



SHRI  
DHARMASTHALA  
MANJUNATHESHWARA  
UNIVERSITY

Ordinance Governing  
MBBS Degree Course Phase I  
Curriculum 2019-20

Amended up to November, 2022

**SHRI DHARMASTHALA MANJUNATHESHWARA UNIVERSITY**

(A State Private University established under the Shri Dharmasthala Manjunatheshwara University  
Act No 19 of 2018 of Government of Karnataka and Notification No. ED 261 URC 2018 dated 19th December 2018)

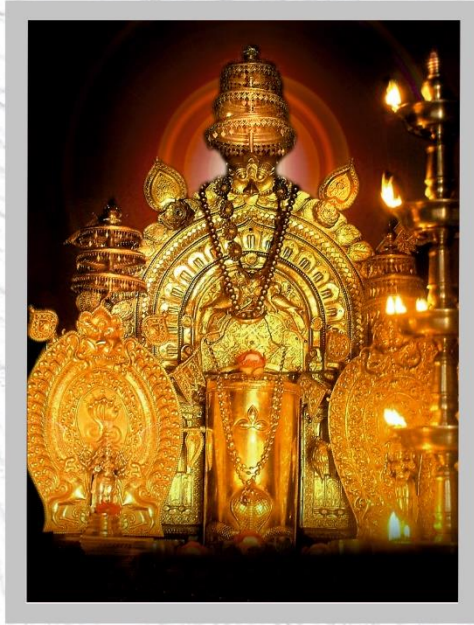
Manjushree Nagar, Sattur, Dharwad - 580 009, Karnataka, India

6<sup>th</sup> Floor, Manjushree Block SDM Medical College Campus

+91 836 2321127,2321126,2321125,2321124 [sdmuniversity.edu.in](http://sdmuniversity.edu.in)

[sdmuo@sdmuniversity.edu.in](mailto:sdmuo@sdmuniversity.edu.in) ; [registrar@sdmuniversity.edu.in](mailto:registrar@sdmuniversity.edu.in)

|| Om Shri Manjunathaya Namaha ||



Shree Kshethra Dharmasthala

**Edition Year : 2019-20**

**Shri Dharmasthala Manjunatheshwara University,**

Manjushree Nagar, Sattur, Dharwad - 580 009, Karnataka, India

Phone: 0836-2321127

email: [sdmuo@sdmuniversity.edu.in](mailto:sdmuo@sdmuniversity.edu.in)

**Published by**

**Registrar**

Shri Dharmasthala Manjunatheshwara University

6<sup>th</sup> Floor, Manjushree Block SDM Medical College Campus

Manjushree Nagar, Sattur, Dharwad - 580 009, Karnataka, India

+91 836 2321127,2321126,2321125,2321124

[sdmuo@sdmuniversity.edu.in](mailto:sdmuo@sdmuniversity.edu.in) ; [registrar@sdmuniversity.edu.in](mailto:registrar@sdmuniversity.edu.in)

[sdmuniversity.edu.in](http://sdmuniversity.edu.in)



SHRI  
DHARMASTHALA  
MANJUNATHESHWARA  
UNIVERSITY

## THE LOGO

Poojya Dr D. Veerendra Heggade, Hon'ble Chancellor of the University, while searching for an appropriate Logo for the University, saw a photograph picked from Temple Architecture showing Wings of a Bird, sculpted in Indian style and wanted it to be incorporated in the logo for the University, as the Wings symbolize 'Spreading of Knowledge beyond Boundaries'. Further it was felt that the Central theme of the logo should be 'Rudra' (The Linga) with wings on each side. In this way, the logo of the University was conceptualized.

Hence:

1. The central part represents **Rudra** who Demolishes Darkness.
2. The Three **horizontal lines on The Linga** stand for Samyak Darshan (Right Belief), Samyak Gyan (Right Knowledge) and Samyak Charitra (Right Conduct).
3. The **Wings** symbolize spreading of Knowledge across the boundaries.
4. Base line "**Truth Liberates**" highlights the Purpose of Education: to liberate oneself unconditionally. It shows that it is not discipline, nor knowledge nor the efforts to freedom that liberate but Truth is what liberates you from all your conditioning and ignorance.

The overall significance of Shri Dharmasthala Manjunatheshwara University's Logo is:

**Darkness of ignorance is destroyed by the flow of knowledge to bring Liberty to everyone, by realizing the truth. And, it should spread globally without the**



SHRI  
DHARMASTHALA  
MANJUNATHESHWARA  
UNIVERSITY

## VISION

Shri Dharmasthala Manjunatheshwara University will set the highest standards of teaching and learning by awakening the intelligence of the students and nurturing the creativity hidden in them by creating an environment where the ancient wisdom blends with modern science, to transform them into whole human beings to face the challenges.

## MISSION

- ▶ To ensure that the journey of education is inspiring, pleasant and enjoyable.
- ▶ Attract the best of teachers and students.
- ▶ Achieve high principles of trust, love and spirituality in the students.
- ▶ Create a collaborative, diverse and exclusive community.
- ▶ Transform the student of today to be a leader of tomorrow and a better human being.
- ▶ Produce passionate teachers.
- ▶ Evolve innovative teaching techniques.
- ▶ Create a peaceful environment.
- ▶ Prepare the student to face the social challenges.
- ▶ Create a University of which the Nation is proud of.
- ▶ Be an effective partner in Nation Building.
- ▶ Create an Eco-friendly University.
- ▶ Create a University based on the principles of beauty, love and justice.

||Om Shanti! Om Shanti! Om Shanti||



**SHRI  
DHARMASTHALA  
MANJUNATHESHWARA  
UNIVERSITY**

6<sup>th</sup> Floor, Manjushree Building,  
SDM Medical Campus, Sattur, Dharwad - 580009  
Tel No. 0836 247 7511 / 0836 232 1115 / 0836 232 1117  
Fax: +91836 246 3400  
Email: registrar@sdmuniversity.edu.in

SDMU/ACAD/MED/UG/367/2019

Date: 27-08-2019

## NOTIFICATION

### Ordinance governing Curricula of Pre-clinical Subjects in MBBS - 2019

- Ref:**
1. Notification from Board of Governors in Supersession of MCI (Letter No: MCI-Academics/2019/128106; Dated:06-07-2019)
  2. Medical Council of India Regulations on Graduate Medical Education, 1997 and its Subsequent Amendments
  3. Minutes of the 1<sup>st</sup> Meeting of Standing Committee of Academic Council held on 21-08-2019 (Letter No: SDMU/SCAC/362/2019; Dated:23-08-2019)
  4. Minutes of the 1<sup>st</sup> Meeting of Academic Council held on 20<sup>th</sup> March 2019 (Letter No: SDMU/AC/M-01/093/2019; Dated:21-03-2019)
  5. Minutes of the 1<sup>st</sup> Meeting of Joint Faculties held on 19<sup>th</sup> March 2019 (Letter No: SDMU/JF/85/2019; Dated:21-03-2019)
  6. Minutes of the 1<sup>st</sup> Meeting of Board of Studies held on 13<sup>th</sup> March 2019 (Letter No: SDMU/BOS Preclinical Medical (UG)/01/2019; Dated:15-03-2019)

In exercise of the powers conferred under Statutes 1.4(Powers and functions - Para ix & x), 1.5b(Powers and functions - Para b & c) and 1.8(Powers and functions - Para i) of Shri Dharmasthala Manjunatheshwara University, the Standing Committee of Academic Council is pleased to notify the ordinance governing the Curricula of Pre-clinical Subjects in MBBS - 2019 as shown in the annexure appended herewith:

1. Anatomy
2. Biochemistry
3. Physiology

The ordinance shall be effective for the students joining the course during 2019-20 and onwards.

  
**REGISTRAR  
REGISTRAR,  
Shri Dharmasthala Manjunatheshwara  
University, Dharwad**

# CONTENTS

## 1. UNIT A GENERAL GUIDELINES

PART 1: ADMISSION AND QUALIFICATIONS.....	1
PART II: Introduction to Competency Based Medical Education (CBME) .....	8
PART III: PROGRESSION IN MBBS PHASE - 1 .....	9
GLOSSARY.....	20

## 2. UNIT B CURRICULUM FOR PRECLINICAL SUBJECTS

ANATOMY .....	23
PHYSIOLOGY .....	60
BIOCHEMISTRY .....	84
COMMUNITY MEDICINE (Including Humanities).....	120

## 3. UNIT C ANNEXURES

ANNEXURES .....	127
-----------------	-----

## **PREAMBLE**

The undergraduate medical curriculum of the Medical Council of India ensures that the doctor emerging after the MBBS training program is capable of assisting the nation to achieve its goal of 'health for all'. In addition, it aspires to ensure that the "graduate" meets or exceeds global bench-mark in knowledge, attitude, skills and communication. This intent is at the core of the Graduate Medical Regulations, 2019.

The Graduate Medical Regulations (GMR), 2019 represents the first major revision to the medical curriculum since 1997 and hence incorporates changes in science and thought over two decades. A significant advance is the development of global competencies and subject-wise outcomes that define the roles of the "Indian Medical Graduate".

Learning and assessment strategies have been outlined that will allow the learner to achieve these competencies/outcomes. Effective appropriate and empathetic communication, skill acquisition, student-doctor method of learning, aligned and integrated learning and assessment are features that have been given additional emphasis in the revised curriculum.

This document represents a compilation of the resource material that was used in the Curricular Implementation Support Program (CISP) and has attempted to provide a stepwise and comprehensive approach to implement the curriculum. The document is to be used in conjunction with the Competency document, AETCOM (Attitude, Ethics and Communication) module and the GMR document.

This syllabus has been created from the list of competencies mentioned in the Competency Based Curriculum (CBC) developed by the Medical Council of India for the First MBBS Batch of 2019-20.



## **Objectives of the Indian Medical Graduate Training Programme**

The undergraduate medical education programme is designed with a goal to create an “Indian Medical Graduate” (IMG) possessing requisite knowledge, skills, attitudes, values and responsiveness, so that she or he may function appropriately and effectively as a physician of first contact of the community while being globally relevant. To achieve this, the following national and institutional goals for the learner of the Indian Medical Graduate training programme are hereby prescribed:-

### **National Goals:**

At the end of undergraduate program, the Indian Medical Graduate should be able to:

- a) Recognize “health for all” as a national goal and health right of all citizens and by undergoing training for medical profession to fulfil his/her social obligations towards realization of this goal.
- b) Learn every aspect of National policies on health and devote her/him to its practical implementation.
- c) Achieve competence in practice of holistic medicine, encompassing promotive, preventive, curative and rehabilitative aspects of common diseases.
- d) Develop scientific temper, acquire educational experience for proficiency in profession and promote healthy living.
- e) Become exemplary citizen by observance of medical ethics and fulfilling social and professional obligations, so as to respond to national aspirations.

### **Institutional Goals:**

The Indian Medical Graduates coming out of SDM College of Medical Sciences and Hospital under Shri Dharmasthala Manjunatheshwara University shall:

- a) Be competent in diagnosis and management of common health problems of the individual and the community, commensurate with his/her position as a member of the health team at the primary, secondary or tertiary levels, using his/her clinical skills based on history, physical examination and relevant investigations.
- b) Be competent to practice preventive, promotive, curative, palliative and rehabilitative medicine in respect to the commonly encountered health problems.

- c) Appreciate rationale for different therapeutic modalities; be familiar with the administration of “essential medicines” and their common adverse effects.
- d) Be able to appreciate the socio-psychological, cultural, economic and environmental factors affecting health and develop humane attitude towards the patients in discharging one's professional responsibilities.
- e) Possess the attitude for continued self-learning and to seek further expertise or to pursue research in any chosen area of medicine, action research and documentation skills.
- f) Be familiar with the basic factors which are essential for the implementation of the National Health Programmes
  - i. Family Welfare and Maternal and Child Health (MCH);
  - ii. Sanitation and water supply;
  - iii. Prevention and control of communicable and non-communicable diseases;
  - iv. Immunization;
  - v. Health Education;
  - vi. Indian Public Health Standards (IPHS) at various level of service delivery;
  - vii. Bio-medical waste disposal; and
  - viii. Organizational and or institutional arrangements.
- g) Acquire basic management skills in the area of human resources, materials and resource management related to health care delivery, hospital management, inventory skills and counselling.
- h) Be able to identify community health problems and learn to work to resolve these by designing, instituting corrective steps and evaluating outcome of such measures.
- i) Be able to work as a leading partner in health care teams and acquire proficiency in communication skills.
- j) Be competent to work in a variety of health care settings.
- k) Have personal characteristics and attitudes required for professional life such as personal integrity, sense of responsibility and dependability and ability to relate to or show concern for other individuals.

## **Goals and Roles for the Learner:**

In order to fulfill the goal of the IMG training programme, the medical graduate must be able to function in the following roles appropriately and effectively:-

1. ***Clinician*** who understands and provides preventive, promotive, curative, palliative and holistic care with compassion.
2. ***Leader and member of the health care team and system*** with capabilities to collect analyze, synthesize and communicate health data appropriately.
3. ***Communicator*** with patients, families, colleagues and community.
4. ***Lifelong learner*** committed to continuous improvement of skills and knowledge.
5. ***Professional***, who is committed to excellence, is ethical, responsive and accountable to patients, community and profession.

## UNIT A

### SHRI DHARMASTHALA MANJUNATHESHWARA UNIVERSITY GUIDELINES GOVERNING MBBS DEGREE COURSE

#### **PART 1: ADMISSION AND QUALIFICATIONS**

#### **1. Eligibility for admission to MBBS course (Qualifying examination marks)**

##### **1.1 Qualifying Examination:**

##### **A CANDIDATE SEEKING ADMISSION TO MBBS DEGREE COURSE:**

i. Shall have passed two years Pre-University examination conducted by Department of Pre-University Education, Karnataka State, with English as one of the subjects and Physics, Chemistry and Biology as optional subjects. The candidate shall have passed subjects of English, Physics, Chemistry and Biology individually also.

OR

ii. Shall have passed any other examination conducted by boards/ Councils/ Intermediate Education established by State Governments/ Central Government and recognised as equivalent to two year Pre University examination by the SDM University, with English as one of the subjects and Physics, Chemistry and Biology as optional subjects and the candidate shall have passed subjects of English, Physics, Chemistry and Biology individually.

OR

iii. Shall have passed Intermediate examination in Science of an Indian University/Board/Council or other recognised examining bodies with Physics, Chemistry and Biology, which shall include a practical test in these subjects and also English as compulsory subject. The candidate shall have passed subjects of English, Physics, Chemistry and Biology individually.

OR

iv. Shall have passed first year of the three year degree course of a recognised University with Physics, Chemistry and Biology including a practical test in these subjects provided the examination is an 'University Examination' provided that the candidate shall have passed subjects of English, Physics, Chemistry and Biology individually in the pre university or other examinations mentioned in the clauses above.

OR

- v. Shall have passed B.Sc. Examination of an Indian University, provided that he/she has passed the B.Sc. examination with not less than two of the following subjects: Physics, Chemistry, Biology (Botany, Zoology) provided the candidate has passed subjects of English, Physics, Chemistry and Biology
- vi. individually in the qualifying examinations mentioned in clauses (i), (ii) and (iii).

**Note:** *Candidates who have passed "Physical Science" instead of Physics and Chemistry as two separate subjects are not eligible for admission to MBBS course as per Medical Council of India Regulations vide letter MCI- 37(2)/2001/Med.922 dated 14.02.2001.*

No candidate shall be allowed to be admitted to the Medical Curriculum proper of first MBBS course until he /she has qualified the National Eligibility Entrance Test, and he/she shall not be allowed to appear for the National Eligibility-Cum-Entrance Test until:

- 1) He/she shall complete the age of 17 years on or before 31st December of the year of admission to the MBBS.
  - a. He /She has obtained a minimum of marks in National Eligibility-Cum-Entrance Test as prescribed in Clause 1.2 Marks of Part 1 of this document.
  - b. Provided further that in order to be eligible, the upper age limit for candidates appearing for National Eligibility Entrance Test and seeking admission to MBBS programme shall be 25 years as on the date of examination with a relaxation of 5 years for candidates belonging to SC/ST/OBC category and persons entitled for reservation under the Rights of Persons with Disabilities Act, 2016.

The above have been substituted in terms of notification published on 23.01.2018 in Gazette of India.

## **1.2 Marks**

The selection of students to the medical college of Shri Dharmasthala Manjunatheshwara University shall be based on merit provided that:

- i. In case of admission on the basis of qualifying examination, a candidate for admission to MBBS course must have passed individually in the subjects of Physics, Chemistry, Biology and English and must have obtained a minimum of 50% marks taken together in Physics, Chemistry and Biology in the qualifying examination. In respect of candidates belonging to Scheduled Castes, Scheduled Tribes or Other Backward Classes, the marks obtained in Physics, Chemistry and Biology taken together in qualifying examination be 40% instead of 50% as above.
- ii. In case of admission on the basis of competitive entrance examination, a candidate must have passed individually in the subjects of Physics, Chemistry, Biology and English and must have obtained a minimum of 50% marks in Physics, Chemistry and Biology taken together at the qualifying examination and in addition must have come in the merit list prepared as a result of such competitive entrance examination by securing not less than 50% marks in Physics, Chemistry and Biology taken together in the competitive examination. In respect of candidates belonging to Scheduled Castes, Scheduled Tribes or Other Backward Classes the marks obtained in Physics, Chemistry and Biology taken together in qualifying examination and competitive entrance examination should be 40% instead of 50% as stated above. (Vide amendment to MCI Regulations, 1997, notified in Gazette of Government of India dated 29.05.1999).
- iii. In order to be eligible for admission to MBBS Course for an academic year, it shall be necessary for a candidate to obtain minimum of marks at 50th percentile in 'National Eligibility-cum-Entrance Test to MBBS course' held for the said academic year. However, in respect of candidates belonging to Scheduled Castes, Scheduled Tribes, Other Backward Classes, the minimum marks shall be at 40th percentile. In respect of candidates with benchmark disabilities specified under the Rights of Persons with Disabilities Act, 2016, in terms of Clause 1.2(3) above, the minimum marks shall be at 45th percentile. The percentile shall be determined on the basis of highest marks secured in the All-India common merit list for admission in 'National Eligibility-cum-Entrance Test for admission to MBBS course'.

The reservation of seats in Medical Colleges for respective categories shall be as per applicable laws prevailing in States/Union Territories. An All India merit list as well as State/Union Territory-wise merit list of the eligible candidates shall be prepared on the basis of marks obtained in 'National Eligibility-cum-Entrance Test and candidates shall be admitted to MBBS course from the said lists only.

No candidate who has failed to obtain the minimum eligibility marks as prescribed in Sub-clause (iii) above shall be admitted to MBBS course in the said academic year. All admission to MBBS course within the respective categories shall be based solely on the marks obtained in the 'National Eligibility-Cum-Entrance Test.

### **1.3 Age:**

The candidate should have completed 17 years on or before 31st day of December of the year of admission.

### **2. Duration of the Course and training:**

- Every student shall undergo a period of certified study extending 4 ½ academic years from the date of commencement of his/her course comprising the medical curriculum, to the date of completion of final year examination followed by compulsory rotating internship of 365 days.
- Each academic year will have at least 240 teaching days with a minimum of eight hours of working on each day including one hour as lunch break.
- Teaching and learning shall be aligned and integrated across specialties both vertically and horizontally for better learner comprehension. Learner centered learning methods should include problem oriented learning, case studies, community oriented learning, self- directed and experiential learning.
- The details of the course as per the GMR 2019 is as follows:

### Time distribution of MBBS Programme & Examination Schedule:

Jan	Feb	Mar	Apr	May	June	July	Aug	Sep	Oct	Nov	Dec
							Foundati on Course	I MBBS			
I MBBS								Phase I exam	II MBBS		
II MBBS								Phase II exam	III MBBS PART 1		
III MBBS PART I									Phase III Part I exam	Electives and Skills	
III MBBS PART II											
Phase III Part II exam	Internship										
Intern- ship											

### Distribution of subjects by Professional Phase:

Year of MBBS Training	Subjects and Teaching Elements	Duration in months	University Examination
<b>First professional MBBS</b>	<ul style="list-style-type: none"> <li>• Foundation course (1month)</li> <li>• Human Anatomy, Physiology and Biochemistry Introduction of Community Medicine, Humanities</li> <li>• Early Clinical Exposure</li> <li>• Attitude. Ethics and Communication Module (AETCOM)</li> </ul>	1+13	I Professional
<b>Second Professional MBBS</b>	<ul style="list-style-type: none"> <li>• Pathology, Microbiology, Pharmacology, Forensic Medicine and Toxicology</li> <li>• Introduction to clinical subjects including community Medicine</li> <li>• Clinical postings</li> </ul>	12	II Professional



	<ul style="list-style-type: none"> <li>• AETCOM</li> </ul>		
<b>Third Professional MBBS Part I</b>	<ul style="list-style-type: none"> <li>• General Medicine, General Surgery, OBG. Paediatrics, Orthopaedics, Dermatology, Psychiatry, Otorhinolaryngology, Ophthalmology, Community Medicine, Forensic Medicine and Toxicology, Radiodiagnosis and Radiotherapy, Respiratory Medicine, Anaesthesiology</li> <li>• Clinical Subjects /postings</li> <li>• AETCOM</li> </ul>	13	III Professional (Part I)
<b>Electives</b>	<ul style="list-style-type: none"> <li>• Electives, skills and assessment</li> </ul>	2	
<b>Third Professional MBBS Part II</b>	<ul style="list-style-type: none"> <li>• General Medicine, Paediatrics, General Surgery, Orthopaedics, Obstetrics and Gynaecology including Family welfare and allied specialties</li> <li>• Clinical Postings /subjects</li> <li>• AETCOM</li> </ul>	13	III Professional (Part II)

- No more than four attempts shall be allowed for a candidate to pass the first Professional examination. The total period for successful completion of first Professional course shall not exceed four (4) years. Partial attendance of examination in any subject shall be counted as an attempt.
  - A learner, who fails in the second Professional examination, shall not be allowed to appear in third Professional Part I examination unless she/he passes all subjects of second Professional examination.

