training programme in Orthopaedics aims to create postgraduate student who, after undergoing the requisite training, should be able to serve the needs of the community and should be competent to solve the problems pertaining to the speciality of Orthopaedics and Trauma.

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 system. She/he should be able to provide competent professional services to trauma and orthopaedic patients at a primary/ secondary/tertiary healthcare centres. The PG should acquire knowledge, skill and attitude to provide healthcare and education to the patients and students.

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 subject-content specialists. The Expert Group of the NMC 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.

In order to achieve sustainable outcomes, certain competencies are essential to be achieved and assessed that will enable the qualified professional to perform the role in practice as an orthopaedic specialist. These roles would be to perform as a:

1. Clinical Expert
2. Professional
3. Scholar
4. Team Member

SUBJECT SPECIFIC OBJECTIVES

The goal of M.S. Orthopaedics is to produce a competent doctor who:

1. Is aware of contemporary advances & developments in medical sciences as related to Orthopaedics and Trauma.
2. Has acquired the competencies pertaining to the subject that are required to be practiced in the community and at all levels of health system.
3. Recognizes the health needs of the patient and family and carries out professional obligations in keeping with principles of the National Health Policy and professional ethics.
4. Is oriented to principles of research methodology.
5. Has acquired skills in educating medical and paramedical professionals.
6. Has acquired skills in effectively communicating with the person, family and the community.

There is need of competency based learning. Core competencies are the essential knowledge, values and skills vital to the successful performance of effective practice of Orthopaedic and Trauma care on patients. Competence-based training is distinctly different from traditional teaching process. Competence-based training focuses on learning by doing.

Competence in medicine has been defined as “the habitual and judicious use of communication, knowledge, technical skills, clinical reasoning, emotions, values, and reflection in daily practice for the benefit of the individuals and communities being served”. Competence is not an achievement but rather a habit of lifelong learning.

Ideally, the assessment of competence (what the student or physician is able to do) should provide insight into actual performance (what he or she does habitually when not observed), as a well as the capacity to adapt to change, find and generate new knowledge, and improve overall performance. The specific learning objectives based on core competence are common to all specialities. As an example of designing learning objectives in the seven domains of core competence are described below:

1. Professionalism
2. Patient care
3. Medical Knowledge
4. Practice-based learning and improvement
5. Interpersonal and Communication skills
6. Systems-based practice

7. Academic skills

The **Goal** of the MS Orthopedics course is to train a doctor to become a competent teacher, surgeon and researcher in who has acquired competence / skills as given below:

1. Professionalism

- 1.1 Accepts personal responsibility for care of one's patients, consistent with good work ethics and empathy.
- 1.2 Demonstrates appropriate truthfulness and honesty with colleagues.
- 1.3 Recognizes personal beliefs, prejudices, and limitations. His / her personal beliefs and prejudices should not come in the way of providing service.
- 1.5 Respects patient confidentiality at all times in verbal and written communication with others.

2. Patient Care

2.1 History of and physical examination

- 2.1.1 Demonstrates ability to obtain a comprehensive and focused history of illness from patient/relatives.
- 2.1.2 Demonstrates ability to perform a comprehensive and problem-focused physical examination of the concerned human organ.

2.2 Information Management

- 2.2.1 Demonstrates mastery of the traditional organization of medical data in oral and written presentations.
- 2.2.2 Demonstrates use and interpretation of diagnostic procedures and data.
- 2.2.3 Demonstrate ability to use information to produce evidence for the diagnosis and treatment of relevant disease condition/s.

2.3 Procedural

- 2.3.1 Demonstrates mastery of adequate medical record keeping.
- 2.3.2 Demonstrates knowledge of accessing data and information systems.
- 2.3.3 Demonstrates the ability to perform a specific set of procedures identified by the faculty.

3. Medical Knowledge

3.1 Core Discipline

- 3.1.1 Competencies unique to the discipline,
- 3.1.2 Competencies derived from the clinical, pre-clinical and para-clinical disciplines.

3.2 Problem Solving

- 3.2.1 Demonstrates the ability to identify and find information relevant to a clinical problem,

using consultation, texts, and the archival literature and electronic media.

- 3.2.2 Demonstrates the ability to generate an initial list of differential diagnoses given a specific chief complaint and patient characteristics.
- 3.2.3 Demonstrates the ability to re-rank the differential diagnoses based on information gathered from the history, physical, and auxiliary studies (investigations).
- 3.2.4 Demonstrates the ability to explain a mechanism for each aspect of a patient's problem, including biological, behavioural, and social aspects.
- 3.2.5 Demonstrates the ability to evaluate scientific / clinical information and critically analyze conflicting data and hypotheses.
- 3.2.6 Demonstrates an ability to counsel a patient providing an option of treatment, conservative or operative.