Passing in third Professional (Part I) examination is not compulsory before starting part II training; however, passing of third Professional (Part I) is compulsory for being eligible for third Professional (Part II) examination.

### 3. Migration

***Migration from one medical college to another is not a right of a student.***

However, migration of students from one Medical College to another Medical College in India may be considered by Medical Council of India, only in exceptional cases on extreme compassionate grounds, provided following criteria are fulfilled.

- i. Routine migrations on other grounds shall not be allowed.
- ii. Both the colleges, i.e., one at which the student is studying at present and one to which migration is sought, should have been recognised by the Medical Council of India.
- iii. The applicant candidate should have passed MBBS professional year I examination.
- iv. The applicant candidate should submit his/her application for migration complete in all respects, to all authorities concerned within a period of one month of passing (declaration of results) the MBBS professional year I examination.
- v. The applicant candidate must submit an affidavit stating that he/she will pursue 11 months of prescribed study before appearing for MBBS professional year II examination at the transferee medical college, which should be duly certified by the Registrar of the concerned University in which he/she is seeking transfer. The transfer will be applicable only after receipt of the affidavit. The amendments in regulations governing the migrations by the regulatory bodies would be applicable as and when released.

**NOTE I:**

- Migration during clinical course of study shall not be allowed on any ground.
- All applications for migration shall be referred to Medical Council of India by college authorities. No Institution/University shall allow migration directly without the approval of the Council.
- Council reserves the right, not to entertain any application which is not under the prescribed compassionate grounds and also to take independent decisions where applicant has been allowed to migrate without referring the same to the Council.

**NOTE II:**

Compassionate grounds criteria:

- Death of a supporting parent or guardian.
- Illness of the candidate causing disability.
- Disturbed conditions as declared by Government in the Medical College area.

## **PART II: Introduction to Competency Based Medical Education (CBME)**

The salient feature of the revision of the medical curriculum in 2019 is the emphasis on learning which is competency-based, integrated and learner-centered acquisition of skills and ethical & humanistic values. The revised undergraduate medical education curriculum enables IMG to recognize "health for all" as a national goal and fulfil his/her societal obligations.

Greater emphasis is laid on hands-on training, symposia, seminars, small group discussions, problem-oriented and problem-based discussions and self-directed learning. Learners are encouraged to take active part in and shared responsibility for their learning.

Few new key areas recommended in the GMR 2019 are :

- a. **Foundation Course:** This is a one month course to orient medical learners to MBBS program and provide them with requisite knowledge, communication (including electronic), and technical and language skills.
- b. **Early clinical exposure:** The clinical training would start in the first year, focusing on communication, basic clinical skills and professionalism. There would be sufficient clinical exposure at the primary care level and this would be integrated with the learning of basic and laboratory sciences. Introduction of case scenarios for classroom discussion/case-based learning would be emphasized. It will be done as a coordinated effort by the pre-clinical, para-clinical and clinical faculty.
- c. **Integrated teaching and learning:** The innovative new curriculum has been structured to facilitate horizontal and vertical integration between and among disciplines. This would bridge the gaps between theory and practice, between hospital-based medicine and community medicine. Basic and laboratory sciences (integrated with their clinical relevance) would be dealt with maximum in the first year and will progressively decrease in the second and third year of the training when clinical exposure and learning would be dominant.
- d. **Skill development and learning (throughout curriculum):** A mandatory and desirable comprehensive list of skills has been planned and would be recommended for the Indian Medical Graduate. Certification of skills would be necessary before licensure.

- e. **Electives:** The aim of adding electives is to allow flexible learning options in the curriculum and may offer a variety of options including clinical electives, laboratory postings or community exposure in areas that students are not normally exposed as a part of regular curriculum. This will also provide opportunity for students to do a project, enhance self-directed learning, critical thinking and research abilities.
- f. **AETCOM (Attitude, Ethics and Communication) Module:** The importance of ethical values, responsiveness to the needs of the patient and acquisition of communication skills is underscored by providing dedicated curriculum time in the form of a longitudinal program called Attitude, Ethics and Communication.
- g. **Learner-doctor method of clinical training (Clinical Clerkship)**  
This provides learners with experience in: Longitudinal patient care, being part of the health care team, and hands-on care of patients in outpatient and inpatient setting.

### **PART III: PROGRESSION IN MBBS PHASE - 1**

The first year shall incorporate subject of Human Anatomy, Physiology including Biophysics, Biochemistry and Introduction to Community Medicine including humanities. Duration of the MBBS professional year I will be of 14 months which includes:

- i. One month of Foundation Course
- ii. Twelve months of teaching learning activities
- iii. One month for examinations

In regards to its goal to impart quality education, Shri Dharmasthala Manjunatheshwara University as per the MCI directive, has incorporated human values, medical ethics, and comprehensive training in communication skills (attitudes, ethics and communication-AETCOM) in the regular teaching of M.B.B.S. course beginning from first year and continuing till the internship. The course content of first year would focus on early clinical exposure (ECE), professional relationship, patient-doctor relationship, issues at the beginning and end of life and health policy. Introduction to clinical ethics will begin in the MBBS professional year I itself.

The course content would also emphasize on increasing the awareness and knowledge of students towards interactions with the patients, care takers, colleagues and public, fostering the development of skills of analysis, decision making and judgment. The students would also be made aware of the need to respect the rights of the patient as also duties and responsibilities of the doctor.

### **Foundation Course**

**Goal:** The goal of the Foundation Course is to prepare a learner to study medicine effectively.

**Objectives:** To orient the learner to:

- i. The medical profession and the physician's role in society
- ii. The MBBS programme
- iii. Alternate health systems in the country and history of medicine
- iv. Medical ethics, attitudes and professionalism
- v. Health care system and its delivery
- vi. National health programmes and policies
- vii. Universal precautions and vaccinations
- viii. Patient safety and biohazard safety
- ix. Principles of primary care (general and community based care)
- x. The academic ambience

The learner is enabled to acquire enhanced skills in Language, Interpersonal relationships, Communication, Learning including self-directed learning, Time management, Stress management, Use of information technology etc.

The learner will be trained to provide first-aid and Basic life support. In addition, students will be given training in language and computer skills, sports and extracurricular activities. The Foundation Course will have compulsory 75% attendance. This will be certified by the Dean of the college.

The Foundation course includes:

<b>Subjects / Contents</b>	<b>Teaching hours</b>	<b>SDL hours</b>	<b>Total hours</b>
Orientation	30	0	30
Skills module	35	0	35
Field visit to community health centre	8	0	8
Introduction to professional development & AETCOM module	-	-	40
Sports and extracurricular activities	22	0	22
Enhancement of language / Computer skills	40	0	40
	-	-	175

### **Early clinical exposure:**

**Objectives:** The objectives of early clinical exposure of the first-year medical learners are to enable the learner to:

- (a) Recognize the relevance of basic sciences in diagnosis, patient care and treatment,
- (b) Provide a context that will enhance basic science learning,
- (c) Relate to experience of patients as a motivation to learn,
- (d) Recognize attitude, ethics and professionalism as integral to the doctor-patient relationship
- (e) Understand the socio-cultural context of disease through the study of humanities.

### **Elements**

- (a) Basic science correlation: i.e. apply and correlate principles of basic sciences as they relate to the care of the patient (this will be part of integrated modules).
- (b) Clinical skills: to include basic skills in interviewing patients, doctor-patient communication, ethics and professionalism, critical thinking and analysis and self-learning (this training will be imparted in the time allotted for early clinical exposure).
- (c) Humanities: To introduce learners to a broader understanding of the socio-economic framework and cultural context within which health is delivered through the study of humanities and social sciences.

**AETCOM sessions:**

This will be a longitudinal programme spread across the continuum of the MBBS programme including internship. Learning experiences may include – small group discussions, patient care scenarios, workshop, seminars, role plays, lectures etc.

Objectives : At the end of the programme, the learner must demonstrate ability to:

- (a) understand and apply principles of bioethics and law as they apply to medical practice and research
- (b) understand and apply the principles of clinical reasoning as they apply to the care of the patients,
- (c) understand and apply the principles of system based care as they relate to the care of the patient,
- (d) understand and apply empathy and other human values to the care of the patient, communicate effectively with patients, families, colleagues and other health care professionals,
- (e) understand the strengths and limitations of alternative systems of medicine,
- (f) respond to events and issues in a professional, considerate and humane fashion,
- (g) translate learning from the humanities in order to further his / her professional and personal growth.

#### 4. Teaching Hours

<b>GMR 2019</b>				
<b>Subjects</b>	<b>Lecture hours</b>	<b>Small group teaching / tutorials / integrated learning / practical (hours)</b>	<b>Self-directed learning (SDL) (hours)</b>	<b>Total (hours)</b>
Human anatomy	220	415	40	675
Physiology	160	310	25	495
Biochemistry	80	150	20	250
Early clinical exposure*	90	-	0	90
Community Medicine	20	27	5	52
Attitude, Ethics and Communication module (AETCOM)**	-	26	8	34
Sports and extracurricular activities	-	-	-	60
Formative assessment and term examinations	-	-	-	80
<b>Total</b>				<b>1736</b>

\*Early clinical exposure hours to be divided equally in all three subjects.

\*\*AETCOM module shall be a longitudinal programme.

#### 5. Attendance

Attendance requirements are 75% in theory and 80% in practical /clinical for eligibility to appear for the examinations in that subject. In subjects that are taught in more than one phase – the learner must have 75% attendance in theory and 80% in practical in each phase of instruction in that subject.

If an examination comprises more than one subject (for e.g., General Surgery and allied branches), the candidate must have 75% attendance in each subject and 80% attendance in each clinical posting.



Theory: includes

- Lectures
- Self-Directed learning sessions

Practical / Clinical: includes

- Practical/Dissection/Clinical
- Small group teaching/ Tutorials/CBL/PBL etc

Early clinical exposure sessions in individual subjects must have 75 % attendance.

AETCOM sessions: 75% attendance in Professional Development Programme (AETCOM Module) is required for eligibility to appear for final examination in each professional year.

A candidate lacking in the prescribed attendance in any subject(s) either in theory or practical in the said academic year will not be permitted to appear for the examination in that subject(s).

## **6. Vacations**

Vacation for the MBBS Phase I with dates and number of days will be notified in the time table.

## **7. Submission of Practical record book and log book**

7.1 At the time of Practical/Clinical Examination each candidate shall submit to the Examiners his/her laboratory notebook and the log book duly certified by the Head of the Department as a bonafide record of the work done by the candidate.

7.2 A timely submitted and certified practical record book and the log book are given weightage in internal assessment.

## **8 Internal Assessment (IA)**

8.1. Regular periodic examinations will be conducted throughout the course. Three internal assessment examinations will be conducted during MBBS professional year I. Theory IA will be for 100 marks and Practical IA will be for 100 marks

- 8.2. Day to day records and log book (including required skill certifications) will be given importance in internal assessment. Internal assessment will be based on competencies and skills.
- 8.3. The results of IA shall be displayed on the notice board within 1-2 weeks of the test. Suitable remedial measures for students who are either not able to score qualifying marks or have missed on some assessments due to any reason shall be taken by college.
- 8.4. Internal assessment marks will reflect as separate head of passing at the summative examination.

Tentative dates for internal assessment examinations will be notified in time table.

<b>Theory IA</b>	<b>Maximum Marks</b>	<b>Practical IA</b>	<b>Maximum Marks</b>
Theory IA written paper	70	Practical IA exam and Viva Voce	70 (50+20)
Continuous assessments 1. Written tests (Part completion tests/ system-based tests) – 20 marks 2. Written tests for ECE and/or SDL topics and/or creative writing experience of AETCOM (Logbook assessment) – 5 marks 3. Participation in ECE and SDL sessions – 5 marks	30	Continuous assessments 1. Record book evaluation – 10 marks 2. Log book assessment of skill competencies acquired in specified subject – 15 marks 3. Participation in SGT and AETCOM – 5 marks	30
<b>TOTAL</b>	<b>100</b>		<b>100</b>

**The final Internal assessment (IA) marks will be calculated as follows:  
Average of all 3 IA will be considered as Final IA marks in Theory and Practical separately.**

## **9 Eligibility for University Examinations**

### **9.1 Attendance**

Attendance requirements are 75% in theory and 80% in practical /clinical for eligibility to appear for the examinations in that subject. In subjects that are taught in more than one phase – the learner must have 75% attendance in theory and 80% in practical in each phase of instruction in that subject.

AETCOM sessions: 75% attendance in Professional Development Programme (AETCOM Module) is required for eligibility to appear for final examination in each professional year.

### **9.2 Internal Assessment Marks**

Learners must secure at least 50% marks of the total marks (combined in theory and practical / clinical; not less than 40 % marks in theory and practical separately) assigned for internal assessment in a particular subject in order to be eligible for appearing at the final University examination of that subject.

### **9.1 Certifiable competencies and Log book**

Learners must have completed the required certifiable competencies for that phase of training and completed the log book appropriate for that phase of training to be eligible for appearing at the final university examination of that subject.

## **10 University examination / Summative examination (Components, Subjects and marks)**

### **Marks distribution:**

The final examination for MBBS Professional year I will be held in the month of September.

The information regarding the conduct, time table of exams and declaration of results would be informed regularly by the Office of the University.

<b>A. THEORY</b>	<b>Anatomy</b>	<b>Physiology</b>	<b>Biochemistry</b>
1. Paper 1*	100	100	100
2. Paper 2*	100	100	100
<b>Total Theory</b>	<b>200</b>	<b>200</b>	<b>200</b>
<b>B. PRACTICAL</b>			
1. Practical Examination	80	80	80
2. Viva-Voce	20	20	20
<b>Total Practical</b>	<b>100</b>	<b>100</b>	<b>100</b>
<b>Total university examination</b>	<b>300</b>	<b>300</b>	<b>300</b>
<b>INTERNAL ASSESSMENT**</b>			
1. Internal assessment- Theory	100	100	100
2. Internal Assessment - Practical	100	100	100
<b>Total IA</b>	<b>200</b>	<b>200</b>	<b>200</b>
Grand Total of all three subjects in university examination = 300 + 300 + 300 = 900 marks			

- \*Written paper of each subject will have 20 marks MCQs per paper.
- No Negative Markings
- University exams of MBBS Phase I will not include the subject of Community Medicine.
- \*\* Internal assessment marks will reflect under separate head in the marks card of the University examination

## **11 Supplementary examination**

- 11.1.** There shall be one main examination in an academic year and a supplementary examination held not later than 90 days after the declaration of the results of the main examination.
- 11.2.** Dates of the same will be notified in advance by the University.
- 11.3.** Students who pass this supplementary exam can continue in the MBBS Professional year II in the same year.
- 11.4.** If the student is unable to clear any of the 3 subjects, she/he will have to reappear in the next MBBS Professional year I examination for the said subject/s.

## 12 Criteria for pass and grace marks

- 12.1. **University Theory examination:** In subjects that have two papers, the student must secure at least 40% marks in each of the papers with minimum 50% of marks in aggregate (both papers together) to pass.
- 12.2. **University Practical Examination:** Student shall secure 50% marks in university practical examination and viva voce (together) to be declared pass.
- 12.3. Student shall obtain 50% marks in university conducted examination separately in Theory and Practical (practical includes Practical/clinical and Viva voce) in order to be declared as passed in that subject.
- 12.4. Internal assessment is considered under separate heading of passing. Students should secure at least 50% of the total marks (combined in Theory and Practical, not less than 40% in theory and practical separately) assigned for internal assessment in order to be declared successful at the final university of that subject.
- 12.5. Grace of up to 5 marks can be given to the student by the University if student is failing in only one subject as an aggregate.
- 12.6. If a candidate fails in either theory or practical, he/she has to appear for both in supplementary examination.

Re-evaluation/Recounting process shall be as per the rules of SDM University.

## 13 Declaration of class

- 13.1. A candidate having appeared in all the subjects in the same examination and passed that examination in the first attempt and secures 75% of marks or more of grand total marks prescribed will be declared to have *passed the examination with distinction*.
- 13.2. A candidate having appeared in all the subjects in the same examination and passed that examination in the first attempt and secures 65% of marks or more but less than 75% of grand total marks prescribed will be declared to have *passed the examination in First Class*.
- 13.3. A candidate having appeared in all the subjects in the same examination and passed that examination in the first attempt and secures 50% of marks or more but less than 65% of grand total marks prescribed will be declared to have *passed the examination in Second Class*.

- 13.4.** A candidate passing a university examination in more than one attempt shall be placed in *Pass class* irrespective of the percentage of marks secured by him/her in the examination.

*[Note: Fraction of marks should not be rounded off for clauses 13.1, 13.2, 13.3]*

#### **14 Number of Chances**

##### **For a student to pass MBBS Professional year I.**

- 14.1.** A maximum number of four permissible attempts would be available to clear the first Professional University examination, whereby the first Professional course will have to be cleared within 4 years of admission to the said course. Partial attendance at any University examination shall be counted as an availed attempt.

A learner shall not be entitled to graduate after 10 years of his/her joining of the first part of the MBBS course.

#### **15 Eligibility to join MBBS professional year II**

Only candidates who pass all the MBBS Professional year I subjects shall be eligible to join the MBBS Professional year II of the course.

## GLOSSARY

- **Competency:** The habitual and judicious use of communication, knowledge, technical skills, clinical reasoning, emotions, values, and reflection in daily practice for the benefit of the individual and community being served
- **Objective:** Statement of what a learner should be able to do at the end of a specific learning experience
- **Lecture:** Any instructional large group method including traditional lecture and interactive lecture
- **Small group discussion:** Any instructional method involving small groups of students in an appropriate learning context
- **DOAP (Demonstrate-Observe-Assist-Perform):** A practical session that allows the student to observe a demonstration assists the performer, perform in a simulated environment, perform under supervision or perform independently
- **OSPE:** Objective Structured Practical Examination
- **OSCE:** Objective Structured Clinical Examination
- **Skill assessment:** A session that assesses the skill of the student including those in the practical laboratory, skills lab, skills station that uses mannequins/ paper case/simulated patients/real patients as the context demands. Certification will be done for few selected skills based on CBME curriculum
- **Core:** A competency that is necessary in order to complete the requirements of the subject
- **Non-Core:** A competency that is optional in order to complete the requirements of the subject

- **Integration:** Integration is a learning experience that allows the learner to perceive relationships from blocks of knowledge and develop a unified view of its basis and its application
- **Horizontal integration:** can be facilitated by the following methods: Alignment of timetables of the three first year subjects wherever possible, consciously connecting what is learned in one subject with the other subjects during teaching and learning activities, Joint sessions by all the three departments which may be in the form of lectures, case-based learning or seminars
- **Vertical integration:** can be facilitated by the following methods: Discussing relevant clinical case scenarios during teaching and learning sessions, Guest lectures by clinicians or para-clinical faculty, Hospital visits to see relevant patient presentations, radiological imaging and operative procedures
- **AETCOM Module:** is a longitudinal program that will help students acquire necessary competence in the attitudinal, ethical and communication domains
- **Early clinical exposure (ECE) includes:**
  - Basic science correlation: i.e. apply and correlate principles of basic sciences as they relate to the care of the patient. (This will be part of integrated modules)
  - Clinical skills: To include basic skills in interviewing patients, doctor-patient communication, ethics and professionalism, critical thinking and analysis and self-learning. (This training will be imparted in the time allotted for early clinical exposure.)
  - Humanities: To introduce learners to a broader understanding of the socio-economic framework and cultural context within which health is delivered through the study of humanities and social sciences.
- **Self-Directed Learning (SDL):** SDL is “preparedness of a student to engage in learning activities defined by himself rather than a teacher”. Dedicated time for SDL is provided for each subject in the first phase.
- **Domains of learning:** K-Knowledge; S-Skill; A- Attitude; C-Communication



- **Levels of competency:**

K	Knows	A knowledge attribute – Usually enumerates or describes
KH	Knows how	A higher level of knowledge – is able to discuss or analyze
S	Shows	A skill attribute: is able to identify or demonstrate the steps
SH	Shows how	A skill attribute: is able to interpret / demonstrate a complex procedure requiring thought, knowledge and behavior
P	Performs (under supervision or independently)	Mastery for the level of competence - When done independently under supervision a pre specified number of times - certification or capacity to perform independently results

# **ANATOMY**

## **1. GOAL**

The broad goal of the teaching of undergraduate students in Anatomy aims at providing comprehensive knowledge of the gross and microscopic structure and development of human body to provide a basis for understanding the clinical correlation of organs or structures involved and the anatomical basis for the disease presentations.

## **2. OBJECTIVES**

### **2.1 KNOWLEDGE**

At the end of the course the student should be able to

- i. Comprehend the normal disposition, clinically relevant interrelationships, functional and cross sectional anatomy of the various structures in the body.
- ii. Identify the microscopic structure and correlate elementary ultra-structure of various organs and tissues and correlate the structure with the functions as a prerequisite for understanding the altered state in various disease processes.
- iii. Comprehend the basic structure and connections of the central nervous system to analyse the integrative and regulative functions of the organs and systems. He/She should be able to locate the site of gross lesions according to the deficits encountered.
- iv. Demonstrate knowledge of the basic principles and sequential development of the organs and systems; recognise the critical stages of development and the effects of common teratogens, genetic mutations and environmental hazards. He/She should be able to explain the developmental basis of the major variations and abnormalities.

### **2.2 SKILLS**

At the end of the course the student should be able to:

- i. Identify and locate all the structures of the body and mark the topography of the living anatomy.
- ii. Identify the organs and tissues under the microscope.
- iii. Understand the principles of karyotyping and identify the gross congenital anomalies.

- iv. Understand principles of newer imaging techniques and interpretation of Computerised Tomography (CT) Scan, Sonogram etc.
- v. Understand clinical basis of some common clinical procedures i.e., intramuscular and intravenous injection, lumbar puncture and kidney biopsy etc.

### 2.3 INTEGRATION

From the integrated teaching of other basic sciences, student should be able to comprehend the regulation and integration of the functions of the organs and systems in the body and thus interpret the anatomical basis of disease process.

### 3. TEACHING HOURS AND COURSE CONTENT

#### A. Teaching hours

**Total: 675 hours**

Theory: 220 hours

Practical: 415 hours

Self-directed learning (SDL): 40 hours

Early Clinical Exposure: 30 hours (18 hours Basic Science correlation + 12 hours clinical skills)

Sl. No.	Teaching Learning Method	No. of Hours
1	Large group teaching	220
2	Small group teaching (SGT) (Small group discussions- SGD/Tutorials/Seminars/ Case based learning sessions/Practical)	415
3	Self-directed Learning( SDL)	40
	<b>TOTAL</b>	<b>675</b>
4	Early Clinical Exposure	30

## B. COURSE CONTENT\*: THEORY

*\*Course content given below is based on the Competencies listed in MCI UG curriculum document.*

SL NO	TOPIC : GENERAL ANATOMY (WITH COMPETENCY NUMBER)	Hrs.
1	<b>Introduction (AN 1.1,73.1 )</b> <b>Core:</b> -Basic Anatomical Terminologies -Nomenclature, Planes, Positions -Cell Structure and Chromosomes <b>Non-Core</b> -History of Anatomy -Contribution by Anatomist towards the subject	09
2	<b>Skin and Superficial fascia (AN 4.1,4.2)</b> <b>Core:</b> -Structure and Function -Appendages -Types of sweat glands -Types of sensory receptors -Development and Applied Aspects <b>Non-Core</b> -Dermatomes, Skin incisions	
3	<b>Deep Fascia (AN 4.3,4.4,4.5)</b> <b>Core:</b> -Structure, Modifications and -Functions of Deep fascia -Details of Modifications <b>Non-Core</b> -Clinical correlation of Modifications of Deep fascia	
4	<b>Bones (AN 2.1)</b> <b>Core:</b> -Detailed classification with examples -Gross Anatomy of long bone <b>Non-Core</b> -Development and centres of ossification -Sesamoid bones, Laws of ossification	

5	<p><b>Muscle Tissue (AN 3.1,3.2,3.3) Core:</b></p> <ul style="list-style-type: none"> <li>-Classifications with examples</li> <li>-Nomenclature of Muscles</li> <li>-Neuro– Muscular junction,</li> <li>-Skeletal Muscle Fibres</li> <li>-Applied Anatomy</li> </ul> <p><b>Non-Core</b></p> <ul style="list-style-type: none"> <li>-Shunt and spurt muscle</li> </ul>	
6	<p><b>Blood Vessels (AN 5.1,5.2,5.3) Core:</b></p> <ul style="list-style-type: none"> <li>-Structural and Functional classifications with examples</li> <li>-Types of Anastomosis</li> </ul> <p><b>Non-Core</b></p> <ul style="list-style-type: none"> <li>-Vascular Diseases, Functions of metaarterial precapillary sphincter and AV anastomosis</li> </ul>	
7	<p><b>Lymphatic System (AN 6.1,6.2,6.3) Core:</b></p> <ul style="list-style-type: none"> <li>-Formation and components of Lymphatic System in detail</li> <li>-Functions of Lymphatic system</li> </ul> <p><b>Non-Core:</b></p> <ul style="list-style-type: none"> <li>-Clinical correlation with Diseases of Lymphatic System</li> <li>-Growth Pattern of Lymphoid Tissue, circulation of lymph</li> </ul>	
8	<p><b>Joints ( AN 2.4,2.5.2.6)</b></p> <p><b>Core:</b></p> <ul style="list-style-type: none"> <li>-Classification with examples</li> <li>-Structure of Typical Synovial joint</li> <li>-Hilton’s Law</li> <li>-Factors influencing movements</li> <li>-Anatomical Correlation with disease of joints</li> </ul> <p><b>Non-Core</b></p> <ul style="list-style-type: none"> <li>-Body levers</li> <li>-Bio-mechanics</li> </ul>	
9	<p><b>Nervous System (AN 7.1,7.2,7.3,7.4,7.5,7.6)</b></p> <p><b>Core:</b></p> <ul style="list-style-type: none"> <li>-Parts of Nervous system</li> <li>-Structure and function of different cells of Nervous System</li> <li>-Typical Spinal Nerve</li> </ul> <p><b>Non-Core:</b></p> <ul style="list-style-type: none"> <li>-Neurotransmitters -NM junction , Synapses</li> </ul>	

SL. NO.	TOPIC : GENERAL HISTOLOGY (WITH COMPETENCY NUMBER)	Hrs.
1	<b>Microscope and common objects under microscope (AN 65.1)</b> <b>Core:</b> -Different types of microscopes -Working principal of different types of microscopes -Compound microscope. Parts and Functions -H and E staining	
2	<b>Epithelium (AN 65.1,65.2)</b> <b>Core:</b> -Types and Functions of each Epithelium -Glands -Surface modification of cell <b>Non-Core:</b> -Ultrastructure of epithelium	
3	<b>Connective Tissue ( AN 66.1, 66.2)</b> <b>Core:</b> -Components, Types and-Clinical correlation Functions of connective tissue -Details of each component <b>Non-Core:</b> -Ultrastructure of connective tissue	
4	<b>Cartilage (AN 71.2)</b> <b>Core:</b> -Components of cartilage -Types, Structure in detail of each type of cartilage -Growth of cartilage <b>Non-Core:</b> -Applied Aspect	
5	<b>Bone (AN 71.1)</b> <b>Core:</b> -Types -Structural composition of bone -Ossification	
		<b>10</b>

6	<p><b>Muscular Tissue (AN 67.1,67.2)</b>  <b>67.3</b>  <b>Core:</b>  -Types and Structural organization  -Muscle triad  <b>Non-Core:</b> -Ultrastructure of Muscle tissue</p>	
7	<p><b>Nervous Tissue (AN 68.1,68.2,68.3)</b>  <b>Core:</b>  -Classification of Neurons and nerve fibres with example  -Myelination  -Structure of different types of ganglia  <b>Non-Core:</b>  -Types of nerve injury. Applied Histology  -Ultrastructure of nervous tissue</p>	
8	<p><b>Blood–Vascular System (AN 69.1,69.2,69.3)</b>  <b>Core:</b>  -Structural classification of blood vessels in detail  -Micro–structure of Anastomosis  -Applied Histology  -Ultrastructure of blood vessel</p>	
9	<p><b>Lymphatic System (AN 70.2)</b>  <b>Core:</b>  -Structure of Primary and Secondary lymphoid organs  -Circulation of lymph in Lymph Node  -Blood–Thymus Barrier  -Theories of Splenic circulation  -Waldeyer’s ring</p>	
<p><b>TOPIC : SYSTEMIC HISTOLOGY  (WITH COMPETENCY NUMBER)</b></p>		
10	<p><b>Digestive System -1 (AN 70.1)</b>  <b>Core:</b>  -Salivary Glands  -Composition of saliva</p>	
11	<p><b>Integumentary system (AN 72.1)</b>  <b>Core:</b>  -Types, Structure, Functions of Skin -Appendages  -Details of the appendages</p>	

	<b>Non-Core:</b> -Clinical histology	
<b>12</b>	<b>Placenta and Umbilical cord (AN 52.2)</b> <b>Core:</b> -Structure and Functions -Types of placenta	
<b>13</b>	<b>Respiratory system (AN 43.2,25.1)</b> <b>Core:</b> -Trachea -Lung -Tracheobronchial tree -Epiglottis structure <b>Non-Core:</b> -Air blood barrier	
<b>14</b>	<b>Digestive System -2 (AN 42.3,43.3,52.3,52.1)</b> <b>Core:</b> -Tongue -Oesophagus -Stomach- Fundus and pylorus -Duodenum -Jejunum -Ileum -Colon -Appendix -Functional correlation	
<b>15</b>	<b>Accessory organs of digestive System (AN 52.1) Core:</b> -Liver -Gall bladder -Pancreas <b>Non-Core:</b> -Bile formation and circulation	
<b>16</b>	<b>Excretory system (AN 52.2)</b> <b>Core:</b> -Kidney -Ureter -Urinary bladder <b>Non-Core:</b> -Counter current mechanism	



17	<b>Male reproductive system (AN 52.2)</b> -Testis -Epididymis -Prostate -Vas deferens <b>Non-Core:</b> -Spermatogenesis	
18	<b>Female reproductive system (AN 52.2,52.3)</b> <b>Core:</b> -Ovary -Fallopian tube -Uterus -Oogenesis	
19	<b>Endocrine system (AN 43.2, 52.1)</b> <b>Core:</b> -Pituitary gland -Thyroid gland -Parathyroid gland -Suprarenal gland -Hypothalamus -Hypophyseal portal system <b>Non-Core:</b> -Synthesis and functions of hormones	
20	<b>Special sense organs (AN 43.2, 43.3)</b> <b>Core:</b> -Cornea -Retina -Optic nerve -Clinical histology -Photo receptors <b>Non-Core:</b> -Visual pathway	17
21	<b>Central nervous system (AN 64.1 )</b> <b>Core:</b> -Spinal cord -Cerebellum -Cerebrum -Neurons in detail	

SL. NO.	TOPIC : GENERAL EMBRYOLOGY (WITH COMPETENCY NUMBER)	Hrs.
1	<b>Introduction (AN 76.1,76.2,77.1,77.2,77.3,77.4,77.5,77.6)</b> <b>Core:</b> -Male and Female reproductive system -Gestational period and its subdivisions -Gametogenesis -Spermatogenesis, oogenesis -Structure of male and Female gametes -Fertilization – stages and effects of fertilization - Process involved in development -Principles of family planning -Inducers during pre-natal growth <b>Non-Core:</b> -Sterility, In vitro fertilization	
2	<b>1<sup>st</sup> week changes (AN 78.1,78.2,78.3)</b> <b>Core:</b> -Zygote formation -Cleavage division -Formation of morula and blastocyst -Implantation -Types and Abnormal sites of implantation <b>Non-Core:</b> -Basis of multiple births	
3	<b>2<sup>nd</sup> week changes (AN 78.4,78.5,)</b> <b>Core:</b> -Differentiation of embryoblast -Differentiation of trophoblast -Bilaminar germ disc -Other events like abortion and pregnancy test	

4	<p><b>3<sup>rd</sup> week changes (AN 79.1,79.2,)</b>  <b>Core:</b>  -Formation of trilaminar germ disc  -Primitive streak  -Formation of notochord  -Development of chorionic villi  -Derivatives of ectoderm, endoderm and mesoderm  -Intra-embryonic mesoderm  -Allantoic diverticulum  -Connecting stalk  -Formation of neuro-enteric canal</p>	
5	<p><b>Embryonic period (4-8 week) (AN 79.3,79.4,79.5,79.6)</b>  <b>Core:</b>  -Formation of neural tube and neural crest cells  -Formation of somites  -Folding of embryo  -Formation and subdivision of gut tube  -Structure along the median plane of developing germ disc in cephalo-caudal direction  <b>Non-Core:</b>  -Estimation of embryonic age  -Congenital malformation and role of teratogens</p>	18
6	<p><b>Foetal period (AN 79.4) Core:</b>  -Changes from 3<sup>rd</sup> month to birth  -Brief account of maturation of tissues, organs and growth of body  -Estimation of age</p>	
7	<p><b>Amniotic cavity (AN 80.1,80.2,80.3,80.4)</b>  <b>Core:</b>  Arrangement of foetal membranes  -Amniotic membrane  -Amniotic fluid  -Chorion  -Formation of twins  -Types of twinning  <b>Non-Core:</b>  -Estimation of fetal age</p>	

8	<p><b>Placenta (AN 81.1,81.2,81.3)</b>  <b>Core:</b>          -Stages of formation          -Features and functions          -Types of placenta          -Placental barrier          -Abnormalities of placenta, formation and features  <b>Non-Core:</b>          -Umbilical cord and its abnormal attachments</p>	
9	<p><b>Clinical Genetics and Teratology (AN3.1,73.2,73.3,74.1,74.2,74.3,74.5,75.1,75.2,75.3,75.4,75.5)</b>  <b>Core:</b> -Chromosomes          -Pattern of Inheritance          -Causative factors for congenital malformations          -Teratogens</p>	3
<b>SL. NO.</b>	<b>TOPIC : SYSTEMIC EMBRYOLOGY (WITH COMPETENCY NUMBER)</b>	<b>Hrs.</b>
1	<p><b>Digestive system (AN 52.4,52.6,)</b>  <b>Core:</b>          -Subdivision of gut tube          -Derivatives of foregut, midgut and hindgut          -Rotation of mid-gut          -Cloaca          -Errors of rotation of gut          -Congenital anomalies</p>	
2	<p><b>Respiratory system (AN 25.2)</b>  <b>Core:</b>          -Development of trachea and lungs</p>	
3	<p><b>Coelomic cavities (AN 52.4,52.5)</b>  <b>Core:</b>          -Development of pericardial, pleural and peritoneal cavities          -Development of the diaphragm (thoraco-abdominal)          -Congenital anomalies of the diaphragm</p>	

<p><b>4</b></p>	<p><b>Development of CVS (AN 25.2,25.3,25.4,25.5,25.6,52.5)</b>  <b>Core:</b>          -Development of heart and its anomalies          -Foetal circulation          -Anomalies of great vessels  <b>Non-Core:</b>          -Formation and differentiation of Aortic arterial arches          -Development of venous system          -Development of arteries of limbs</p>	
<p><b>5</b></p>	<p><b>Urogenital system (AN 52.7,52.8)</b>  <b>Core:</b>          -Development of kidney and ureter          -Development urinary bladder and urethra          -Congenital anomalies          -Development of gonads and genital ducts with associated development anomalies.          -Pathogenesis of congenital anomalies</p>	
<p><b>6</b></p>	<p><b>Development of head, neck (AN 43.4,39.1)</b>  <b>Core:</b>          -Branchial apparatus -differentiation and derivatives in detail with congenital anomalies          -Development of face, Nasal cavity, Palate          -Development of endocrine glands  <b>Non-Core:</b>          -Development of salivary glands</p>	
<p><b>7</b></p>	<p><b>Nervous system (AN 64.2,64.3)</b>  <b>Core:</b>          -Division and histogenesis of neural tube          -Differentiation of neural tube          -Development of brain, brainstem, cerebellum and spinal cord  <b>Non-Core:</b>          -Defects of neural tube</p>	<p><b>24</b></p>

<b>8</b>	<b>Development of special sensory organs</b> <b>Non-Core:</b> -Development of eye and ear	
<b>9</b>	<b>Miscellaneous (AN 13.8,20.10,9.3,)</b> <b>Non-Core:</b> -Development of mammary gland. -Development of muscular system -Development of skeletal system -Development of integumentary system -Development of lymphatic system	

<b>TOPIC : UPPER LIMB (WITH COMPETENCY NUMBER)</b>		
<b>1</b>	<b>Pectoral Region (AN 9.1,9.2,9.3)</b> <b>Core:</b> - Mammary Gland - Clavi-pectoral fascia - Muscles -Clinical correlation <b>Non-Core:</b> -Examination of Breast and axillary Lymph Nodes	Hrs.
<b>2</b>	<b>Axilla (AN 10.1,10.2,10.3,10.4,10.5,10.6,10.7)</b> <b>Core:</b> - Boundaries and contents in detail - Brachial plexus - Axillary vessels - Axillary Group of Lymph Nodes <b>Non-Core:</b> -Applied Anatomy	
<b>3</b>	<b>Back and Scapular Region (AN 10.8,10.9,10.10) Core:</b> - Muscles,Neuro-vascular structures - Inter-muscular spaces - Deltoid muscle and structures under it -Acromio-clavicular joint -Sterno-clavicular joint -Deep group of muscles of back <b>Non-Core:</b> -Anastomosis around scapula, Triangle of auscultation, Applied Aspect	

4	<b>Shoulder Joint (AN 10.12,10.13)</b> <b>Core:</b> -Detailed description of joint -Applied Aspect <b>Non-Core:</b> -Axillary nerve injury	10
5	<b>Arm (AN 11.1,11.2,11.3,11.4,11.5,13.1,13.2,13.3)</b> <b>Core:</b> - Anterior compartment and its contents - Posterior compartment and its contents - Applied Aspects	
6	<b>Elbow Region (AN 11.6)</b> <b>Core:</b> - Cubital Fossa – Boundaries and contents - Elbow joint in detail -Applied Aspect <b>Non-Core:</b> - Anastomosis around elbow joint	
7	<b>Forearm (AN 12.1,12.2,12.3,12.4)</b> <b>Core:</b> - Anterior compartment contents in detail - Posterior compartment contents in detail - Radio-ulnar joints - Applied Anatomy	
8	<b>Wrist and Hand (AN 12.5,12.6,12.8)</b> <b>Core:</b> - Palmar and Dorsal Aspect - Retinacula - Muscles and Neuro - Vascular structures of hand - Wrist joint, Extensor expansion - 1st Carpometacarpal joint - Surgical Spaces of Hand - Applied aspect <b>Non-Core:</b> - Types of Grips - Other joints of Hand	

<b>TOPIC : LOWER LIMB (WITH COMPETENCY NUMBER)</b>		
<b>1</b>	<b>Introduction of Lower Limb (AN 20.3,20.4,20.5)</b> <b>Core:</b> -Venous drainage of Lower Limb -Cutaneous nerves of Lower Limb -Lymphatic drainage of Lower Limb -Deep fascia <b>Non-Core:</b> -Applied aspect of Lymphatic drainage of Lower Limb	Hrs.
<b>2</b>	<b>Thigh Region (AN 15.3,15.5,16.4,16.5,16.6)</b> <b>Core:</b> -Anterior compartment and its contents -Adductor compartment and its contents -Posterior compartment and its contents -Applied Aspect <b>Non-Core:</b> -Psoas abscess, Femoral hernia	<b>15</b>
<b>3</b>	<b>Gluteal Region (AN 16.1,16.2,16.3)</b> <b>Core:</b> -Structures in detail -Clinical Application	
<b>4</b>	<b>Hip Joint (AN 17.1,17.2,17.3)</b> <b>Core:</b> -Detailed description of joint -Applied Aspect <b>Non-Core:</b> -Fracture neck of femur, Dislocation of hip joint and hip replacement	
<b>5</b>	<b>Knee Region (AN 18.5,18.6,18.7,18.4,16.5,16.6)</b> <b>Core:</b> -Popliteal fossa -Knee joint in detail <b>Non-Core:</b> -Clinical correlation	



6	<p><b>Leg Region (AN 18.1,18.2,18.3,19.1,19.2,19.3)</b>  <b>Core:</b>  - Anterior compartment in detail  - Lateral compartment in detail  - Posterior compartment in detail  -Superior and inferior tibiofibular joint  <b>Non-Core:</b>  -Clinical Aspect</p>	
7	<p><b>Foot AN (19.5,19.6,19.7,20.1,20.2,20.4)</b>  <b>Core:</b>  -Detailed description of ankle joint  -Retinaculae  -Arrangement of Structures in sole of foot  -Arches of foot in detail  -Talo-calcaneo-navicular joint  -Sub-talar joint  -Dorsum of foot  <b>Non-Core:</b>  -Other joints of foot  -Types of Gait  -Applied Aspect</p>	

<p><b>TOPIC : THORAX</b>  <b>(WITH COMPETENCY NUMBER)</b></p>		
1	<p><b>Thoracic Cage (AN 21.3,21.4,21.5,21.6,21.7)</b>  <b>Core:</b>  - Superior Aperture  - Inferior Aperture (Diaphragm)  - Intercostal spaces in detail  - Respiratory movements  <b>Non-Core:</b>  -Costotransverse joint  -Atypical intercostal nerve, Superior intercostal artery ,Subcostal artery  -Clinical Anatomy</p>	Hrs.