4. Practice-Based Learning and Improvement

4.1 Physician Scholar

- 4.1.1 Demonstrates the ability to analyze the quality and implications of medical literature and apply new knowledge in the delivery of health care.
- 4.1.2 Demonstrates an interest and ability to identify future areas of inquiry in medical research.
- 4.1.3 Demonstrates enthusiasm and positive attitude in the educational process and participates fully in educational activities.

5. Interpersonal and Communication Skills

5.1 Human Relationships

- 5.1.1 Demonstrates knowledge of or appropriate inquiry about family and support systems.
- 5.1.2 Demonstrates an effective system for identifying and addressing ethical, cultural, and spiritual issues associated with health care delivery.
- 5.1.3 Demonstrates knowledge or applies an understanding of psychological, social, and economic factors which are pertinent to the delivery of health care.
- 5.1.4 Accurately assesses a patient's expectations and assumptions in accessing the health care system.
- 5.1.5 Effectively engages the patient and / or family in verbal communications and counselling.

6. System – Based Practice

6.1 Health Care Management

- 6.1.1 Demonstrates a practical, efficient and cost effective approach to diagnosis and treatment planning and recognizes its social and economic impact.

- 6.1.2 Demonstrates the ability to engage the patient family in diagnosis and therapeutic treatment planning.
- 6.1.3 Demonstrates the ability to recognize and outline initial treatment for patient with life threatening emergencies regardless of aetiology.
- 6.1.4 Demonstrates knowledge of alternative medicine options and understands their role in health care delivery (AYUSH).

6.2 Health Service Delivery

- 6.2.1 Demonstrates knowledge of health care financing and applies it in assisting patient to access the best possible care.
- 6.2.2 Utilizes knowledge of population-based and evidence-based medicine in making patient management decisions.
- 6.2.3 Utilizes knowledge of managed care systems in making patient treatment plans and health care maintenance plans.

6.3 Health Care Team approach to health care delivery.

- 6.3.1 Demonstrates an understanding of the roles and competencies of other health care providers.
- 6.3.2 Demonstrates the ability to engage other health care professionals.
- 6.3.3 Demonstrates the ability to follow and lead in a team approach to health care delivery.

7. Academic Skills (Scholarly activity)

- 7.1** Familiarity with basic research methodology, epidemiology, basic information technology skills.
- 7.2** Planning the protocol of a thesis, its execution and final report.
- 7.3** Skills to review of relevant literature and asking relevant research question with hypothesis development.
- 7.4** Conducting clinical sessions for undergraduate medical students, nurses and paramedical workers.

SUBJECT SPECIFIC COMPETENCIES

1. Predominant in cognitive domain:

- 1.1. Describe the principles of injury and its mechanism and mode, its clinical presentation, plan appropriate investigations and interpret the results, and institute the management of musculoskeletally injured patient, different forces resulting in fractures, biomechanical principles of fracture fixation.
- 1.2. Identify and describe the surface anatomy and relationship 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. Identify structural peculiarities of specific bony components and structural speciality of clinical importance during fixation.
- 1.3. Define and describe the pathophysiology of shock (circulatory failure), types of shock and principles of management.
- 1.4. Define and describe, types of respiratory failure, the pathophysiology of respiratory failure and management.
- 1.5. Describe the principles and stages of bone and soft tissue healing, types of bone healing and different intrinsic and extrinsic factors which influence fracture healing.
- 1.6. Understand and describe the metabolic, nutritional, endocrine, and social impact of trauma, critical illness and biomechanical principles involved in each.
- 1.7. Enumerate, classify and describe the various bony/soft tissue injuries affecting the axial and appendicular skeletal system in adults and children.
- 1.8. Describe the principles of internal and external fixation for stabilization of bone and joint injuries.
- 1.9. Describe the mechanism of homeostasis, fibrinolysis and methods to control haemorrhage and rationale for each management.
- 1.10. Describe the physiological coagulation cascade and its abnormalities.
- 1.11. Describe different techniques of pain management as well as recovery of function in specific disease and trauma scenario.
- 1.12. Describe the pharmacokinetics and pharmacodynamics of drug metabolism and excretion of analgesics, anti-inflammatory agents, antibiotics, disease - modifying agents and chemotherapeutic agents and biologicals.

- 1.13. Understand the principles of Early Total Care and Damage Control Orthopaedics and planning of definitive orthopaedic management.
- 1.14. Understand the principles of biostatistics and research methodology.
- 1.15. Understand the principles of Angiography, CT/MR angiography, Doppler Ultrasound, Sinogram.
- 1.16. Acquire the ability to order investigations.
2. Describe the clinical presentation, plan investigations, interpret results and institute steps for the management and prevention of the following disease conditions:
 - 2.1. Nutritional deficiency diseases affecting the bones and joints,
 - 2.2. Depositional arthropathies,
 - 2.3. Endocrine abnormalities of the musculoskeletal system,
 - 2.4. Metabolic abnormalities of the musculoskeletal system,
 - 2.5. Congenital anomalies of the musculoskeletal system,
 - 2.6. Developmental skeletal disorder of the musculoskeletal system,
 - 2.7. Bone and soft tissue tumours affecting the musculoskeletal system.
3. Describe the pathogenesis and clinical features of the following conditions in adults and children, plan appropriate investigations, interpret the results and institute appropriate management of:
 - 3.1. Tubercular infections of bone and joints (musculoskeletal system),
 - 3.2. Pyogenic infections of musculoskeletal system,
 - 3.3. Mycotic infections of musculoskeletal system,
 - 3.4. Autoimmune disorders of the musculoskeletal system (HIV),
 - 3.5. Rheumatoid arthropathy, Ankylosing spondylitis, seronegative arthropathy.
 - 3.5.1. Osteoarthritis and spondylosis
4. Describe the pathogenesis and clinical presentation, plan and interpret results of investigations and institute appropriate treatment in the following conditions:
 - 4.1. Post-polio residual paralysis
 - 4.2. Cerebral palsy
 - 4.3. Muscular dystrophies and myopathies
 - 4.4. Nerve injuries
 - 4.5. Entrapment neuropathies
 - 4.6. Spinal dysraphism
 - 4.7. Spinal anomalies.

5. Diagnose musculoskeletal manifestation of AIDS and HIV infection and its management.
6. Describe the aetiopathogenesis and clinical presentation, plan and interpret results of investigations and institute appropriate treatment for the management of osteonecrosis of bones.
7. Identify situations requiring rehabilitation services, prescribe suitable orthotic and prosthetic appliances and act as a member of the team providing rehabilitation care.
8. Identify and manage emergency situation in disorders of the musculoskeletal system.
9. Understand the basics of diagnostic imaging in orthopaedics like how and when to order and how to interpret the results of:
 - 9.1. Plain x-ray
 - 9.2. Ultrasonography
 - 9.3. Computerised axial tomography
 - 9.4. Magnetic resonance imaging
 - 9.5. PET scan
 - 9.6. Radio Isotope bone scan
 - 9.7. Digital Subtraction Angiography (DSA)
 - 9.8. Dual energy x-ray Absorptiometry
 - 9.9. Arthrography.
10. Describe the aetiopathogenesis, clinical presentation, identification, plan investigation/s and institute appropriate treatment for oncologic problems of musculoskeletal system (both benign and malignant: primary and secondary).
11. Understand the basics and principles of biomaterials and orthopaedic metallurgy.
12. Describe the principles of normal and abnormal gait and understand the biomedical principles of posture and replacement surgeries.
13. Describe social, economic, environmental, biological and emotional determinants of health in a given patient with a musculoskeletal problem.
14. Identify a research problem, prepare a research protocol, conduct a study, record observations, analyse data, interpret the results, discuss and disseminate the findings

II. Predominant in the Psychomotor domain

- 1. At the end of the first year of M.S. Orthopaedics programme, the student should be able to:**
 - 1.1. Elicit a clinical history from a patient, do a physical examination, document in a case

record, order appropriate investigations and make a clinical diagnosis. (Records of all competencies achieved should be documented in log book/E-Portfolio)