2	<b>Mediastinum (AN 21.11, 24.1)</b> <b>Core:</b> -Sub-divisions and contents -Clinical Anatomy	10
3	<b>Lungs and Pleura , Trachea (AN 24.2,24.3)</b> <b>Core:</b> -Gross anatomy in detail -Clinical Anatomy <b>Non-Core:</b> -Trachea	
4	<b>Pericardium and Heart (AN 22.1,22.3,22.4,22.5,22.6)</b> <b>Core:</b> - Gross Anatomy of heart - Pericardium -Fibrous skeleton of heart -Conducting System -Cardiac Plexus -Clinical Anatomy	
5	<b>Posterior Mediastinum (AN 23.1,23.2,23.3,23.4,23.5,23.6,23.7)</b> <b>Core:</b> - Oesophagus - Thoracic duct - Azygous system of veins - Arch of aorta and Descending aorta -Sympathetic Nerves and its branches -Lymph nodes -Clinical Anatomy <b>Non-Core:</b> -Splanchnic nerves	



<b>7</b>	<p><b>Posterior Abdominal Wall (AN 47.6,47.7 47.12,47.13,47.14)</b></p> <p><b>Core:</b></p> <ul style="list-style-type: none"> <li>-Kidney, Suprarenal Gland</li> <li>-Ureters</li> <li>-Abdominal Aorta</li> <li>-Inferior Vena Cava</li> <li>-Muscles</li> <li>-Thoracolumbar Fascia</li> <li>- Thoracoabdominal diaphragm</li> <li>-Applied Anatomy</li> </ul> <p><b>Non-Core:</b></p> <ul style="list-style-type: none"> <li>-Sympathetic Nervous System</li> <li>- Abnormal opening of the thoracoabdominal diaphragm and diaphragmatic hernia</li> </ul>	
<b>8</b>	<p><b>Pelvis (AN 48.1,48.2,48.7,49.1,49.2,49.3,49.4,49.5,49.3,49.4)</b></p> <p><b>Core:</b></p> <ul style="list-style-type: none"> <li>-Urinary Bladder, Prostate, Urethra</li> <li>-Uterus, Fallopian Tubes, Ovary</li> <li>-Rectum, Anal Canal, Ischio-Rectal Fossa</li> <li>-Pelvic Diaphragm, Urogenital diaphragm and Perineum</li> <li>-Seminal vesicle</li> <li>-Male and Female External Genitalia</li> </ul> <p><b>Non-Core:</b></p> <ul style="list-style-type: none"> <li>-Applied Aspect</li> </ul>	

<b>TOPIC : HEAD AND NECK (WITH COMPETENCY NUMBER)</b>		
<b>1</b>	<p><b>Head (AN 27.1,27.2,28.1,28.7)</b></p> <p><b>Core:</b></p> <ul style="list-style-type: none"> <li>-Scalp , face</li> <li>-Lacrimal Apparatus</li> <li>-Nerve plexus between facial and Trigeminal Nerve</li> <li>-Cervical lymph nodes and Lymphatic drainage of head, face and neck</li> <li>-Anatomical basis of facial nerve palsy</li> <li>-Deep facial vein</li> </ul>	Hrs.

2	<p><b>Parotid Region (AN 28.9)</b>  <b>Core:</b>          -Parotid Gland and Structures related to it  <b>Non-Core:</b>          -Frey's Syndrome</p>	
3	<p><b>Deep Cervical Fascia (AN 35.1,35.10)</b>          -All layers and its reflections          -Pharyngeal spaces          -Clinical Anatomy  <b>Non-Core:</b>          -Facial spaces</p>	
4	<p><b>Neck AN (29.1,35.9, 32.2,35.2,42.1,42.2,42.3,43.2)</b>  <b>Core:</b>          -Posterior triangle          -Sub-occipital triangle          -Anterior Median Region of neck          -Anterior triangle          -Sub-mental triangle-Digastric triangle          -Carotid triangle and Submandibular region          -Thyroid gland          -Deep structures of neck          -Subclavian artery, cervical part of sympathetic chain and its branches in detail          -Muscular triangle -Applied Aspect  <b>Non-Core:</b>          -Cervical rib, Thyroid swellings</p>	26
5	<p><b>Cranial Cavity (AN 30.3,30.4)</b>  <b>Core:</b>          -Meninges          -Dural venous sinuses , Cavernous sinus in detail          -Cranial Nerves          -Trigeminal Ganglion -Clinical Correlation  <b>Non-Core:</b>          -Pituitary tumours</p>	

6	<p><b>Orbit (AN 41.1, 41.2, 41.3,31.1,31.2,31.3,31.4)</b></p> <p><b>Core:</b>          Contents of orbit in detail          - Layers of Eye ball          -Applied Anatomy</p> <p><b>Non-Core:</b>          -Anatomical aspects of cataract ,glaucoma and CRA occlusion          - Intraocular muscles</p>	
7	<p><b>Infra-temporal Fossa (AN 33.1,33.2,33.3,33.4,33.5)</b></p> <p><b>Core:</b>          -Muscles of Mastication          -Maxillary Artery          -Mandibular Nerve and Otic Ganglion          -Temporo-Mandibular Joint          -Pterygoid venous plexus and its connections</p> <p><b>Non-Core:</b>          -Pterygo–palatine fossa and its contents          -Applied Aspect of TMJ</p>	
8	<p><b>Nose (AN 37.1,37.2,37.3)</b></p> <p><b>Core:</b>          -Walls of Nasal cavity          -Para-nasal Air sinuses</p> <p><b>Non-Core:</b>          -Anatomical basis of sinusitis and maxillary sinus tumors</p>	
9	<p><b>Oral Cavity (AN 36.1,36.2,36.3,36.4)</b></p> <p><b>Core:</b>          -Palatine Tonsil          -Palate          -Tongue</p> <p><b>Non-Core:</b>          -Anatomy of Tooth and gums</p>	

10	<b>Pharynx (AN 36.4,36.5)</b> <b>Core:</b> -Nasopharynx - Eustachian tube -Oropharynx -Laryngopharynx -Walls of Pharynx -Pharyngeal nerve plexus <b>Non-Core:</b> -Deglutition, Pyriform Fossa -Applied Aspect	
11	<b>Larynx (AN 38.1,38.2,38.3)</b> <b>Core:</b> -Skeleton and Muscles of Larynx -Interior of larynx -Glottis -Vocal Cords <b>Non-Core:</b> -Applied Aspect	
12	<b>Ear (AN 40.1,40.2)</b> <b>Core:</b> -External Ear -Middle Ear and Eustachian tube <b>Non-Core:</b> -Inner Ear , Otitis externa and Otitis Media, Myringotomy	

<b>TOPIC : NEUROANATOMY (WITH COMPETENCY NUMBER)</b>		
1	<b>Spinal Cord (AN 57.1,57.2)</b> <b>Core:</b> -External features of spinal cord - Blood supply -Internal features of spinal cord at mid cervical and mid thoracic level. -Clinical correlation -Ascending and descending pathways <b>Non-Core:</b> -Syringomyelia	Hrs.

2	<b>Brain–stem (AN 58.3,58.4,59.1,59.2,59.3)</b> <b>Core:</b> -External and Internal features of medulla oblongata, pons and midbrain -Blood supply <b>Non-Core:</b> -Reticular formation -Clinical syndromes	
3	<b>Cerebellum (AN 64.1,62.3)</b> <b>Core:</b> -External and Internal features , -Cerebellar connections -Blood supply -Details of cerebellar peduncles <b>Non-Core:</b> -Cerebellar syndromes	
4	<b>Cerebral hemisphere (AN 62.2,62.3,62.4)</b> <b>Core:</b> -External features -Functional areas -Clinical correlation -Motor and sensory homunculi	12
5	<b>White fibres of Cerebrum (AN 62.2,62.3,62.4)</b> <b>Core:</b> -Types of white fibres in detail -Internal capsule -Corpus callosum -Applied Aspect	
6	<b>Basal Ganglia (AN 62.4,62.5)</b> <b>Core:</b> -Parts and Functions -Clinical Correlation	
7	<b>Limbic System (AN 62.4,62.5)</b> <b>Core:</b> -Components and Functions -Clinical correlation	



8	<b>Thalamus and Hypothalamus (AN 62.4,62.5)</b> <b>Core:</b> -Features, Relations and Functions	
9	<b>Ventricles of brain (AN 63.1,63.2,56.1,56.2) Core:</b> -Lateral ventricle -Third ventricle -Fourth ventricle -CSF Formation -Cisterns -Applied Anatomy -Composition of CSF <b>Non-Core:</b> -Circumventricular organs -Congenital Hydrocephalous	
10	<b>Blood Supply of brain (AN 62.6)</b> <b>Core:</b> -Arterial circle of Willis -Arterial supply of brain in detail -Venous drainage -Clinical Aspect -Blood-brain barrier	
11	<b>Functional components of cranial nerves (AN 62.1)</b> <b>Core:</b> -Sensory component -Motor component -Secreto-motor component -Intra-cranial course of cranial nerves	
<b>TOPIC : OSTEOLOGY (WITH COMPETENCY NUMBER)</b>		
1	<b>Upper Limb (AN 8.1,8.28.3,8.4,8.5)</b> <b>Core:</b> -Clavicle, Scapula, Humerus, Radius, Ulna, Articulated Hand (Features, Attachments and Relation of each bone) -Applied Anatomy	Hrs.
2	<b>Lower Limb (AN 14.1,14.2,14.3,14.4)</b> <b>Core:</b> -Hip bone, Femur, Patella, -Tibia, Fibula, Articulated Foot -Applied Anatomy	

<b>3</b>	<b>Thorax (AN 21.1,21.2,50.2)</b> <b>Core:</b> -Sternum, Ribs, Thoracic vertebrae -Movements of Thoracic cage	<b>32</b>
<b>4</b>	<b>Lumbar vertebra, Sacrum, Articulated Pelvis (AN 50.150.2,,53.1,53.2,53.3,53.4,54.1,54.2,54.3)</b> <b>Core:</b> -Sex differentiation of pelvis -Features and Attachments -Relation of each bone <b>Non-Core:</b> -Pelvimetry	
<b>8</b>	<b>Skull (AN 26.1,26.2,26.3,26.4,26.5,26.7)</b> <b>Core:</b> - Normas, cranial fossae -Cervical vertebrae -Hyoid bone -Fetal Skull -Individual bones of skull <b>Non-Core:</b> -Facial bones	

<b>SL. NO.</b>	<b>SURFACE MARKING TOPICS</b> <b>Core</b>	<b>Hrs.</b>
<b>1</b>	Surface features and bony projections of all the regions of the body Upper limb (AN 8.1,8.28.3,8.4,8.5)	<b>04</b>
<b>2</b>	Lower Limb (AN 14.1,14.2,14.3,14.4)	
<b>3</b>	Outline of the viscera in the region of thorax and abdomen <b>AN 55.1,55.2</b>	
<b>4</b>	Head and Neck (AN 26.1,26.2,26.3,26.4,26.5,26.7)	

<b>SL. NO</b>	<b>RADIOLOGICAL ANATOMY TOPICS</b> <b>Core</b>	<b>Hrs.</b>
---------------	---	-------------

<b>1</b>	<b>Normal X-rays</b>	Normal Skiagrams of 1. Upper limb 2. Lower limb 3. Thorax 4. Abdomen and Pelvis 5. Head and Neck -Clinical correlation	<b>04</b>
<b>2</b>	<b>Special X-rays</b>	Special Skiagrams of different regions of the body -Investigative procedures like barium studies, pyelography and hysterosalpingography etc. -CT Scan and MRI	

**Assessment methods for Theory (Formative and Summative)**

- **Written (MCQ's/Structured Long Essay Questions/Short essay questions/Short Answer questions/Case vignette Based Questions).**
- **Viva-Voce.**

**Note: Content under NONCORE category must not be assessed in Summative Assessments. However, the same can be assessed in Formative Assessments.**

<b>SUGGESTED DISTRIBUTION OF TEACHING HOURS</b>				
<b>SL. NO</b>	<b>Topic</b>	<b>Large Group (220)</b>	<b>Dissection/Practical SGT/tutorials/Integrated learning (415)</b>	<b>Self-Directed Learning (SDL)</b>
1.	Orientation lecture and General Anatomy	09		<b>40</b>
2.	Histology	39	80	
3.	Embryology	39		
4.	Osteology		32	
5.	Upper limb	12		

6.	Lower limb	15	295
7.	Thorax	10	
8.	Abdomen and Pelvis	24	
9.	Head and neck	26	
10.	Neuroanatomy	06	
11.	Surface marking		04
12.	Radiology		04
13.	Revision	40	
	<b>TOTAL</b>	<b>220</b>	<b>415</b>

**Note:** The above table of teaching hours assigned to different topics under large and small group teaching is suggested which may be used as a guide by the Institute.

### C. PRACTICAL: 415 HOURS

Dissection- 295 hours

Histology - 80 hours

Osteology+ Surface marking+ Radiology: 40 hours

### 4. CERTIFICATION OF SKILLS

**To be evaluated using format provided in Annexures. Checklist can be prepared by subject experts.**

Competency Description with Competency number	No. required to certify P
Identify epithelium under the microscope and describe the various types that correlate to its functions (AN 66.1)	1

**Note:** In theory, Practical and certification of skill sections, topics with corresponding competency numbers as mentioned in volume 1 of competency based undergraduate curriculum for Indian Medical Graduate (2018) prescribed by Medical Council of India, have been mentioned.

### 5. SCHEME OF EXAMINATION

#### A. INTERNAL ASSESSMENT (IA):

#### THEORY INTERNAL ASSESSMENT:

- A minimum of **THREE** Theory Internal Assessments (IA) to be conducted. 3<sup>rd</sup> Internal assessment must be conducted similar to the university examination pattern.
- **Components of Theory IA:** (Marks distribution given in table below)
  - Marks obtained in Theory IA written papers
  - Continuous assessment marks shall be calculated based on scoring in written tests/ assignments/ creative writing experiences of AETCOM modules
  - Log book assessment of ECE, SDL, Seminars, Quiz etc.

### **PRACTICAL INTERNAL ASSESSMENT**

- A minimum of **THREE** Practical Internal Assessments (IA) to be conducted. 3<sup>rd</sup> Internal assessment must be conducted similar to the university examination pattern.
- **Components of Practical IA:** (Marks distribution given in table below)
  - Marks obtained in Practical IA exams
  - Viva/oral examination should assess approach to clinical context in the concepts of basic sciences.
  - Record book evaluation
  - Log book assessment of skill competencies acquired in specified subject and AETCOM.

The distribution of internal assessment marks shall be as mentioned below:

<b>Theory IA</b>	<b>Maximum Marks</b>	<b>Practical IA</b>	<b>Maximum Marks</b>
Theory IA written paper	70	Practical IA exam and Viva Voce	70 (50+20)
Continuous assessments 4. Written tests (Part completion tests/ system based tests) – 20 marks 5. Written tests for ECE and/or SDL topics and/or	30	Continuous assessments 4. Record book evaluation – 10 marks 5. Log book assessment of skill competencies	30

creative writing experience of AETCOM (Logbook assessment) – 5 marks 6. Participation in ECE and SDL sessions – 5 marks		acquired in specified subject – 15 marks 6. Participation in SGT and AETCOM – 5 marks	
<b>TOTAL</b>	<b>100</b>		<b>100</b>

### **FINAL INTERNAL ASSESSMENT MARKS**

**The final Internal assessment (IA) marks will be calculated as follows:**

**Average of all 3 IA will be considered as Final IA marks in Theory and Practical separately.**

Level of participation in ECE, SDL and AETCOM modules shall be assessed using the format given in annexure.

A clear record of all components that add to the internal assessment marks needs to be maintained by the institution/departments and retained by them for at least 5 years after completion of the examination.

The internal and formative assessments provide ideal opportunities for students and teachers to identify learning gaps. Teachers should provide high quality feedback to each student to enable them to bridge these learning gaps.

The format for providing feedback is given in annexure.

The results of IA shall be displayed on the notice board within 1-2 weeks of the test. Suitable remedial measures for students who are either not able to score qualifying marks or have missed on some assessments due to any reason shall be taken by college.

Formative assessments also enable the early identification of students who are struggling to achieve the intended learning outcomes. Early and appropriate targeted remediation must be planned for such students.

## **B. SUMMATIVE ASSESSMENT:(University examination)**

### **Eligibility for University Examinations**

- **Attendance**

Attendance requirements are 75% in theory and 80% in practical /clinical for eligibility to appear for the examinations in that subject. In subjects that are taught in more than one phase – the learner must have 75% attendance in theory and 80% in practical in each phase of instruction in that subject.

AETCOM sessions: 75% attendance in Professional Development Programme (AETCOM Module) is required for eligibility to appear for final examination in each professional year.

- **Internal Assessment Marks**

Learners must secure at least 50% marks of the total marks (combined in theory and practical / clinical; not less than 40 % marks in theory and practical separately) assigned for internal assessment in a particular subject in order to be eligible for appearing at the final University examination of that subject.

- **Certifiable competencies and Log book**

Learners must have completed the required certifiable competencies for that phase of training and completed the log book appropriate for that phase of training to be eligible for appearing at the final university examination of that subject.

### **Pass criteria:**

- **University Theory examination:** In subjects that have two papers, the student must secure at least 40% marks in each of the papers with minimum 50% of marks in aggregate (both papers together) to pass.
- **University Practical Examination:** Student shall secure 50% marks in university practical examination and viva voce (together) to be declared pass.
- Student shall obtain 50% marks in university conducted examination separately in Theory and Practical (practical includes Practical/clinical and Viva voce) in order to be declared as passed in that subject.

- Internal assessment is considered under separate heading of passing. Students should secure at least 50% of the total marks (combined in Theory and Practical, not less than 40% in theory and practical separately) assigned for internal assessment in order to be declared successful at the final university of that subject.

### MARKS DISTRIBUTION FOR UNIVERSITY EXAMINATION

THEORY			THEORY TOTAL	PRACTICAL		PRACTICAL TOTAL
	Written paper	MCQ's		Practical	Viva Voce	
PAPER 1	80	20	<b>200</b>	80	20	<b>100</b>
PAPER 2	80	20				

#### THEORY UNIVERSITY EXAMINATION:

**Written paper: Paper-1: 100 marks + Paper 2: 100 marks = 200 marks**

**Time: 3 hours for each paper**

The pattern of questions in each paper shall be as mentioned below:

Type of Question	Number of Questions	Maximum Marks for each question	Total
Multiple Choice Questions (MCQs)	20	01	20
Structured Long essay questions (SLEQ)	02	10	20
Short essay questions (SEQ)	08	05	40
Short answer questions (SAQ)	10	02	20
<b>Total marks</b>			<b>100</b>

The question papers shall be based on the blue print of question paper setting.

The weightage of marks allotted for each topic shall be strictly adhered to.

A MINIMUM OF 20% up to a MAXIMUM OF 40% marks shall be allocated to assess the higher order thinking of the learner.

The questions framed shall be with appropriate verbs without any ambiguity or overlap.



### **Distribution of topics for Paper 1 and Paper 2 for University summative examination:**

<b>Sl. No</b>	<b>Paper 1 Topics</b>	<b>Weightage Marks</b>	<b>Sl No.</b>	<b>Paper 2 Topics</b>	<b>Weightage Marks</b>
1	Head and Neck	17-35	1	Abdomen	25-40
2	Brain and Spinal cord	7-12	2	Pelvis and Perineum	10-17
3	Upper limb	12-22	3	Lower limb	17-30
4	Thorax including diaphragm	15-25	4	Systemic Histology	5-8
5	General Anatomy	5-8	5	Genetics	5-8
6	General Embryology	5-8	6	Systemic Embryology	5-8
7	General Histology	5-8			

#### **Note:**

- *Weightage of marks assigned to topics may add to more than 100.*
- *Long essay question should be from the topics with weightage of 10 or MORE THAN 10.*
- *The topics to different paper are generally evaluated under those sections. However, a strict division of the subject may not be possible and some overlapping of topics is inevitable. Students should be prepared to answer overlapping topics.*

#### **Blueprint for the anatomy theory examinations**

##### **(To be filled by the question paper setter)**

- Total marks under each type of question from each topic needs to be entered by QP Setter.
- It should be in accordance with Shri Dharmasthala Manjunatheshwara University guidelines.

## ANATOMY - BLUE PRINTING OF QUESTION PAPER

A	B	C	D	E	F	G	H	I	
SL. NO	ANATOMY PAPER 1 Topics	Weightage of Marks as per SDMU guideline	MCQs 1X20= 20 marks	SLEQ 10X= 20 marks	SEQ 5X8Q= 40 marks	SAQ 10X2= 20 marks	Total marks (Topic wise) (D+E+F+G)	HOTS including Case vignette based questions (20-40 Marks)	
								Q No.	Marks
1	Head and Neck	17-35							
2	Brain and Spinal cord	7-12							
3	Upper limb	12-22							
4	Thorax including diaphragm	15-25							
5	General Anatomy	5-8							
6	General Embryology	5-8							
7	General Histology	5-8							
<b>Total Marks (Question wise)</b>			<b>20</b>	<b>20</b>	<b>40</b>	<b>20</b>	<b>100</b>	<b>Total HOTS</b>	
<p><i>Long essay question should be from the topics with weightage of 10 or MORE THAN 10.</i></p> <p><i>Multiple Choice Questions (MCQs); Structured Long essay questions (SLEQ); Short essay questions (SEQ); Short answer questions (SAQ)</i></p>									

A	B	C	D	E	F	G	H	I	
SL. NO.	ANATOMY PAPER 2 Topics	Weightage of Marks as per SDMU guideline	MCQs 1X20Q = 20 marks	SLEQ 10X2Q= 20 marks	SEQ 5X8Q= 40 marks	SAQ 10X2Q = 20 marks	Total marks (D+E+F+G)	HOTS including Case vignette based questions (20-40 Marks)	
								Q No.	Marks
1	Abdomen	25-40							
2	Pelvis and Perineum	10-17							
3	Lower limb	17-30							
4	Systemic Histology	5-8							
5	Genetics	5-8							
6	Systemic Embryology	5-8							
<b>Total Marks (Question wise)</b>			<b>20</b>	<b>20</b>	<b>40</b>	<b>20</b>	<b>100</b>	<b>Total HOTS</b>	
<p><i>Long essay question should be from the topics with weightage of 10 or MORE THAN 10.</i></p> <p><i>Multiple Choice Questions (MCQs); Structured Long essay questions (SLEQ); Short essay questions (SEQ); Short answer questions (SAQ)</i></p>									

## **PRACTICAL UNIVERSITY EXAMINATION: TOTAL 100 MARKS**

### **PRACTICAL EXERCISES: 80 MARKS**

#### **VIVA VOCE: 20 MARKS**

1. Exercise 1 : Spotters/OSPE - 20 marks
2. Exercise 2 : Specimen discussion- 30 marks
3. Exercise 3 : Slides discussion -20 marks
4. Exercise 4: Surface marking- 10 marks

#### **Gross Anatomy: 50 Marks**

- a. Spotters/OSPE: Identification of structures in given 10 specimen, each carrying two marks, one of which shall be a cross section = 20 marks
- b. Discussion on two given dissected specimens, each carrying
  - Structures above diaphragm and = 10 marks
  - Structures below diaphragm = 10 marks
- c. Surface Anatomy = 10 marks

#### **Histology – 30 Marks**

- a. Identification of 9 slides, interpretation of 1 chart on genetics, each carrying 1 mark =10 marks
- b. Discussion on two given slides =20 marks

#### **Viva-Voce Examination: 20 Marks**

**The Viva – Voce examination will be conducted by four examiners individually. The distribution of topics and marks for each examiner will be as under:**

- I. Questions on embryology (with models) = 5 marks
- II. Radiological anatomy including ultrasound, C.T and MRI = 5 marks
- III. Osteology of upper limb, thorax, head and neck. = 5 marks
- IV. Osteology of lower limb, abdomen and Pelvis. = 5 marks

#### **6. EARLY CLINICAL EXPOSURE (ECE):**

- Needs to be entered in log book
- Clinical Skills : 12 Hours
- Basic Science correlations-18 hours

#### **7. SELF DIRECTED LEARNING (SDL)**

Suggested topics should be entered in the log book preferably in the form of concept mapping. Minimum of any 4 needs to be entered in log book.

## 8. INTEGRATION

- May be conducted in the form of sharing/nesting/correlation using CBL/PBL/ Case study approach and involving various departments concerned.
- Department involved may be chosen according to the topic and may be conducted as Horizontal/ Vertical form of integration as per the MCI CBME document.

Suggested Topics-

SL. NO.	Topic	Integration
1	Peripheral nerve blocks	Physiology, Anesthesia
2	Fractures and injuries	Orthopedics
3	Heart – coronary circulation, conduction and anomalies	Physiology, Biochemistry, General medicine, Pediatrics
4	Inguinal hernia	General Surgery
5	Intestinal obstruction and pancreatitis	Biochemistry, General Surgery
6	Kidney diseases	Physiology, Biochemistry, Pathology
7	Pelvic organs	OBG
8	Congenital anomalies of rectum, anal canal	General Surgery
9	Liver tumors and Spleen injuries	Physiology, Biochemistry, General Surgery
10	Thyroid swellings	Physiology, Biochemistry, General Surgery
12	Surgical anatomy of lens, vascular occlusion of retina, Glaucoma	Ophthalmology
13	Functional anatomy of vocal cords	ENT
14	Functional and vascular anatomy of brain	Physiology, General medicine
Integration with radiology wherever required.		

## **RECOMMENDED TEXT BOOKS, REFERENCE BOOKS AND ATLAS**

### **Text Books**

*Note: A single textbook may not cover the entire curriculum. Referring to more than one book is recommended.*

#### **Gross Anatomy**

1. SNELL (Richard. S) Clinical Anatomy.
2. MOORIE (Kieth L) Clinical Oriented Anatomy.
3. DATTA (A.K) Essentials of human anatomy: Thorax and Abdomen.  
DATTA (A.K) Essentials of human anatomy: Head and Neck.  
DATTA (A.K) Essentials of human anatomy: Neuroanatomy.
4. B.D. CHAURASIA Vol.I, II, III, IV.
5. VISHRAM SINGH Vol.I, II, III, IV.
6. ROMANES (G J), Cunningham manual of practical anatomy: upper and lower limb.
7. ROMANES (G J), Cunningham manual of practical anatomy: thorax and abdomen.
8. ROMANES (G J), Cunningham manual of practical anatomy: Head and Neck and brain.
9. Neeta V. Kulkarni. Clinical Anatomy.
10. Last R. J. Last's Anatomy: regional and applied.

#### **Histology**

1. SINGH (Inderbir), Text book of Histology.
2. G. P. Pal. Text book of Histology.
3. Brijesh Kumar. Text book of Histology.
4. Ross Text book and atlas of Histology.
5. COPENHAVER (WM), Baily's Text book of Histology.

#### **Embryology**

1. SINGH (Inderbir), Human Embryology.
2. VISHRAM SINGH, Clinical Embryology.
3. DATTA (A.K), Essentials of Human Embryology.
4. MORRIE (Keith L) and PERSAUD (TVN), The Development Human: Clinically oriented Embryology.
5. LANGMAN, Medical Embryology: human development-normal-abnormal.

### **Neuroanatomy**

1. Vishram Singh, Textbook of Human Neuroanatomy.
2. I. B. Singh, Textbook of Human Neuroanatomy.
3. DATTA (A K), Essentials of Neuroanatomy.
4. B.D.Chaurasia, Neuroanatomy.
5. Snell's Clinical Neuroanatomy.

### **Osteology**

1. DATTA, ASIM KUMAR. Essentials of Human Osteology.
2. HALIM A. Surface and radiological Anatomy.
3. TIM WHITE, M. BLACK, P. FOLKENS. Human Osteology.
4. JAMIE WEIR, PETER ABRAHAMS. Imaging Atlas of Human Anatomy.

### **ATLAS**

1. Netter, Frank H. Atlas of Human Anatomy.
2. Grant, John C. B. Grant's atlas of Anatomy.
3. FIORE, MARIANO S. H. Di Fiore atlas of Human Histology.

### **Cross-sectional anatomy**

1. MADDEN, MICHAEL E. Introduction to Sectional Anatomy.

### **Genetics**

1. Essentials of Human Genetics, A. K. Datta.
2. Human Genetics, S. D. Gangane.
3. Emery's Elements of Medical Genetics, Mueller.

### **Reference books**

- A. GRAY HENRY. Gray's Anatomy: the anatomical basis of clinical practice.
- B. DECKER (CAG) and DJ DUPLESSIS, Lee McGregor's synopsis of surgical anatomy.
- C. McMINN (RMH), Anatomy regional and applied.

\*\*\*\*\*

## **PHYSIOLOGY**

### **1. GOAL**

The broad goal is to teach Physiology to undergraduate students to make them understand the scientific basis of the physiological processes at the systemic and molecular level and to orient them towards the application of the knowledge acquired in solving clinical problems.

### **2. OBJECTIVES**

#### **2.1 KNOWLEDGE**

At the end of the course, the student should be able to:

- i. Describe the normal functions of all organ systems, regulatory mechanisms and interactions of the various organs for well co-ordinate total body function.
- ii. Understand the basic principles, mechanism and homeostatic control of all the functions of human body as a whole.
- iii. Elucidate the physiological aspect of normal growth and development.
- iv. Analyze the physiological responses and adaptation to different stresses during life processes.
- v. Lay emphasis on applied aspect of physiological functions underlying disease state.

#### **2.2 SKILLS**

At the end of the course, the student should be able to:

- i. Acquire the skills to do the experiments for study of physiological function.
- ii. Should be able to perform clinical examination to assess various organ systems.
- iii. Interpret experimental and investigative data.
- iv. Distinguish between normal and abnormal data derived as a result of tests which he/she performed and observed in the laboratory

## 2.3 INTEGRATION

The knowledge acquired in Physiology should help the students to integrate physiological processes occurring at various systemic levels with structure and function of the human body in health and disease.

## 3. TEACHING HOURS AND COURSE CONTENT

### A. Teaching hours

SL. NO.	Teaching learning method	No. of Hours	Suggested Distribution	No. of Hours
1	Large group teaching (Lecture hours)	160		
2	Small group teaching (SGT) (Small group discussions- SGD/ Tutorials/ Seminars/Integrated teaching sessions/ Practical)	310	Small group discussion/tutorials	90
			Practical	220
3	Self-directed learning (SDL)	25		
	<b>TOTAL</b>	<b>495</b>		
4	Early clinical exposure (ECE)	30	ECE Clinical skills	12
			ECE Basic science correlation	18

### B. COURSE CONTENT\*: THEORY

*\*Course content given is based on the Competencies listed in MCI UG curriculum document.*

SL. NO.	Topic (Competency No )	Hrs.
1	<b>General physiology</b> <b>Core:</b> Structure and functions of a mammalian cell (PY1.1) Principles of homeostasis (PY1.2) Intercellular communication (PY1.3) Apoptosis – programmed cell death (PY1.4)	08



	<p>Transport mechanisms across cell membrane (PY1.5)</p> <p>Fluid compartments of the body (PY1.6)</p> <p>pH and Buffer systems in the body (PY1.7)</p> <p>Molecular basis of resting membrane potential and action potential in excitable tissue (PY1.8)</p> <p>Functions of the cells, its products, its communications and their applications in clinical care and research (PY1.9)</p>	
2	<p><b>Hematology</b></p> <p><b>Core:</b></p> <p>Composition and functions of blood component (PY2.1)</p> <p>Origin, forms, variations and functions of plasma proteins (PY2.2)</p> <p>Synthesis, functions, variants and breakdown of Hemoglobin (PY2.3)</p> <p>RBC formation, functions and regulation (erythropoietin and its regulation) (PY2.4)</p> <p>Types of Anemia and Jaundice (PY2.5)</p> <p>WBC formation (granulopoiesis) and its regulation (PY2.6)</p> <p>Platelets : formation, functions and variations (PY2.7)</p> <p>Physiological basis of hemostasis and anticoagulants. Bleeding and clotting disorders (Hemophilia, purpura) (PY2.8)</p> <p>Different blood groups and clinical importance of blood grouping. Blood banking and transfusion (PY2.9)</p> <p>Definition and classification of different types of immunity. Development of immunity and its regulation (PY2.10)</p>	16
3	<p><b>Nerve and Muscle Physiology</b></p> <p><b>Core:</b></p> <p>Structure and functions of a neuron and neuroglia; Nerve Growth Factor and other growth factors/cytokines (PY3.1)</p> <p>Types, functions and properties of nerve fibers (PY3.2)</p> <p>Degeneration and regeneration in peripheral nerves (PY3.3)</p> <p>Structure of Neuromuscular junction and transmission of impulses (PY3.4)</p> <p>Action of Neuromuscular blocking agents (PY3.5)</p> <p>Pathophysiology of Myasthenia gravis (PY3.6)</p> <p>Different types of muscle fibres and their structure (PY3.7)</p> <p>Action potential and its properties in different muscle types (skeletal and smooth) (PY3.8)</p>	10

	<p>Molecular basis of muscle contraction in skeletal and smooth muscles (PY3.9)</p> <p>Mode of muscle contraction (isometric and isotonic) (PY3.10)</p> <p>Energy source and muscle metabolism (PY3.11)</p> <p>Gradation of muscular activity (PY3.12)</p> <p>Muscular dystrophy: Myopathies (PY3.13)</p> <p>Strength-duration curve (PY3.17)</p>	
4	<p><b>Gastro-intestinal Physiology</b></p> <p><b>Core:</b></p> <p>Structure and functions of digestive system (PY4.1)</p> <p>Composition, mechanism of secretion, functions, and regulation of saliva, gastric, pancreatic, intestinal juices and bile secretion (PY4.2)</p> <p>GIT movements, regulation and functions. Defecation reflex. Role of dietary fibre (PY4.3)</p> <p>Physiology of digestion and absorption of nutrients (PY4.4)</p> <p>GIT hormones: Sources, regulation and functions (PY4.5)</p> <p>Gut-Brain Axis (PY4.6)</p> <p>Structure and functions of liver and gall bladder (PY4.7)</p> <p>Gastric function tests, pancreatic exocrine function tests and liver function tests (PY4.8)</p> <p>Physiological aspects of: Peptic ulcer, gastro-esophageal reflux disease, vomiting, diarrhea, constipation, adynamic ileus and Hirschsprung's disease (PY4.9)</p>	10
5	<p><b>Cardiovascular Physiology</b></p> <p><b>Core:</b></p> <p>The functional anatomy of heart including chambers, sounds, pacemaker tissue and conducting system. (PY5.1)</p> <p>Properties of cardiac muscle including its morphology, electrical, mechanical and metabolic functions (PY5.2)</p> <p>Events occurring during the cardiac cycle (PY5.3)</p> <p>Generation and conduction of cardiac impulse (PY5.4)</p> <p>Physiology of electrocardiogram (ECG), its applications and the cardiac axis (PY5.5)</p> <p>Abnormal ECG, arrhythmias, heart block and myocardial infarction (PY5.6)</p> <p>Hemodynamic of circulatory system (PY5.7)</p> <p>Local and systemic cardiovascular regulatory mechanisms (PY5.8)</p>	25

	<p>Factors affecting heart rate, regulation of cardiac output and blood pressure (PY5.9)</p> <p>Regional circulation including microcirculation, lymphatic circulation, coronary, cerebral, capillary, skin, fetal, pulmonary and splanchnic circulation (PY5.10)</p> <p>Patho-physiology of shock, syncope and heart failure (PY5.11)</p>	
--	--	--

6	<p><b>Respiratory Physiology</b></p> <p><b>Core:</b></p> <p>Functional anatomy of respiratory tract (PY6.1)</p> <p>Mechanics of normal respiration, pressure changes during ventilation, lung volume and capacities, alveolar surface tension, compliance, airway resistance, ventilation, V/P ratio, diffusion capacity of lungs, Neural and chemical regulation of respiration (PY6.2)</p> <p>Transport of respiratory gases: Oxygen and Carbon dioxide (PY6.3)</p> <p>Physiology of high altitude and deep sea diving (PY6.4)</p> <p>Principles of artificial respiration, oxygen therapy, acclimatization and decompression sickness (PY6.5)</p> <p>Patho- physiology of dyspnoea, hypoxia, cyanosis, asphyxia;drowning and periodic breathing (PY6.6)</p> <p>Lung function tests and their clinical significance (PY6.7)</p>	12
7.	<p><b>Renal Physiology</b></p> <p><b>Core:</b></p> <p>Structure and function of kidney (PY7.1)</p> <p>Structure and functions of Juxta- Glomerular apparatus and role of renin-angiotensin system (PY7.2)</p> <p>Mechanism of urine formation involving processes of filtration, tubular reabsorption and secretion,concentration and diluting mechanism (PY7.3)</p> <p>Significance and implication of Renal clearance (PY7.4)</p> <p>Renal regulation of fluid electrolytes and acid-base balance (PY7.5)</p> <p>Innervations of urinary bladder, physiology of micturition and its abnormalities (PY7.6)</p> <p>Artificial kidney, dialysis and renal transplantation (PY7.7)</p> <p>Renal Function Tests (PY7.8)</p> <p>Cystometry and normal cystometrogram (PY7.9)</p>	10
8	<p><b>Endocrine Physiology</b></p> <p><b>Core:</b></p> <p>The physiology of bone and calcium metabolism (PY8.1)</p>	16

	<p>Synthesis, secretion, transport, physiological actions, regulation and effect of altered (hypo and hyper)secretion of pituitary gland, thyroid gland, parathyroid gland, adrenal gland, pancreas and hypothalamus (PY8.2)</p> <p>Physiology of thymus and pineal Gland (PY8.3)</p> <p>Various function tests: Thyroid gland, Adrenal cortex, Adrenal medulla and pancreas (PY8.4)</p> <p>Metabolic and endocrine consequences of obesity, metabolic syndrome and stress response. Psychiatric component pertaining to metabolic syndrome. (PY8.5)</p> <p>Mechanism of action of steroid, protein and amine hormones (PY8.6)</p>	
9	<p><b>Reproductive Physiology</b></p> <p><b>Core:</b></p> <p>Sex determination; sex differentiation and their abnormalities. Psychiatric and practical implication of sex determination (PY9.1)</p> <p>Puberty: onset, progression, stages; early and delayed puberty and adolescent clinical and psychological association (PY9.2)</p> <p>Male reproductive system: functions of testis and control of spermatogenesis. Factors modifying it and its association with psychiatric illness (PY9.3)</p> <p>Female reproductive system: (a) functions of ovary and its control (b) menstrual cycle - hormonal, uterine and ovarian changes (PY9.4)</p> <p>Physiological effects of sex hormones (PY9.5)</p> <p>Contraceptive methods for male and female; advantages and disadvantages (PY9.6)</p> <p>Effects of removal of gonads on physiological functions (PY9.7)</p> <p>Physiology of pregnancy, parturition and lactation. Psychological and psychiatry-disorders associated with it (PY9.8)</p> <p>Normal semen analysis including (a) sperm count, (b) sperm morphology and (c) sperm motility, as per WHO guidelines (PY9.9)</p> <p>Physiological basis of various pregnancy tests (PY9.10)</p> <p>Hormonal changes and their effects during perimenopausal and menopause (PY9.11)</p> <p>Common causes of infertility in a couple and role of IVF in managing a case of infertility (PY9.12)</p>	10

10	<p><b>Neuro-Physiology (Including Special senses)</b></p> <p><b>Core:</b></p> <p>Organization of nervous system (PY10.1)</p> <p>Functions and properties of synapse, reflex, receptors (PY10.2)</p> <p>Somatic sensations and sensory tracts (PY10.3)</p> <p>Motor tracts, mechanism of maintenance of tone, control of body movements, posture and equilibrium and vestibular apparatus (PY10.4)</p> <p>Structure and functions of reticular activating system, autonomic nervous system (PY10.5)</p> <p>Spinal cord, its functions, lesion and sensory disturbances (PY10.6)</p> <p>Functions of cerebral cortex, basal ganglia, thalamus, hypothalamus, cerebellum and limbic system and their abnormalities (PY10.7)</p> <p>EEG characteristics during sleep and mechanism responsible for its production (PY10.8)</p> <p>Physiological basis of memory, learning and speech (PY10.9)</p> <p>Chemical transmission in the nervous system. (PY10.10)</p> <p>Perception of smell and taste sensation (PY10.13)</p> <p>Pathophysiology of altered smell and taste sensation (PY10.14)</p> <p>Functional anatomy of ear, auditory pathways and physiology of hearing (PY10.15)</p> <p>Pathophysiology of deafness. Hearing tests (PY10.16)</p> <p>Functional anatomy of eye, physiology of image formation, physiology of vision including colour vision, refractive errors, colour blindness, physiology of pupil and light reflex (PY10.17)</p> <p>Physiological basis of lesion in visual pathway (PY10.18)</p> <p>Auditory and visual evoke potentials (PY10.19)</p>	37
11	<p><b>Integrated Physiology</b></p> <p><b>Core:</b></p> <p>Mechanism of temperature regulation (PY11.1)</p> <p>Adaptation to altered temperature (heat and cold) (PY11.2)</p> <p>Mechanism of fever, cold injuries and heat stroke (PY11.3)</p> <p>Cardio-respiratory and metabolic adjustments during exercise; physical training effects (PY11.4)</p> <p>Physiological consequences of sedentary lifestyle (PY11.5)</p>	06

	<p>Cardio-respiratory changes in exercise (isometric and isotonic) with that in the resting state and under different environmental conditions (heat and cold) (PY11.8)</p> <p>Concept, criteria for diagnosis of brain death and its implications (PY11.11)</p> <p><b>Non-core:</b></p> <p>Physiology of Infancy (PY11.6)</p> <p>Physiology of aging; free radicals and antioxidants (PY11.7)</p> <p>Interpret growth charts (PY11.9)</p> <p>Interpret anthropometric assessment of infants (PY11.10)</p> <p>Physiological effects of meditation (PY11.12)</p>	
--	---	--

**Assessment methods for Theory (Formative and Summative):**

- Written (MCQs/Structured Long essay Questions/Short essay questions /short answer questions/ clinical vignette based questions)
- Viva Voce

**Note:** Content under Noncore category need not be assessed in Summative assessments. However, the same can be assessed in Formative assessments.