- 1.2. Impart wound care, where applicable, including different types of wound, and different chemotherapeutic agents for wound care, including VAC application and its care, and local antibiotic delivery system.
 - 1.3. Apply all types of POP casts/slabs, splints and tractions as per need. Learn different types of bandaging.
 - 1.4. Identify shock and provide resuscitation.
 - 1.5. Perform aspiration of joints and local infiltration of appropriate drugs.
 - 1.6. Perform appropriate wound debridement.
 - 1.7. Perform arthrotomy of knee joint and also assist in arthrotomy of hip, ankle and shoulder.
 - 1.8. Perform incision and drainage of abscess.
 - 1.9. Perform split thickness skin grafting.
 - 1.10. Perform fasciotomies.
 - 1.11. Apply external fixators.
 - 1.12. Apply skeletal tractions including skull tongs.
 - 1.13. Triage a disaster situation and multiple trauma patients in an emergency room.
 - 1.14. Perform on bone models, interfragmentary compression screws, external fixation, Tension band wiring and Broad plating.
 - 1.15. Perform closed reduction of common dislocations like shoulder and common fractures like collar fracture, supracondylar fracture.
 - 1.16. Perform on a cadaver standard surgical approaches to the musculo-skeletal system.
- 2. At the end of the second year of M.S. Orthopaedics course, the student should be able to:**
- 2.1. Take an informed consent for standard orthopaedic procedures.
 - 2.2. Perform closed/open biopsies for lesions of bone, joints and soft tissues.
 - 2.3. Perform split thickness skin grafting and local flaps.
 - 2.4. Perform on bone models, internal fixation with k-wires, screws, plates, Dynamic hip/condylar screws/nailing.
 - 2.5. Perform sequestrectomy and saucerisation.
 - 2.6. Perform arthrotomy of joints like hip/shoulder, ankle, elbow.
 - 2.7. Perform repair of open hand injuries including tendon repair.
 - 2.8. Perform arthrodesis of small joints.

- 2.9. Perform diagnostic arthroscopy on models and their patients.
- 2.10. Perform carpal tunnel/tarsal tunnel release.
- 2.11. Apply Ilizarov external fixator.
- 2.12. Perform soft tissue releases in contractures, tendon lengthening and correction of deformities.
- 2.13. Perform amputations at different levels.
- 2.14. Perform corrective surgeries for Congenital talipes equino-varus (CTEV), DDH, Perthes/ skeletal dysplasia.
- 2.15. Perform cadaver based procedures, arthroscopy, arthrotomy.

3. At the end of the third year of M.S. Orthopaedics programme, the student should be able to:

- 3.1. Assist in the surgical management of poly trauma patient.
- 3.2. Assist in Arthroplasty surgeries of hip, knee, shoulder and the ankle.
- 3.3. Assist in spinal decompressions and spinal stabilizations.
- 3.4. Assist in operative arthroscopy of various joints.
- 3.5. Assist /perform arthrodesis of major joints like hip, knee, shoulder, elbow.
- 3.6. Assist in corrective osteotomies around the hip, pelvis, knee, elbow, finger and toes.
- 3.7. Assist in surgical operations on benign and malignant musculoskeletal tumour including radical excision and custom prosthesis replacement.
- 3.8. Assist in open reduction and internal fixations of complex fractures of acetabulum, pelvis, IPSI lateral floating knee/elbow injuries, shoulder girdle and hand.
- 3.9. Assist in spinal deformity corrections.
- 3.10. Independently perform closed/open reduction and internal fixation with DCP, LCP, intra- medullary nailing, LRS.
- 3.11. Assist in limb lengthening procedures.
- 3.12. Assist in revision surgeries.
- 3.13. Provide pre- and post- OP care. This care should be exercised from first year.
- 3.14. Perform all clinical skills as related to the speciality.

III. Predominant in Affective Domain:

- 1.1. 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.
- 1.2. 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.

- 1.3. 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.

IV. Attitudes including Communication skills and Professionalism

1. Communication skills: The PG student should:

- 1.1. Exhibit participation in honest, accurate health related information sharing in a sensitive and suitable manner.
 - 1.2. Recognize that being a good communicator is essential to practice effectively.
 - 1.3. Exhibit effective and sensitive listening skills.
 - 1.4. Recognise the importance and timing of breaking bad news and know how to communicate.
 - 1.5. Exhibit participation in discussion of emotional issues.
 - 1.6. Exhibit leadership in handling complex and advanced communication.
 - 1.7. Recognize the importance of patient confidentiality and the conflict between confidentiality and disclosure.
 - 1.8. Be able to establish rapport in therapeutic bonding with patients, relatives and other stakeholders through appropriate communication.
 - 1.9. Able to obtain comprehensive and relevant history from patients/relatives.
 - 1.10. Able to counsel patients on their condition and needs. Add counselling of diagnosis, prognosis, complications as well as planning for the management.
- 2. Team work:** Seek cooperation. Coordination and communication among treating specialties and paramedical staff.
 - 3. Counselling of relatives:** regarding patient's condition, seriousness, bereavement and counselling for organ donation in case of brain stem death.
 - 4. Leadership:** Trauma prevention, education of the public, paramedical and medical persons.
 - 5. Advocacy:** with the government and other agencies towards cause of trauma care.
 - 6. Ethics:** The Code of Medical Ethics as proposed by National Medical Commission of India will be learnt and observed.