<b>SUGGESTED DISTRIBUTION OF THEORY TEACHING HOURS</b>				
<b>SL. NO.</b>	<b>Topic</b>	<b>Large group Teaching (160 Hours)</b>	<b>Small group discussion (90 Hours)</b>	<b>Total</b>
1	General Physiology	08	04	12
2	Hematology	16	10	26
3	Nerve and Muscle Physiology	10	05	15
4	Gastro-intestinal Physiology	10	06	16
5	Cardiovascular Physiology	25	10	35
6	Respiratory Physiology	12	08	20
7	Renal Physiology	10	05	15
8	Endocrine Physiology	16	10	26
9	Reproductive Physiology	10	06	16
10	Neuro-Physiology	37	22	59
11	Integrated Physiology	06	04	10

**Note:** The above table of teaching hours assigned to different topics under large and small group teaching may be used as a guide by the Institute.

## C. PRACTICAL COURSE CONTENT

**Total Teaching hours - 220 hours**

Part 1: Haematology Experiments	- 70 hours
Part 2: Human Experiments	- 60 hours
Part 3: Clinical Experiments	- 80 hours
Part 4: Charts/ calculation/case history	-10 hours

SL. NO.	Type of Experiment Competency No.	Suggested Teaching learning method	Domain / Level	Assessment method
<b>Part 1: Haematology Experiments- 70 hours</b>				
1	Estimation of Haemoglobin concentration (Hb) PY2.11	DOAP sessions	SH	Practical/viva voce/OSPE
2	Red Blood Cell Count (RBC) PY2.11	DOAP sessions	SH	Practical/viva voce/OSPE
3	Total Leukocyte Count (TLC) PY2.11	DOAP sessions	SH	Practical/viva voce/OSPE
4	Calculation of Blood indices PY2.11	DOAP sessions	SH	Practical/viva voce/OSPE
	Differential Leukocyte Count (DLC) PY2.11	DOAP sessions	SH	Practical/viva voce/OSPE
6	Blood grouping PY2.11	DOAP sessions	SH	Practical/viva voce/OSPE
7	Bleeding time (BT) PY2.11	DOAP sessions	SH	Practical/viva voce/OSPE
8	Clotting time (CT) PY2.11	DOAP sessions	SH	Practical/viva voce/OSPE
9	Erythrocyte Sedimentation Rate (ESR), Hematocrit, Osmotic fragility PY2.12	Demonstration	KH	Viva voce
10	Reticulocyte count PY2.13	Demonstration	KH	Viva voce
11	Platelet count PY2.13	Demonstration	KH	Viva voce



<b>Part 2: Human experiments – 60 hours</b>				
1	Mosso's ergography PY3.14	DOAP sessions	SH	Practical/viva voce/OSPE
2	Effect of mild, moderate and severe exercise on cardio-respiratory parameters PY3.15	DOAP sessions	SH	Practical/viva voce/OSPE
3	Harvard Step test and its impact on induced physiologic parameters in a simulated environment PY3.16	DOAP sessions	SH	Practical/viva voce/OSPE
4	Record blood pressure and pulse at rest, different grades of exercise and postures in a volunteer or simulated environment PY5.12	DOAP sessions	P	Skill assessment /Practical/viva voce/OSPE
5	Record and interpret normal ECG in a volunteer or simulated environment PY 5.13	DOAP sessions	SH	Practical/viva voce/OSPE
6	Observe cardiovascular autonomic function tests in a volunteer or simulated environment PY5.14	Non-core Demonstration	KH	Viva voce
7	Record Arterial pulse tracing using finger plethysmography in a volunteer or simulated environment PY 5.16	Non-core Demonstration	KH	Viva voce
8	Demonstrate the correct technique to perform and interpret spirometry PY6.8	DOAP sessions	SH	Practical/viva voce/OSPE

9	Demonstrate the correct technique to perform measurement of peak expiratory flow rate in a normal volunteer or simulated environment PY6.10	DOAP sessions	S	Practical/viva voce/OSPE
10	Identify normal EEG form PY10.12	Demonstration	KH	Viva voce
11	Record field of vision using perimeter PY 10.20	DOAP sessions	SH	Practical/Viva voce
12	Demonstrate Basic Life Support in a simulated environment PY11.14	DOAP sessions	SH	OSCE/Viva voce

<b>Part 3: Clinical Practical- 80 hours</b>				
1	Clinical examination of the abdomen in a normal volunteer or simulated environment PY4.10	DOAP sessions	SH	Practical/viva voce/OSCE
2	Clinical examination of the cardiovascular system in a normal volunteer or simulated environment PY 5.15	DOAP sessions	SH	Practical/viva voce/OSCE
3	Clinical examination of the respiratory system in a normal volunteer or simulated environment PY6.9	DOAP sessions	P	Skill assessment/ OSCE/Viva voce
4	Clinical examination of the nervous system: Higher functions in a normal volunteer or simulated environment PY10.11	DOAP sessions	P	Skill assessment/ OSCE/Viva voce

5	Clinical examination of the nervous system: Sensory system in a normal volunteer or simulated environment PY10.11	DOAP sessions	P	Skill assessment/ OSCE/Viva voce
6	Clinical examination of the nervous system: Motor system in a normal volunteer or simulated environment PY10.11	DOAP sessions	P	Skill assessment/ OSCE/Viva voce
7	Clinical examination of the nervous system: Reflexes in a normal volunteer or simulated environment PY10.11	DOAP sessions	P	Skill assessment/ OSCE/Viva voce
8	Clinical examination of the nervous system: Cranial nerves in a normal volunteer or simulated environment PY10.11	DOAP sessions	P	Skill assessment/ OSCE/Viva voce
9	Testing of visual acuity, colour and field of vision in volunteer/ simulated environment PY10.20	DOAP sessions	P	Skill assessment/ OSCE/Viva voce
10	Testing for hearing sensation in volunteer/ simulated environment PY10.20	DOAP sessions	P	Skill assessment/ OSCE/Viva voce
11	Testing for smell sensation in volunteer/ simulated environment PY10.20	DOAP sessions	P	Skill assessment/ OSCE/Viva voce
12	Testing for taste sensation in volunteer/ simulated environment PY10.20	DOAP sessions	P	Skill assessment/ OSCE/Viva voce

13	Obtain history and perform general examination in the volunteer / simulated environment PY11.13	DOAP sessions	SH	OSCE/ Viva voce
<b>Part 4: Charts – 10 hours</b>				
1	Observe with Computer assisted learning (i) amphibian nerve - muscle experiments PY3.18	Demonstration/ computer assisted learning methods	KH	Chart based interpretation / Viva voce
2	Observe with Computer assisted learning (ii) amphibian cardiac experiments PY3.18	Demonstration/ computer assisted learning methods	KH	Chart based interpretation / Viva voce

#### 4. CERTIFICATION OF SKILLS:

***To be evaluated using format provided in Annexures. Checklist can be prepared by subject experts.***

<b>SL. NO.</b>	<b>Competency to be certified with Competency number</b>	<b>No. required to certify P</b>
1	Demonstrate the correct clinical examination of the respiratory system in a normal volunteer or simulated environment ( PY6.9)	1
2	Record blood pressure and pulse at rest in a volunteer or simulated environment (PY5.12)	1
3	Record blood pressure and pulse in different grades of exercise in a volunteer or simulated environment (PY5.12)	1
4	Record blood pressure and pulse in various postures in a volunteer or simulated environment (PY5.12)	1
5	Demonstrate correct clinical examination of the nervous system: Higher functions in a normal volunteer or simulated environment (PY10.11)	1

6	Demonstrate correct clinical examination of the nervous system: Sensory system, in a normal volunteer or simulated environment (PY10.11)	1
7	Demonstrate correct clinical examination of the nervous system: Motor system in a normal volunteer or simulated environment (PY10.11)	1
8	Demonstrate correct clinical examination of the nervous system: Reflexes in a normal volunteer or simulated environment (PY10.11)	1
9	Demonstrate correct clinical examination of the nervous system: Cranial nerves in a normal volunteer or simulated environment (PY10.11)	1
10	Demonstrate testing of visual acuity, colour and field of vision in volunteer/ simulated environment (PY10.20)	1
11	Demonstrate hearing in volunteer/ simulated environment (PY10.20)	1
12	Demonstrate for smell in volunteer/ simulated environment (PY10.20)	1
13	Demonstrate taste sensation in volunteer/simulated environment (PY10.20)	1

**Note:** In theory, Practical and certification of skill sections, topics with corresponding competency numbers as mentioned in volume 1 of competency based undergraduate curriculum for Indian Medical Graduate (2018) prescribed by Medical Council of India, have been mentioned.

## **5. SCHEME OF EXAMINATION:**

### **A. INTERNAL ASSESSMENT (IA):**

#### **THEORY INTERNAL ASSESSMENT:**

- A minimum of **THREE** Theory Internal Assessments (IA) to be conducted. 3<sup>rd</sup> Internal assessment must be conducted similar to the university examination pattern.
- **Components of Theory IA:** (Marks distribution given in table below)
  - Marks obtained in Theory IA written papers
  - Continuous assessment marks shall be calculated based on scoring in written tests/ assignments/ creative writing experiences of AETCOM modules
  - Log book assessment of ECE, SDL, Seminars, Quiz etc.

## PRACTICAL INTERNAL ASSESSMENT

- A minimum of **THREE** Practical Internal Assessments (IA) to be conducted. 3<sup>rd</sup> Internal assessment must be conducted similar to the university examination pattern.
- **Components of Practical IA:** (Marks distribution given in table below)
  - Marks obtained in Practical IA exams
  - Viva/oral examination should assess approach to clinical context in the concepts of basic sciences.
  - Record book evaluation
  - Log book assessment of skill competencies acquired in specified subject and AETCOM.

The distribution of internal assessment marks shall be as mentioned below:

<b>Theory IA</b>	<b>Maximum Marks</b>	<b>Practical IA</b>	<b>Maximum Marks</b>
Theory IA written paper	70	Practical IA exam and Viva Voce	70 <i>(50+20)</i>
Continuous assessments 7. Written tests (Part completion tests/ system based tests) – 20 marks 8. Written tests for ECE and/or SDL topics and/or creative writing experience of AETCOM (Logbook assessment) – 5 marks 9. Participation in ECE and SDL sessions – 5 marks	30	Continuous assessments 7. Record book evaluation – 10 marks 8. Log book assessment of skill competencies acquired in specified subject – 15 marks 9. Participation in SGT and AETCOM – 5 marks	30
<b>TOTAL</b>	<b>100</b>		<b>100</b>

## **FINAL INTERNAL ASSESSMENT MARKS**

**The final Internal assessment (IA) marks will be calculated as follows:**

**Average of all 3 IA will be considered as Final IA marks in Theory and Practical separately.**

Level of participation in ECE, SDL and AETCOM modules shall be assessed using the format given in annexure.

A clear record of all components that add to the internal assessment marks needs to be maintained by the institution/departments and retained by them for at least 5 years after completion of the examination.

The internal and formative assessments provide ideal opportunities for students and teachers to identify learning gaps. Teachers should provide high quality feedback to each student to enable them to bridge these learning gaps.

The format for providing feedback is shown in annexure.

The results of IA shall be displayed on the notice board within 1-2 weeks of the test. Suitable remedial measures for students who are either not able to score qualifying marks or have missed on some assessments due to any reason shall be taken by college.

Formative assessments also enable the early identification of students who are struggling to achieve the intended learning outcomes. Early and appropriate targeted remediation must be planned for such students.

### **B. SUMMATIVE ASSESSMENT: (University examination)**

#### **Eligibility for University Examinations**

- **Attendance**

Attendance requirements are 75% in theory and 80% in practical /clinical for eligibility to appear for the examinations in that subject. In subjects that are taught in more than one phase – the learner must have 75% attendance in theory and 80% in practical in each phase of instruction in that subject.

AETCOM sessions: 75% attendance in Professional Development Programme (AETCOM Module) is required for eligibility to appear for final examination in each professional year.

- **Internal Assessment Marks**

Learners must secure at least 50% marks of the total marks (combined in theory and practical / clinical; not less than 40 % marks in theory and practical separately) assigned for internal assessment in a particular subject in order to be eligible for appearing at the final University examination of that subject.

- **Certifiable competencies and Log book**

Learners must have completed the required certifiable competencies for that phase of training and completed the log book appropriate for that phase of training to be eligible for appearing at the final university examination of that subject.

**Pass criteria:**

- **University Theory examination:** In subjects that have two papers, the student must secure at least 40% marks in each of the papers with minimum 50% of marks in aggregate (both papers together) to pass.
- **University Practical Examination:** Student shall secure 50% marks in university practical examination and viva voce (together) to be declared pass.
- Student shall obtain 50% marks in university conducted examination separately in Theory and Practical (practical includes Practical/clinical and Viva voce) in order to be declared as passed in that subject.
- Internal assessment is considered under separate heading of passing. Students should secure at least 50% of the total marks (combined in Theory and Practical, not less than 40% in theory and practical separately) assigned for internal assessment in order to be declared successful at the final university of that subject.

**MARKS DISTRIBUTION FOR UNIVERSITY EXAMINATION**

THEORY			THEORY TOTAL	PRACTICAL		PRACTICAL TOTAL
	Written paper	MCQ's		Practical	Viva Voce	
PAPER 1	80	20	200	80	20	100
PAPER 2	80	20				



**THEORY UNIVERSITY EXAMINATION:****Written paper: Paper-1: 100 marks + Paper 2: 100 marks = 200 marks****Time: 3 hours for each paper**

The pattern of questions in each paper shall be as mentioned below:

Type of Question	Number of Questions	Maximum Marks for each question	Total
Multiple Choice Questions (MCQs)	20	01	20
Structured Long essay questions (SLEQ)	02	10	20
Short essay questions (SEQ)	08	05	40
Short answer questions (SAQ)	10	02	20
<b>Total marks</b>			100

The question papers shall be based on the blue print of question paper setting.

The weightage of marks allotted for each topic shall be strictly adhered to.

A MINIMUM OF 20% up to a MAXIMUM OF 40% marks shall be allocated to assess the higher order thinking of the learner.

The questions framed shall be with appropriate verbs without any ambiguity or overlap.

**Distribution of topics for Paper 1 and Paper 2 for University summative examination:**

Sl. No.	Paper 1 Topics	Weightage of Marks	Sl. No.	Paper 2 Topics	Weightage of Marks
1	General physiology	04-06	1	Endocrine physiology	18-22
2	Haematology	18-22	2	Central nervous system	32-38
3	Cardiovascular physiology	22-28	3	Special senses	08-12
4	Respiratory physiology	18-22	4	Reproductive physiology	18-22
5	Gastrointestinal physiology	12-16	5	Muscle and nerve physiology	10-12
6	Renal physiology	12-16	6	Integrated physiology	06-08

**Note:**

- *Weightage of marks assigned to topics may add to more than 100.*
- *Long essay question should be from the topics with weightage of 10 or MORE THAN 10%.*
- *The topics to different paper are generally evaluated under those sections. However, a strict division of the subject may not be possible and some overlapping of topics is inevitable. Students should be prepared to answer overlapping topics.*

**BLUE PRINT FOR QUESTION PAPER SETTING****(To be filled by the question paper setter)**

- Total marks under each type of question from each topic needs to be entered by QP Setter.
- It should be in accordance with Shri Dharmasthala Manjunatheshwara University guidelines.

## PHYSIOLOGY- BLUE PRINTING OF QUESTION PAPER

A	B	C	D	E	F	G	H	I	
SL. NO.	PHYSIOLOGY PAPER 1 Topics	Weightage of Marks as per SDMU guideline	MCQs 1X20Q= 20 marks	SLEQ 10X2Q= 20 marks	SEQ 5X8Q= 40 marks	SAQ 2X10Q = 20 marks	Total marks (D+E+F+G)	HOTS including Case vignette based questions (20-40 Marks)	
								Q No.	Marks
1	General physiology	04-06							
2	Haematology	18-22							
3	Cardiovascular physiology	22-28							
4	Respiratory physiology	18-22							
5	Gastrointestinal physiology	12-16							
6	Renal physiology	12-16							
<b>Total Marks (Question wise)</b>			<b>20</b>	<b>20</b>	<b>40</b>	<b>20</b>	<b>100</b>	<b>Total HOTS</b>	
<p><i>Long essay question should be from the topics with weightage of 10 or MORE THAN 10. Multiple Choice Questions (MCQs); Structured Long essay questions (SLEQ); Short essay questions (SEQ); Short answer questions (SAQ)</i></p>									

A	B	C	D	E	F	G	H	I	
SI No	Physiology PAPER 2 Topics	Weightage of Marks as per SDMU guideline	MCQs 1X20Q= 20 marks	SLEQ 10X2Q= 20 marks	SEQ 5X8Q= 40 marks	SAQ 2X10Q= 20 marks	Total marks (D+E+F+G)	HOTS including Case vignette based questions (20-40 Marks)	
								Q No.	Marks
1	Endocrine physiology	18-22							
2	Central nervous system	32-38							
3	Special senses	08-12							
4	Reproductive physiology	18-22							
5	Muscle and nerve physiology	10-12							
6	Integrated physiology	06-08							
<b>Total Marks (Question wise)</b>			<b>20</b>	<b>20</b>	<b>40</b>	<b>20</b>	<b>100</b>	<b>Total HOTS</b>	
<p><i>Long essay question should be from the topics with weightage of 10 or MORE THAN 10. Multiple Choice Questions (MCQs); Structured Long essay questions (SLEQ); Short essay questions (SEQ); Short answer questions (SAQ)</i></p>									

## **PRACTICAL SUMMATIVE EXAMINATION: Total - 100 Marks**

### **a. PRACTICAL EXERCISES – 80 MARKS**

### **b. VIVA VOCE – 20 MARKS**

## **PRACTICAL EXERCISES – 80 MARKS**

There shall be four practical sessions, each carrying 20 marks. The distribution of content and marks for the practical would be:

### **Practical I: (20 marks)**

- a. Clinical examination - I (CNS – sensory / motor/ reflexes / cranial nerve): 15marks**
- b. Chart: Clinical case history / graphs / clinical charts: 5marks**

### **Practical II: (20 marks)**

- c. Clinical examination - II (CVS / RS): 15marks**
- d. Clinical examination/OSCE(general physical examination/abdomen examination: 5 marks**

### **Practical III: (20 marks)**

- e. Human experiment: 15marks**
  - Mosso's ergography
  - Effect of posture / exercise on Blood pressure and pulse rate
  - Estimate fitness using the Harvard step test
  - Record and interpret Lead II ECG
  - Spirometry and PEFr
  - Perimetry
  - Demonstrate BLS
- f. Chart: Amphibian charts (nerve muscle / cardiac): 5 marks**

### **Practical IV: (20 marks)**

- g. Hematology (RBC count / WBC count / making a peripheral smear + DLC on the provided stained slide / BT + Blood group / Hb % + Blood group/ CT + Blood group): 15 marks**
- h. Clinical problems: 5 marks**

**Note:** *the 'procedures to be performed' for practical exam under different sections (I to IV) mentioned above needs to be strictly adhered to. The experiments kept under clinical examination should allow for an assessment of the marks allotted (and not be a very small component of the experiment for e.g. "Elicit a knee jerk" is not a complete experiment).*

## **6. EARLY CLINICAL EXPOSURE (ECE): 30 hours**

CLINICAL SKILLS - 12 hours (all 4 session topics needs to be entered in Log book)

Suggested cases for hospital visit (Other topics can also be given)-

- a. Anaemia
- b. Diabetes mellitus
- c. Obstructive / restrictive lung disorder
- d. Cerebellar palsy

BASIC SCIENCE CORRELATION - 18 hours

Suggested topics (Other topics can also be given)-

Discussion based on case vignettes, graphs, clinical videos, patient in classroom setting, etc. linked to various systems in physiology.

## **7. SELF DIRECTED LEARNING (SDL): 25 hours**

(Minimum of any 4 needs to be entered in log book)

## **8. INTEGRATION**

- May be conducted in the form of sharing/nesting/correlation using CBL/PBL/ Case study approach and involving various departments concerned.
- Department involved may be chosen according to the topic and may be conducted as Horizontal/ Vertical form of integration as per the MCI CBME document.

## **SUGGESTED TOPICS**

<b>SL.NO.</b>	<b>Topic</b>	<b>Department involved in integration</b>
1	Apoptosis	Biochemistry, Pathology
2	NMJ Blockers, Myasthenia gravis	Pharmacology
3	Lung disease	Anatomy, Pulmonology
4	ECG	General medicine
5	Infertility	Anatomy, Biochemistry, OBG
6	Contraception	Community medicine

7	EEG	Psychiatry
8	Thyroid	Anatomy, Biochemistry, General medicine
9	Deafness and BERA	ENT
10	Infant growth charts	Pediatrics
11	Liver function	Anatomy, Biochemistry, General medicine
12	Renal function	Anatomy, Biochemistry, General medicine

### **RECOMMENDED TEXT AND REFERENCE BOOKS**

1. Guyton and Hall. Text of Medical Physiology. Recent edition.
2. Ganong's Review of Medical Physiology, Recent edition.
3. G K Pal. Textbook of Medical Physiology, 3<sup>rd</sup> edition.
4. A.K.Jain. Textbook of Medical Physiology. Recent edition.
5. Chaudhari. Concise Medical Physiology. Recent edition.
6. Bijlani. Understanding medical physiology. Recent edition.
7. Indu Khurana. Text book of Medical Physiology. Recent edition.
8. Vander's Human Physiology.
9. D Venkatesh, H.H.Sudhakar. Text book of Medical Physiology. Recent edition.
10. G K Pal. Comprehensive textbook of medical Physiology. Recent edition.
11. CC Chatterjee. Human Physiology. Recent edition.

### **Experimental Physiology:**

1. C.L.Ghai. Textbook of Practical Physiology.
2. G K Pal. Text book of Practical Physiology.
3. Macleod's Clinical Examination.
4. Hutchinson and Hunter, Clinical Methods.
5. A.K.Jain - Manual of practical Physiology.

**Note:** *A single textbook may not cover the entire curriculum. Referring to more than one book is recommended*

\*\*\*\*\*

# **BIOCHEMISTRY**

## **1. GOAL**

The broad goal is to teach Biochemistry to undergraduate students to make them understand the scientific basis of the life processes at the molecular level and to orient them towards the application of the knowledge acquired in solving clinical problems.

## **2. OBJECTIVES**

### **2.1 KNOWLEDGE**

At the end of the course, the student should be able to:

- i. Describe the molecular and functional organization of a cell and its subcellular components.
- ii. Delineate structure, function and inter-relationships of biomolecules and consequences of deviation from normal.
- iii. Summarize the fundamental aspects of enzymology and clinical application wherein regulation of enzymatic activity is altered.
- iv. Describe digestion and assimilation of nutrients and consequences of malnutrition.
- v. Integrate the various aspects of metabolism and their regulatory pathways;
- vi. Explain the biochemical basis of inherited disorders with their associated sequelae.
- vii. Describe mechanisms involved in maintenance of body fluid and pH homeostasis.
- viii. Outline the molecular mechanisms of gene expression and regulation, the principles of genetic engineering and their application in medicine.
- ix. Summarize the molecular concepts of body defence and their application in medicine.
- x. Outline the biochemical basis of environmental health hazards, biochemical basis of cancer and carcinogenesis.
- xi. Familiarize with the principles of various conventional and specialized laboratory investigations and instrumentation analysis and interpretation of a given data.
- xii. Suggest experiments to support theoretical concepts and clinical diagnosis.

## 2.2 SKILLS:

At the end of the course, the student should be able to:

- i. Make use of conventional techniques/instruments to perform biochemical analysis relevant to clinical screening and diagnosis.
- ii. Analyse and interpret investigative data.
- iii. Demonstrate the skills of solving scientific and clinical problems and decision making.

## 2.3 INTEGRATION

The knowledge acquired in Biochemistry should help the students to integrate molecular events with structure and function of the human body in health and disease.

## 3. TEACHING HOURS AND COURSE CONTENT

### A. Teaching hours:

<b>Suggested distribution of teaching hours:</b>				
<b>Sl. No.</b>	<b>Teaching learning method</b>	<b>No. of Hours</b>	<b>Suggested distribution</b>	<b>No. of Hours</b>
1	Large group teaching	80		
2	Small group teaching (SGT) (Small group discussions- SGD/Tutorials/Seminars/Case based learning sessions/Integrated teaching sessions/Practical)	150	Small group discussion/ Tutorials etc	40
			Case based learning sessions/ Integrated teaching etc	40
			Practical (Performance and Demonstrations)	70
3	Self-directed learning (SDL)	20		
	<b>TOTAL</b>	<b>250</b>		
4	Early clinical Exposure (ECE)	30	ECE Clinical Skills	12
			ECE Basic science correlation sessions	18



## B. COURSE CONTENT\*: THEORY

*\*Course content given below is based on the Competencies listed in MCI UG curriculum document.*

SL. NO.	Topic (Competency No )	Hrs**
1	<b>Relevance of Biochemistry in Medicine</b> <ul style="list-style-type: none"><li>- Importance of Biochemistry in health and disease</li><li>- Examples of normal biochemical process</li><li>- Examples of biochemical derangements involved in disease development</li><li>- Examples of application of laboratory medicine in screening, diagnosis and prognosis of diseases</li></ul>	1
2	<b>Cell and organelles, Cell membrane, Transport across cell membranes (BI1.1)</b> Prerequisite: Concept of prokaryotic and eukaryotic cell <b>Core:</b> Cell organelles – Structure, Biochemical functions, Marker enzymes Cell Membrane - Fluid mosaic model, composition, Fluidity of membrane Transport across cell membranes with examples <ul style="list-style-type: none"><li>• Passive transport – Diffusion and facilitated transport (ion channels)</li><li>• Active transport – Primary and Secondary</li><li>• Endocytosis and Exocytosis</li></ul> Aquaporins ABC family of transporters <b>Non-core:</b> Cytoskeleton – Structure and functions of microtubules, actin filaments, intermediate filaments Intercellular communication Separation of cell organelles	2

3	<p><b>Enzymes (BI2.1, BI2.3, BI2.4, BI2.5, BI2.6, BI2.7)</b></p> <p><b>Core:</b>  Enzymes- Definition, General properties, IUBMB Classification.  Coenzymes and Cofactors  Mechanism of Enzyme action - Concept of activation energy, transition state, binding energy, active site; Substrate binding to active site - Koshlands Induced fit theory  Factors affecting enzyme activity  Effect of substrate concentration - Michaelis -Menton theory, Km value, Vmax and its significance (derivation not required)  Enzyme specificity  Enzyme inhibition - Competitive and Non-competitive inhibition with examples of clinical importance  Suicide inhibition  Enzymes as toxins – Eg. Snake venom phospholipase  Enzyme regulation by- Short term (Covalent modification, Zymogen activation, Allosteric regulation, Feedback regulation) and long term regulation (Induction and repression)  Clinical Enzymology – Concept of plasma functional and non-functional enzymes  Diagnostic Importance of enzymes – LDH, CK, AST, ALT, ALP, GGT, Amylase, Lipase, G6PD, Cholinesterase, ACP, 5'nucleotidase  Isoenzymes – Definition, Diagnostic Importance of isoenzymes with examples.  Enzymes as Therapeutic agents  Enzymes used in diagnostic assays  Ribozymes</p> <p><b>Non- core:</b>  Mechanisms of enzyme catalysis (List)</p>	9
4	<p><b>Chemistry of Carbohydrates (BI3.1)</b></p> <p><b>Core:</b>  Definition, Biomedical importance  Classification with examples  Monosaccharides derivatives – Uronic acids, aminosugars, Glycosides, Sorbitol, Mannitol and their Clinical significance.  Disaccharides, oligosaccharides -composition, importance</p>	3

	<p>Polysaccharides –Homopolysaccharides – Composition and Importance of starch, glycogen, Dextran, Cellulose and Inulin. Heteropolysaccharides – mucopolysaccharides (Composition and function)</p> <p>Concept of glycation and glycosylation</p> <p>Importance of - Glycolipids, Glycoproteins</p> <p><b>Non-core:</b></p> <p>Sialic acid – importance</p> <p>Blood group substances</p>	
5	<p><b>Carbohydrate metabolism (BI3.2, BI3.3, BI3.4, BI3.5, BI3.6, BI3.7, BI3.9)</b></p> <p><b>Core:</b></p> <p>Digestion and absorption</p> <p>Lactose intolerance</p> <p>Glucose transporters</p> <p>Insulin dependent and Insulin independent uptake of glucose by tissues</p> <p>PATHWAYS – Significance, Site, reactions, key steps, energetics, regulation, inhibitors and associated disorders of -</p> <p>Glycolysis, Rapaport Leubering cycle and its significance</p> <p>Citric acid cycle, Amphibolic role, Anapleurotic reactions</p> <p>Gluconeogenesis, Cori's cycle</p> <p>Glycogenesis, Glycogenolysis, Glycogen storage disorders</p> <p>Significance of HMP shunt pathway and uronic acid pathway</p> <p>Glucose-6-Phosphate dehydrogenase deficiency</p> <p>Essential Fructosuria, Hereditary fructose intolerance</p> <p>Galactosemia</p> <p>Regulation of blood glucose levels in well fed condition and fasting/starvation</p> <p><b>Non-core:</b></p> <p>Details of Pyruvate dehydrogenase (PDH) reaction</p> <p>Sorbitol pathway</p> <p>Essential pentosuria</p>	12
6	<p><b>Chemistry of lipids (BI4.1, BI11.24)</b></p> <p><b>Core:</b></p> <p>Definition, Modified Bloor's classification with examples.</p> <p>Biomedical importance of lipids</p>	3

	<p>Fatty acids - Definition, examples and importance of Essential fatty acids, Mono and Polyunsaturated fatty acids, omega 3 and omega 6 fatty acids, Trans-fatty acids.</p> <p>Triacylglycerol – composition and importance</p> <p>Phospholipids - Types, functions with clinical importance, Respiratory distress syndrome</p> <p>Glycolipids – Types and importance</p> <p>Cholesterol - structure and biological importance, important products derived and their significance.</p> <p>Lipoproteins – Types, composition and functions</p> <p>Amphipathic lipids - Definition, examples and importance, Liposomes</p> <p><b>Non-core:</b></p> <p>Fatty acids – nomenclature and different types of classification</p> <p>Synthesis of lung surfactant</p>	
7	<p><b>Lipid metabolism (BI4.2, BI4.3, BI4.4, BI4.6)</b></p> <p><b>Core:</b></p> <p>Digestion and Absorption</p> <p>Steatorrhea</p> <p>Biosynthesis and breakdown of triacylglycerol</p> <p>PATHWAYS – Significance, Site, reactions, key steps, energetics, regulation, and associated disorders of -</p> <p>Beta oxidation</p> <p>Ketogenesis, ketolysis</p> <p>Cholesterol biosynthesis up to mevalonate.</p> <p>Other types of Oxidation of fatty acids and associated disorders</p> <p>Lipoprotein metabolism: Metabolism of Chylomicrons, VLDL, LDL, HDL</p> <p>Formation and functions of bile acids and bile salts</p> <p>Fatty liver and lipotropic factors</p> <p>Hyperlipoproteinemias</p> <p>Prostaglandins – types and biomedical importance</p> <p><b>Non-core:</b></p> <p>Fatty acid synthase multienzyme complex</p> <p>Outline of Fatty acid biosynthesis</p> <p>Lipid Storage Disorders</p>	12

8	<p><b>Chemistry of amino acids and Proteins (BI5.1, BI5.2)</b></p> <p><b>Core:</b>  Prerequisite: Aminoacids – Classification based on side chain properties, nutritional requirement and metabolic fate  Standard and non-standard amino acids  Biologically important peptides  Proteins – Definition, Classification based on chemical nature and solubility, functions, nutritional value  Structural organization of proteins (primary, secondary, super secondary structures/ motifs, domains, tertiary and quaternary structures with examples)  Bonds stabilizing protein structure  Structure function relationship of proteins - haemoglobin, myoglobin, collagen and Insulin  Denaturation - definition, causes, properties of a denatured protein, significance.</p> <p><b>Non-core:</b>  Properties of amino acids with emphasis on Isoelectric pH and its significance  Non protein amino acids, Non alpha aminoacids, D aminoacids</p>	3
9	<p><b>Protein and amino acid metabolism (BI5.3, BI5.4, BI5.5, BI11.17)</b></p> <p><b>Core:</b>  Digestion and absorption and associated disorders  Amino acid pool  General reactions – Transamination, Transdeamination, Transmethylation, Deamination - Oxidative and non-oxidative and their significance.  Decarboxylation reactions and Biogenic amines  Sources and fate of ammonia – Sources, Trapping, Transport and Disposal of ammonia, Congenital and acquired hyperammonemias and ammonia toxicity  Urea cycle and its disorders</p> <p><b>Aminoacid metabolism</b>  Glycine – specialised products and their importance  Phenylalanine, Tyrosine – metabolic/catabolic pathway, synthesis of catecholamines.</p>	13

	<p>Other specialised products formed from tyrosine and their importance</p> <p>Tryptophan- synthesis of serotonin and melatonin, other important products and their importance</p> <p>Sulphur containing aminoacids – functions of cysteine and methionine, Synthesis of SAM, SAH, Homocysteine (Transmethylation reaction)</p> <p>Formation of Nitric oxide and its importance</p> <p>Inborn errors of metabolism – enzyme defects, clinical features, laboratory diagnosis and biochemical basis of management of – PKU, Tyrosinosis, Alkaptonuria, Albinism, Homocystinuria, Maple syrup urine disease (MSUD)</p> <p>Important functions/products from histidine, serine, Aspartate, Asparagine, glutamate, glutamine</p> <p>Polyamines - Examples and importance</p> <p>Biochemical basis and lab tests for Pheochromocytoma</p> <p>Biochemical basis of Carcinoid syndrome</p> <p><b>Non-core:</b></p> <p>Techniques to separate and identify amino acids.</p>	
10	<p><b>Plasma proteins (BI5.2)</b></p> <p><b>Core:</b></p> <p>Functions and clinical significance of plasma proteins - Albumin, <math>\alpha</math>, <math>\beta</math> and <math>\gamma</math> globulins.</p> <p>Acute phase reactants - Positive and Negative (clinical significance)</p> <p>Biological Reference range of serum total protein, albumin, total globulin, C reactive protein</p> <p>Paraproteinemias, Multiple Myeloma</p> <p><b>Non-core:</b></p> <p>Separation and identification of plasma proteins by electrophoresis and precipitation reactions, Bence jones proteins</p>	3
11	<p><b>Metabolism and homeostasis (BI6.1, BI3.8, BI4.5, BI4.7, BI3.10, BI11.17)</b></p> <p><b>Core:</b></p> <p>Metabolic processes taking place in specific organs in the body in fed, fasting and exercise states.</p> <p>Metabolic changes during starvation</p>	6

	<p>Adipose tissue – Hormones secreted from adipose tissue (adipokines – leptin, adiponectin) their functions and role in hunger and satiety.</p> <p>Diabetes mellitus – types, metabolic changes, complications.</p> <p>Guidelines for diagnosis of Diabetes mellitus</p> <p>Artificial sweeteners</p> <p>Lipid profile, Dyslipidemia</p> <p>Atherosclerosis – definition, role of lipids in atherogenesis (LDL, Oxidised LDL, Lp(a), Small dense LDL, HDL)</p> <p>Lab tests in Myocardial infarction</p> <p>Biochemical basis of use of hypolipidemic drugs</p> <p>Alcohol metabolism</p> <p><b>Non core:</b></p> <p>Advanced Glycation End (AGEs) products</p>	
12	<p><b>Biological Oxidation (BI6.6)</b></p> <p>Prerequisite: Bioenergetics – Laws of thermodynamics, Free energy, Exergonic and endergonic reactions, Chemical Coupling Redox pair, Redox potential.</p> <p><b>Core:</b></p> <p>High Energy Compounds – Definition, Classification, biological significance.</p> <p>Transport of reducing equivalents across mitochondria</p> <p>Electron Transport Chain – Organization, components, flow of electrons.</p> <p>Oxidative Phosphorylation – Sites, mechanism (Chemiosmotic theory).</p> <p>Binding change mechanism of ATP synthesis by ATP synthase.</p> <p>Inhibitors of Electron Transport Chain and oxidative phosphorylation.</p> <p>Uncouplers and their significance.</p> <p>Brown adipose tissue metabolism.</p> <p><b>Non core:</b></p> <p>ATP-ADP cycle.</p> <p>Structure and organization of ATP synthase complex.</p> <p>Mitochondrial myopathies</p>	3

13	<p><b>Heme metabolism (BI6.11, BI6.12, BI5.2, BI11.17)</b></p> <p><b>Core:</b></p> <p>Heme – Outline of Synthesis, porphyrias  Heme containing proteins  Degradation of Heme in reticulo endothelial system  Bilirubin metabolism – Transport, Uptake, conjugation, excretion  Jaundice – definition, types, causes, lab diagnosis  Congenital hyperbilirubinemias  Hemoglobin – Adult, fetal and embryonic types  Abnormal hemoglobins– carboxy, sulph, methHb.  Hemoglobinopathies – molecular defects, pathophysiological changes in thalassemias and sickle cell anemia</p>	7
14	<p><b>Extracellular matrix (BI9.1, BI9.2)</b></p> <p><b>Core:</b></p> <p>Components of ECM and functions – Proteins (Collagen, elastin, fibrillin, fibronectin, laminin) and Proteoglycans and associated disorders Eg. Osteogenesis imperfecta, Marfans syndrome, Ehler Danlos syndrome etc  Involvement of ECM components in health and disease - Changes occurring in ECM during aging and tissue injury, osteoarthritis and rheumatoid arthritis.</p> <p><b>Non core:</b></p> <p><b>Bone tissue</b>– Concept of Bone turnover, factors affecting bone turnover, Peak bone mass, List of markers of bone formation and bone resorption.</p>	4
15	<p><b>Vitamins (BI6.5)</b></p> <p>Prerequisite: Definition, difference between water and fat soluble vitamins</p> <p><b>Core:</b></p> <p>RDA, Sources, Metabolism, Biochemical functions, Deficiency manifestations, Hypervitaminoses of Fat soluble vitamins (A,D,E,K),  RDA, Sources, Biochemical functions, Deficiency manifestations of Water soluble vitamins - Vitamin C, Folic acid (including one carbon metabolism), Vitamin B12 (including absorption, transport</p>	12