Name/ Description of practice based competencies	Expected quantum
<p>1. Taking a Clinical History from a patient with appropriate physical exam</p> <ol style="list-style-type: none"> a. Hip-pain, Limp, Deformity, Instability, Both in child and adult b. Knee-pain, Deformity, Instability in child and adult c. Ankle, Foot d. Shoulder e. Elbow f. Wrist g. Head h. Spine 	<p>At least 3 clinical encounters in each region</p>
<p>2. In the Bone Skills Lab</p> <p><u>Basic</u></p> <ol style="list-style-type: none"> 1. Introduction and tension band wiring 2. Lag screw interfragmentary compression 3. Broad plating 4. Narrow plating 5. Ex-Fix 6. Cancellous screw fixation 7. Umex <p><u>Intermediary</u></p> <ol style="list-style-type: none"> 1. DHS 2. DCS 3. Tibia nailing 4. Femur nailing 5. Tibia condyle 6. Elbow 7. Ankle <p><u>Advanced:</u></p> <ol style="list-style-type: none"> 1. Pelvis 2. Pubic symphysis 3. Acetabulum 4. MIPPO 5. Hemiarthroplasty 6. Spine posterior 7. Spine anterior 	<p>Practice at least twice on bone models and record</p>

SUBJECT SPECIFIC PRACTICE-BASED OR PRACTICAL COMPETENCIES

3. On Patients

i. At the end of the first year of M.S. Orthopaedics programme, the student will be able to perform:

- a. Wound care - different types of wound, and different chemotherapeutic agents for wound care, including VAC application
- b. POP casts/slabs, splints and tractions as per need. Learning of different types of bandaging.
- c. Identify shock and provide resuscitation
- d. Aspiration of joints and infiltration of appropriate drugs
- e. wound debridement
- f. Arthrotomy of knee joint and assist in arthrotomy of Hip, ankle, shoulder.
- g. Incision and drainage of abscess
- h. Split thickness skin grafting
- i. Fasciotomes
- j. External fixators
- k. Skeletal tractions including skull tongs
- l. Triage a disaster situation and multiple trauma patients in an emergency room
- m. Perform on bone models, interfragmentary compression screws, external fixation, Tension band wiring and Broad plating
- n. Closed reduction of common dislocations like shoulder and common fractures like collar fracture, supracondylar fracture.
- o. Perform on a cadaver standard surgical approaches to the musculo skeletal system.

ii. At the end of the second year of M.S. Orthopaedics course, the student should be able to:

- a. Perform closed/open biopsies for lesions of bone, joints and soft tissues
- b. Perform split thickness skin grafting and local flaps

As per the clinical volume available in each institution

<ul style="list-style-type: none"> c. Perform on bone models, internal fixation with k-wires, screws, plates. Dynamic hip/condylar screws/nailing. d. Perform sequestrectomy and saucerisation e. Perform arthrotomy of joints like hip/shoulder, ankle, elbow f. Perform repair of open hand injuries including tendon repair g. Perform arthodesis of small joints h. Perform diagnostic arthroscopy on models and their patients i. Perform carpal tunnel/tarsal tunnel release j. Apply ilizarov external fixator k. Perform soft tissue releases in contractures, tendon lengthening and correction of deformities l. Perform amputations at different levels m. Perform corrective surgeries for CTEV, DDH, perthes/ skeletal dysplasia n. Perform cadaver based procedures, Arthroscopy, Arthrotomy. 	<p>As per the clinical volume available in each institution</p>
<p>iii. At the end of the third year of M.S. Orthopaedics programme, the student should be able to:</p> <ul style="list-style-type: none"> a. Assist in the surgical management of poly trauma patient b. Assist in Arthroplasty surgeries of hip, knee, shoulder and the ankle c. Assist in spinal decompressions and spinal stabilizations d. Assist in operative arthroscopy of various joints e. Assist /perform arthrodesis of major joints like hip, knee, shoulder, elbow f. Assist in corrective osteotomies around the hip, pelvis, knee, elbow, finger and toes g. Assist in surgical operations on benign and malignant musculoskeletal tumour including radical excision and custom prosthesis replacement. h. Assist in open reduction and internal fixations of complex fractures of acetabulum, pelvis, IPSI lateral floating knee/elbow injuries, shoulder girdle and hand i. Assist in spinal deformity corrections 	<p>As per the clinical volume available in each institution</p>

- | | |
|--|--|
| <ul style="list-style-type: none"> j. Independently perform closed/open reduction and internal fixation with DCP, LCP, intra medullary nailing, LRS k. Assist in limb lengthening procedures l. Assist in Revision surgeries m. Provide pre and post OP care This care should be exercised from first year n. Perform all clinical skills as related to the speciality. | |
|--|--|

SYLLABUS

I. COGNITIVE DOMAIN

At the end of the M.S. Orthopaedics programme, the post graduate student should be competent and show sufficient understanding of Basic Sciences as applicable to Orthopaedics and Trauma through a problem based approach.

1. Basic Sciences as related to Orthopaedics and Trauma

- a) Embryogenesis of all organ systems
- b) Structure and function of Central Nervous System
- c) Structure and function of the peripheral Nervous System
- d) Structure and function of the arterial and venous system
- e) Structure and functions of the head & neck, abdomen, thorax and extremities.

2. Physiological basis and Pathophysiology in Health and Disease

- a) Physical Growth
- b) Temperature regulation
- c) Acid Base Balance
- d) Fluid Balance
- e) Hematopoiesis
- f) Hemostasis
- g) Electrolyte balance
- h) Bone mineralization: Calcium-Phosphate balance
- i) Renal functions

- j) Hepatic function
- k) Respiratory functions
- l) Cardiac functions
- m) Gastrointestinal functions
- n) Endocrine functions
- o) Developmental Milestones
- p) Nutritional Needs of Orthopaedic/Trauma Patients
- q) Allergy

3. Clinical Microbiology as related to Orthopaedic infections

- a) Virology
- b) Bacteriology
- c) Mycology
- d) Parasitology (Protozoology and Helminthology)
- e) Waste disposal, Sterilization, Disinfection

4. Clinical Pharmacology as related to Orthopaedics & Trauma

- a) Pharmacokinetics – of common medications used in Orthopaedics & Trauma
- b) Antimicrobials
- c) Analgesia, Sedation
- d) Drug Interactions
- e) Adverse effects
- f) Antidotes for Poisons
- g) Drug induced disease

5. Professionalism and Ethics

- a) Professionalism
- b) Ethics
- c) Medico legal essentials

6. Wound healing principles

- a) Types of wounds
- b) Stages of wound healing
- c) Biochemical & Molecular factors in wound healing
- d) Chemotherapeutic and other Pharmaceuticals in wound care
- e) Host, Environment and agent factors

7. Bone Healing

- a) Principles of bone healing
- b) Biological bone healing
- c) Factors influencing bone healing
- d) Biomechanism of bone healing

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, symposia, journal clubs, clinical meetings, seminars, small group discussion, bed-side teaching, 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 relevant to basic/clinical sciences should also be used. **The suggested examples of teaching-learning methods are given below but are not limited to these. The frequency of various below mentioned teaching-learning methods can vary based on the subject's requirements, competencies, work load and overall working schedule in the concerned subject.**

A. Lectures: Didactic lectures should be used sparingly. A minimum of 10 lectures per year in the concerned PG department is suggested. Topics to be selected would be as per subject requirements. All postgraduate trainees will be required to attend these lectures. Lectures can cover topics such as:

1. Subject related important topics as per specialty requirement
2. Recent advances
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 1. Journal club: Minimum of twice a month 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.

B 2. ORTHO RADIOLOGY MEETS: Twice a month discussions amongst Ortho & Radiology Residents under facilitation of faculty on various imaging modalities used and its interpretation.

B.3. ORTHO SURGICAL PATHOLOGICAL MEET: Special emphasis on the surgical pathology radiological aspect of the case in the pathology department. Clinician (Ortho resident) presents 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.

B. 4. SKILLS LAB SESSIONS: Once a fortnight for first 2 years.

C. Student Seminar: Minimum of twice a month is suggested.

Important topics should be selected as per subject requirements 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 / Bedside clinics/case presentation: Case presentation once a week in the ward, outpatient department/special clinics.

Laboratory work/Clinics/bedside 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 during clinical rounds.

F. Interdepartmental colloquium

Faculty and students must attend monthly meetings between the main Department and other department/s on topics of current/common interest or clinical cases; eg., combined clinical round with Radiology, Pathology etc.

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. Few examples are listed below:

1. 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.
- Medical Education Unit (MEU) or Department of Medical Education (DOME) (optional)

T/L Education

- Bone Skills Lab sessions – Twice a week
- Surgical Audit sessions – Once every week
- Cadaver based education – Twice a month

- Web based e-learning sessions – Once a fortnight
- Simulated environment learning – Two sessions in a week
- **Mortality & Morbidity meetings with SURGICAL AUDIT:** Once a month

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”.

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

Opportunities to present and discuss infectious disease cases through bedside discussion and ward/grand rounds with specialists / clinicians in different hospital settings must be scheduled to address antimicrobial resistance issues and strategies to deal with it.

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 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 Wards, OPDs, Casualty 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 NMC Logbook Guidelines uploaded on the Website.

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

Other aspects

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

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

ASSESSMENT

FORMATIVE ASSESSMENT, ie., assessment to improve learning

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

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 MS training should be based on:

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. Mini Cex encounter – at least 4
7. Clinical encounter cards - at least -4
8. Direct observation of procedural skills – at least 6 including Cadaver dissection
9. OSCE/Theory, Essay, Short notes
10. MCQS
11. Bone Skill Lab performance assessment

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

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

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

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

Essential pre-requisites for appearing for examination include:

1. **Log book** of work done during the training period including rotation postings, departmental presentations, and internal assessment reports should be submitted.
2. At least **two presentations** at national level conference. One research paper should be published / accepted in an indexed journal. **(It is suggested that the local or University Review committee assess the work sent for publication).**

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

The postgraduate examination shall be in three parts:

1. Thesis

Thesis shall be submitted at least six months before the Theory and Clinical / Practical examination. The thesis shall be examined by a minimum of three examiners; one internal and two external examiners, who shall not be the examiners for Theory and Clinical examination. A post graduate student in broad specialty shall be allowed to appear for the Theory and Practical/Clinical examination only after the acceptance of the Thesis by the examiners.

2. Theory examination

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

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

Paper I: Basic sciences as applied to the subject

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 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.

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.

It should include:

- Stations for clinical, procedural and communication skills
- Log Book Records and reports of day-to-day observation during the training
- Should test the post graduate student's overall knowledge of the subject in:
 - Ortho Radiology
 - Ortho Pathology
 - Histopathology & Gross anatomy
 - Instruments

Recommended Reading:

1. Campbell's Operative Orthopaedics, Vols 1, 2, 3 & 4 Campbell's Operative Orthopaedics, 4-Volume Set, 14th Edition by Frederick M Azar, MD, S. Terry Canale, MD and James H. Beaty, MD
2. Mercer's Orthopaedic Surgery Vol. 1 & 2, Author(s) : Robert B Duthie Edition: Ninth, Year of Publication: 2003
3. Rockwood And Greens – Fractures in Adults, Vol 1& 2 Rockwood and Green's Fractures in Adults Author(s): Paul Tornetta , William Ricci MD, FAAOS, Charles M. Court-Brown MD, FRCS Ed (Orth), Margaret M. McQueen MD, Michael McKee MD, FRCS (C)Publication Date: March 27, 2019
4. Fractures in Children – Rockwood & Wilkins - Rockwood and Wilkins Fractures in Children Edition: 9. Author(s): Peter M Waters MD, David L. Skaggs MD, John M. Flynn. Publication Date: March 19, 2019
5. Paediatric Orthopaedics – Tachidjian, Vol 4 Tachdjian's Pediatric Orthopaedics: From the Texas Scottish Rite Hospital for Children, 6th edition - November 27, 2020 Author: John Herring
6. Concise System Of Orthopaedics And Fractures – Graham Apley Apley's Concise System of Orthopaedics and Fractures Louis Solomon, David Warwick, Selvadurai Nayagam CRC Press, 31-Mar-2005
7. Textbook of Orthopaedics and Trauma – Kulkarni, Vol 1 Textbook of Orthopedics and Trauma (4 Volumes) GS Kulkarni, Sushrut Babhulkar, Publish Year 2016
8. B.D. Chaurasia's Human Anatomy, Vol1, Vol 2, Vol 3 B D Chaurasia's Handbook of Anatomy English Editions 2022 Eighth Editions Volume 2 (paperpack, CHAURASIAS), Author: CHAURASIAS, Publisher: CBS Publishers, Publishing Date 2022
9. Pharmacology and Pharmacotherapeutics – Satoskar- Pharmacology and Pharmacotherapeutics, 24th Edition - June 30, 2015, Authors: RS Satoskar, Nirmala Rege, SD Bhandarkar
10. Orthopaedics Anatomy and Surgical Approaches Frederick Wreckling Orthopaedic Anatomy and Surgical Approaches Edited by Frederick W. Reckling, Jo Anne B. Reckling and Melvyn P. Mohn, S. P. Frostick, First Published August 1, 1991
11. Green's Operative Hand Surgery-Vol. 1&. 2, Green, David P; Hotchkiss, Robert N Green's Operative Hand Surgery, 2-Volume Set 7th Edition - February 24, 2016,

Authors: Scott W. Wolfe, William C. Pederson, Scott H. Kozin, Mark S. Cohen

12. Surgical Exposures in Orthopedics: The Anatomic Approach, Hoppenfeld, Stanley; De Boer, Piet Surgical Exposures in Orthopaedics: The Anatomic Approach, Edition: 6, Author(s): Piet de Boer MD, Richard Buckley MD, FRCSC, Stanley Hoppenfeld MD, Publication Date: October 7, 2021
13. Text Book of Ilizarov Surgical Techniques Bone Correction And Lengthening, Golyakhovsky, Vladimir; Frankel, Victor H Textbook of Ilizarov Surgical Techniques: Bone Correction and Lengthening by Vladimir Golyakhovsky, Victor H Frankel, Publishing Year 2010
14. Applied Orthopaedic Biomechanics, Dutta, Santosh; Datta, Debasis Applied Orthopaedic Biomechanics, by Debasis Datta Santosh K Dutta Publisher : B.I.Publications, Year 2008.

Journals

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

Student appraisal form for MS in Orthopedics

	Element	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	Care of the patient										
2.1	Ability to provide patient care appropriate to level of training										
2.2	Ability to work with other members of the health care team										
2.3	Ability to communicate appropriately and empathetically with patients families and care givers										
2.4	Ability to do procedures appropriate for the level of training and assigned role										

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

Subject Expert Group members for preparation of REVISED Guidelines for competency based postgraduate training programme for MS in Orthopaedics

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MS04

MODEL PAPER

Ortho.-I

MS Examination Month, Year

ORTHOPAEDICS

Paper- I

Basic sciences as applied to the subject

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 What are the principles of tendon transfer? Discuss the role of tendon transfer in a case of foot drop. 20

Q.2 Write in detail 2x15 =30

a) Describe anatomy of arches of foot.

b) Write a short note on biomechanics of hip joint. Briefly describe Trendelenburg Gait.

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

a) Principles of amputation.

b) Pathophysiology of Fracture Healing.

c) Compartment syndrome.

d) Anatomy of meniscus and its function.

MS04

MODEL PAPER

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 Classify fracture of Talus. Describe it's blood supply and management of fracture of neck of talus in young adults. 20
- Q.2 Write in detail 2x15 = 30
- a) Discuss fracture of lower end of Radius.
 - b) Describe Emergency and Definitive management of an unstable pelvic fracture.
- Q.3 Write short notes on - 5x10 = 50
- a) Supracondylar fracture and its management in 7 year old child.
 - b) Mangled Extremity Severity Score.
 - c) Maisonneuve fracture.
 - d) Chronic refractory Pain Syndrome.
 - e) SLAP injury.

MS04

MODEL PAPER

Ortho.-III

MS Examination Month, Year
ORTHOPAEDICS
Paper- III
Orthopaedic 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 Describe the clinical presentation , Evaluation and Management of Acute Lumbar Disc prolapse in 40 year old gentlemen 20
- Q.2 Write in detail 2x15 = 30
- a) Classify Bone tumours.
 - b) Describe Management of Acute Osteomyelitis.
- Q.3 Write short notes on - 5x10 = 50
- a) Primary osteoarthritis of knee in a 55 year old female.
 - b) Ponsetti Technique.
 - c) Gout.
 - d) Joint Deformities in Rheumatoid Arthritis.
 - e) Kohler's Disease.

MODEL PAPER

MS04

Ortho.-IV

MS Examination Month, Year
ORTHOPAEDICS
Paper- IV

Recent advances in Orthopaedic 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 clinical features , Investigations and Management of infected total knee replacement in a 70 year old gentlemen . 20

Q.2 Write in detail 2x15 = 30

- a) Role of Stem cell therapy in Orthopaedics.
- b) Discuss Current concepts in mangement of Recurrent Dislocation of patella.

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

- a) MRI in orthopaedics.
- b) Teriperatide.
- c) Mini TLIF
- d) Unicondylar Knee Replacement.
- e) Elbow Arthroscopy.