	<p>and storage), Thiamine, riboflavin, Niacin, Pyridoxine, Biotin, Pantothenic acid</p> <p>Biological reference range of Vitamin D, Vitamin B12, Folic acid.</p> <p>Antivitamins</p> <p><b>Non core:</b></p> <p>Vitamers</p> <p>Lipoic acid</p>	
16	<p><b>Minerals (BI6.9, BI6.10)</b></p> <p><b>Core:</b></p> <p>Major elements and trace elements</p> <p>Sources, RDA, absorption and transport, Homeostasis, Functions, Biological reference range, disorders associated with – Calcium, phosphorus, Iron</p> <p>Functions and disorders associated with - Copper, Zinc, Selenium, Fluoride, Iodine, Magnesium, Molybdenum.</p>	8
17	<p><b>Chemistry of Nucleic acids (BI7.1)</b></p> <p><b>Core:</b></p> <p>Nitrogenous bases: Purines and Pyrimidines (Major, Minor, Free Bases); Nucleosides and Nucleotides – Composition, examples, Importance</p> <p>Nucleoside derivatives: NMP, NDP, NTP cAMP, SAM, PAPS, UDP sugars etc</p> <p>Synthetic Nucleotide Analogues and their application</p> <p>Structure and function of DNA (B-DNA)</p> <p>Structural organization of DNA to form chromatin (Primary and Secondary)</p> <p>Types of RNA (hnRNA, mRNA, rRNA, tRNA, SnRNA) with structure and functions</p> <p>microRNA (miRNA) and small interfering RNA (siRNA) and their applications in medicine</p> <p><b>Non core:</b></p> <p>Other types of DNA</p>	2
18	<p><b>Nucleotide metabolism (BI6.2, BI6.3, BI6.4)</b></p> <p><b>Core:</b></p> <p>Sources of atoms of Purine and pyrimidine ring</p> <p>Salvage pathways of Purine and pyrimidine synthesis</p> <p>Catabolism of Purines, Uric acid and its importance</p>	4

	<p>Etiology, manifestations and biochemical basis of clinical manifestations, lab investigations of Gout. Lesch Nyhan syndrome</p> <p><b>Non core:</b> SCID, Orotic aciduria Diagnostic importance of Adenosine deaminase</p>	
19	<p><b>Molecular Biology (BI7.1, BI7.2, BI7.3, BI9.3)</b></p> <p><b>Core:</b></p> <p>Concept of Genomics, proteomics and metabolomics</p> <p><b>DNA Metabolism</b></p> <p>Cell cycle DNA replication - prokaryotic and eukaryotic replication, requirements, process, inhibitors Telomere, Telomerase and its importance DNA repair mechanisms Diseases associated with DNA repair – E.g. Xeroderma Pigmentosum Mutations: Causes, types , Consequences with examples</p> <p><b>RNA Metabolism</b></p> <p>Transcription process Transcriptional units, promoter regions, RNA polymerases in prokaryotes and eukaryotes Differences between prokaryotic and Eukaryotic transcription Inhibitors of transcription process Post transcriptional modifications of all types of RNA</p> <p><b>Protein Biosynthesis</b></p> <p>Genetic Code and its characteristics Requirements and activation of amino acids Translation in Eukaryotes Inhibitors of Translation Post translational modifications</p> <p><b>Regulation of Gene expression</b></p> <p>Concept of Gene, introns, exons, cistron Regulation of gene expression in prokaryotes with illustration of Lac Operon Regulation of gene expression in eukaryotes – Role of enhancers, repressors, DNA regulatory elements, gene</p>	11

	<p>amplification, gene rearrangement, RNA processing, RNA editing, mRNA stability.</p> <p><b>Non core:</b></p> <p>Role of transcriptional activators and coregulators</p> <p>Protein folding – Role of Chaperones and Heat shock proteins, Alzheimer’s disease, Prion diseases</p> <p>Protein targeting and sorting with associated disorders Eg, I cell disease</p> <p>Intracellular protein degradation (ubiquitination)</p> <p>Protein motifs in DNA regulatory proteins</p> <p>Chromatin remodeling in regulation</p> <p>Epigenetics</p>	
20	<p><b>Molecular Biology Techniques and gene therapy (BI7.4)</b></p> <p><b>Core:</b></p> <p>Recombinant DNA technology, DNA cloning - process and application</p> <p>PCR technique and its application</p> <p>Blotting techniques</p> <p>Types and application of gene therapy.</p> <p>DNA Polymorphism, SNP, VNTR, RFLP</p> <p>Genomic and cDNA libraries</p> <p>DNA Probes</p> <p>DNA Microarrays</p> <p>Overview of Human Genome Project</p>	4
21	<p><b>Biochemistry of Cancer (BI10.1, BI10.2)</b></p> <p><b>Core:</b></p> <p>Cell cycle, regulation, abnormal cell growth, programmed cell death (apoptosis).</p> <p>Cell signalling (action of hormones and growth factors) – Cell surface receptors -G protein coupled signaling, catalytic receptor signaling, steroid receptor signaling</p> <p>Biochemical changes in cancer cells</p> <p>Etiology of Cancer: Mutagens and carcinogens - Definitions, examples and their actions in carcinogenesis</p> <p>Protooncogenes and their activation, oncogenes, tumour suppressor genes and their role in development of cancer</p> <p>Oncogenic viruses (HPV and cervical cancer)</p>	7

	<p>Growth factors and their receptors  Tumour markers and their importance in diagnosis and prognosis of cancer  Biochemical basis of cancer therapy – alkylating agents, antimetabolites, topoisomerase inhibitors, antibiotics, hormones, receptor blockers, radiotherapy etc  Monoclonal antibodies and their application</p> <p><b>Non core:</b>  Hybridoma technology  Estrogen and progesterone receptors and their clinical importance in breast cancer</p>	
22	<p><b>Immunology (BI10.3, BI10.4, BI10.5)</b>  <b>Core:</b>  Cellular and humoral components of immune system  Immunoglobulins – Classes, structure function relationship, Ig class switching, Clonal selection  Innate and adaptive immune responses  Self/non-self-recognition, proteins encoded by MHC, HLA antigens  Role of T-helper cells in immune responses  Concept of Immune tolerance and Autoimmunity  Antigens and concepts in vaccine development – types of vaccines, immunological basis of vaccine development, recombinant DNA technology in vaccine development.</p> <p><b>Non core:</b>  Autoimmune disorders  Concept of Hypersensitivity reactions, graft rejection, Phases of vaccine development.</p>	2
23	<p><b>Nutrition and dietetics (BI8.1, BI8.2, BI8.3, BI8.4, BI8.5, BI11.17, BI11.23, BI11.24)</b>  <b>Core:</b>  Energy content of food items  BMR – Definition, Normal values, Factors affecting and biomedical importance  SDA – Definition and significance (Thermogenic effect of food)  Nitrogen balance, amino acid pool  Balanced diet  Dietary fibres – definition, examples, importance</p>	7

	<p>Glycemic index – definition, calculation, importance</p> <p>Nutritional importance of Carbohydrates, Lipids, Proteins, Vitamins and minerals, commonly used food items including fruits and vegetables.</p> <p>Advantages and disadvantages of use of unsaturated, saturated and trans fatty acids in food.</p> <p>Nutritional indices</p> <p>Calculation of calorie requirement</p> <p>Dietary advice for optimal health in childhood and adults, special conditions like diabetes, coronary artery disease, pregnancy.</p> <p>Types, causes and effects of Protein energy malnutrition</p> <p>Obesity – Definition, BMI, types, causes, role of GI peptides and adipokines in obesity, associated health risks (e.g., metabolic syndrome)</p> <p><b>Non core:</b></p> <p>Artificial sweeteners</p>	
24	<p><b>Organ function tests (BI6.13, BI6.14, BI6.15, BI11.17) Core:</b></p> <p>Functions of Liver, Kidney, Thyroid and adrenals.</p> <p>Disorders of Liver, Kidney, Thyroid and adrenals.</p> <p>Liver Function Tests: Tests based on Synthetic, Excretory, and Role of enzymes in hepatic dysfunction</p> <p>Renal Function tests – Tests to assess glomerular and tubular functions</p> <p>Mechanism of action of Group I and Group II hormones</p> <p>Thyroid function tests</p> <p>Adrenal function tests</p> <p><b>Non core:</b></p> <p>List of Lab tests for evaluation of Infertility.</p>	10
25	<p><b>Acid base balance (BI6.7, BI6.8, BI11.17)</b></p> <p>Prerequisite: Concept of Acids, Bases and buffers, HH Equation and its application</p> <p><b>Core:</b></p> <p>Regulation of pH of blood by buffers, respiratory and renal mechanisms</p> <p>Anion gap and its significance</p>	4

	Acidosis and alkalosis (metabolic and respiratory) – causes, compensatory mechanisms and lab findings	
26	<p><b>Water and electrolyte balance (Core:</b>  Distribution of water and electrolytes in ICF and ECF  Osmolality of ECF and its biological reference interval.  Osmolal gap and its significance  Regulation of water and electrolyte balance  Disorders of electrolyte imbalance – causes and clinical features of Hyperkalemia, Hypokalemia, Hyponatremia, Dehydration, SIADH</p>	3
27	<p><b>Free Radicals and Antioxidants (BI7.6, BI7.7)</b>  <b>Core:</b>  Free radicals, Reactive oxygen species (ROS), Reactive nitrogen species (RNS)  Damaging effects of ROS on biomolecules, lipid peroxidation  Anti-oxidant defense system of our body – enzymes, vitamins, metabolites as antioxidants  Role of oxidative stress in aging, atherosclerosis, diabetes mellitus and cancer  <b>Non core:</b>  Biochemistry of aging  Fenton and Haber Weiss reactions</p>	3
28	<p><b>Xenobiotics and Detoxification (BI7.5)</b>  <b>Core:</b>  Definition of Xenobiotics, Biotransformation, detoxification  <b>Phase –I reactions</b>  Oxidation  Hydroxylation  Cytochrome P450  <b>Phase-II reactions</b>  Conjugation reactions-Glucuronic acid, Glutathione, Glycine  <b>Non core:</b>  Other detoxification reactions reduction, hydrolysis, Acetylation, Methylation and reduction</p>	1
29	<p><b>Clinical chemistry(BI11.16)</b>  <b>Core:</b>  Basic concepts of clinical chemistry laboratory</p>	2

	Automation - advantages Quality control concepts (Internal and external quality control, precision, accuracy) Specimen collection and Common Preanalytical errors Biological reference intervals Critical alerts Ethics in laboratory medicine	
<i>**No. of teaching hours include Large group and Small group teaching including CBL sessions  Additionally, 20 hours of Self-directed learning can be used for teaching the above content</i>		

**Assessment methods for Theory (Formative and Summative):**

- **Written (MCQs/SAQs/SEQs/LEQ/case vignette based questions)**
- **Viva Voce**

**Note:** Content under Noncore category should not be assessed in University Summative examination. However, the same can be assessed in Formative assessments.

**CASE BASED LEARNING SESSIONS (CBL): 40 hours**

*(The CBL teaching hours is included in the course content table above)*

Sl. No.	Topic	Suggested Cases for discussion	Domain/ Level	Assessment method
1	Diagnostic enzymology BI2.7, BI11.17	Myocardial infarction Acute pancreatitis	K/KH	<b>Written</b> - Case vignette based essay question/ MCQs <b>Practical</b> - case chart interpretation/ OSPE <b>Viva Voce</b>
2	Carbohydrate metabolism BI3.8, BI3.10, BI11.17	Diabetes Mellitus GTT charts/GST Galactosemia Von Gierkes disease	K/KH	
3	Lipid metabolism BI3.10, BI4.7, BI11.17	Dyslipidemia/Metabolic syndrome Ketoacidosis	K/KH	
4	Protein metabolism Inborn errors of metabolism BI5.5, BI11.17	PKU, Alkaptonuria, Homocystinuria MSUD, Albinism	K/KH	

5	Plasma proteins BI5.5, BI11.16, BI11.17	Multiple myeloma	K/KH
6	Nucleotide metabolism BI6.4, BI11.17	Gout	K/KH
7	Liver Function tests and Hemoglobinopathies BI6.2, BI6.14, BI11.17	Hemolytic Jaundice Hepatic jaundice - Alcoholic cirrhosis/ Non alcoholic steatohepatitis Obstructive jaundice Neonatal jaundice Sickle cell anaemia	K/KH
8	Renal function tests BI6.14, BI11.17	Renal failure/Diabetic nephropathy Nephrotic syndrome Acute glomerulonephritis	K/KH
9	Thyroid function tests BI6.14, BI11.17	Hypothyroidism (Goitre) Hyperthyroidism	K/KH
10	Vitamin deficiency disorders BI6.5	Vitamin A deficiency Rickets, Scurvy, BeriBeri, Pellagra Megaloblastic anemia	K/KH
11	Minerals BI6.10	Iron deficiency anaemia Tetany, Wilson's disease	K/KH
12	Nutritional disorders BI8.2	Kwashiorkor Marasmus	K/KH
13	Cancer BI10.2	Prostate carcinoma Breast carcinoma	K/KH
14	Disturbances in acid-base balance BI6.8, BI11.17	Metabolic acidosis Metabolic alkalosis Respiratory acidosis Respiratory alkalosis	K/KH



<b>SUGGESTED DISTRIBUTION OF TEACHING HOURS (Topic wise)</b>				
<b>Sl. No.</b>	<b>Topic</b>	<b>Large group Teaching (LGT)</b>	<b>Small group Teaching (SGT)</b>	
		<b>Lectures (80)</b>	<b>Small group discussions (SGD) (40)</b>	<b>Case based learning sessions (CBL) (40)</b>
1	Relevance of Biochemistry in Medicine	1 Orientation lecture		
2	Cell and organelles, Cell membrane, Transport across cell membranes	2	-	-
3	Enzymes	5	2	2
4	Chemistry of Carbohydrates	3	-	-
5	Carbohydrate metabolism	8	2	4
6	Chemistry of lipids	3	-	-
7	Lipid metabolism	8	2	2
8	Chemistry of amino acids and Proteins	3	-	-
9	Protein and amino acid metabolism	7	2	4
10	Plasma proteins	1	-	2
11	Metabolism and homeostasis	2	4	-
12	Biological Oxidation	3	-	-
13	Heme metabolism	3	-	4
14	Extracellular matrix	2	2	-
15	Vitamins	2	4	6
16	Minerals	2	4	2
17	Chemistry of Nucleic acids	2	-	-
18	Nucleotide metabolism	2	-	2
19	Molecular Biology	7	4	-
20	Molecular Genetics and Techniques	2	2	-
21	Biochemistry of cancer	3	-	2
22	Immunology	2	-	-
23	Nutrition and dietetics	3	2	2
24	Organ function tests	-	4	6
25	Acid base balance	2	-	2
26	Water and electrolyte balance	1	2	-
27	Free Radicals and Antioxidants	1	2	-
28	Detoxification and xenobiotics	1	-	-
29	Clinical chemistry	-	2	-

**Note:** The above table of teaching hours assigned to different topics under large and small group teaching is suggested only and thus may be used as a guide.

## 6. PRACTICAL COURSE CONTENT:

**Total Teaching hours: - 70 hours**

- a. Part 1: Qualitative Experiments - 18hrs
- b. Part 2: Quantitative Experiments - 28hrs
- c. Part 3: Demonstration Experiments - 24hrs

SL. NO.	Type of Experiment	Suggested Teaching learning method - Practical tests to be performed	Domain/ Level	Assessment method
<b>Part 1: Qualitative Experiments</b>				
1	Analysis of Normal constituents of urine BI11.3, BI11.4	DOAP sessions – Examine Physical properties, Inorganic constituents (Calcium, Phosphorus and Ammonia) and Organic constituents (Urobilinogen, Urea, Uric acid, Creatinine)	S/P	Qualitative analysis / OSPE
2	Analysis of Pathological Constituents of Urine BI11.4, BI11.20	DOAP sessions - Physical examination, chemical tests for Glucose, Ketone Bodies, Blood, Proteins, Bile salts and Bile Pigments Demonstration by using Dip sticks	S/P	Qualitative analysis / OSPE
3	Urine screening tests for Inborn errors of metabolism BI11.5, BI5.5	Newborn screening tests- Interpretation of laboratory reports	K/KH	OSPE/ Viva Voce

4	Calculate the energy content of food items 11.23	Small group discussion - Calculate	K/KH	OSPE/ Viva Voce
<b>Part 2: Quantitative Experiments</b>				
1	Estimation of plasma glucose by Enzymatic method and Glucometer as point of care testing BI11.21, BI3.10	DOAP sessions - Perform and Interpret	S/P	Quantitative analysis/ Case chart interpretation / OSPE/ Viva Voce/
2	Estimation of serum and urine creatinine by Jaffe's method, Creatinine clearance BI11.7, BI11.21	DOAP sessions - Perform and Interpret	S/P	
3	Estimation of blood urea by Urease/ GLDH method BI11.21	DOAP sessions - Perform and Interpret	S/P	
4	Estimation of Total Protein by Biuret method and Albumin in serum by BCG method, A:G ratio BI11.8, BI11.21	DOAP sessions - Perform and Interpret	S/P	
5	Estimation of Total cholesterol and HDL cholesterol BI11.9	Practical - Perform and Interpret	S/P	
6	Estimation of Triacylglycerols BI11.10	Practical - Perform and Interpret	S/P	
7	Estimation of Calcium and Phosphorous BI11.11	Practical - Perform and Interpret	S/P	
8	Estimation of Serum Bilirubin BI11.12	Practical - Perform and Interpret	S/P	

9	Estimation of AST, ALT activity BI11.13	Practical - Perform and Interpret	S/P	
10	Estimation of ALP activity BI11.14	Practical - Perform and Interpret	S/P	
<b>Part 3: Demonstrations</b>				
1	Lab safety and Biomedical waste disposal, Commonly used lab equipment, glassware and reagents BI11.1	Small group discussion, lab visit	K/KH	Viva Voce
2	Preparation of buffers and estimation of pH using pH meter BI11.2, 11.16, 11.19	Demonstration - Observe	K/KH	Viva Voce
3	Colorimetry, Spectrophotometry BI11.6, BI11.18,	Demonstration - Observe	K/KH	Viva Voce
4	Clinical chemistry autoanalyser and quality control (Internal and External quality control, Precision, Accuracy), Biological reference intervals BI11.16, BI11.19	Demonstration - Observe and interpret	K/KH	OSPE/ Viva Voce
5	Specimen collection and preanalytical errors in clinical Biochemistry lab	Collection centre and lab visit	K/KH	Viva Voce
6	Serum protein electrophoresis, types and applications BI11.16, BI11.19	Demonstration - Observe and interpret	K/KH	OSPE/ Viva Voce

7	Paper chromatography/ TLC of aminoacids/ sugars, types and applications BI11.5, BI5.5, BI11.16, BI11.19	Demonstration - Observe and Interpret	K/KH	OSPE/ Viva Voce
8	Analysis of CSF BI11.15	Small group discussion - Interpret	K/KH	OSPE/ Viva Voce
9	Estimation of serum electrolytes by ISE BI11.16, BI11.19	Demonstration - Observe and Interpret	K/KH	OSPE/ Viva Voce
10	Blood gas analysis using ABG analyser BI11.16, BI11.19	Demonstration- Observe and Interpret	K/KH	OSPE/ Viva Voce
11	Principle, procedure and applications of ELISA, protein extraction, Blotting techniques, PAGE BI11.16, BI11.19	Demonstration- Observe	K/KH	Viva Voce
12	Principle, procedure and applications of PCR, DNA isolation BI11.16, BI11.19	Demonstration- Observe	K/KH	Viva Voce

#### 4. CERTIFICATION OF SKILLS:

***To be evaluated using format provided in Annexures. Checklist can be prepared by subject experts.***

SL.NO.	Competency to be certified with Competency number	No. required to certify P
1	Perform urine analysis to estimate and determine normal constituents (BI11.4)	1
2	Perform urine analysis to estimate and determine abnormal constituents (BI11.4)	1

3	Identify abnormal constituents in urine, interpret the findings and correlate these with pathological states (BI11.20)	1
4	Demonstrate estimation of glucose in serum (BI11.21)	1
5	Demonstrate the estimation of serum Creatinine and Creatinine clearance (BI11.7, BI11.21)	1
6	Demonstrate estimation of urea in serum (BI11.21)	1
7	Demonstrate estimation of serum protein, albumin and A:G ratio (BI11.8, BI11.21)	1

*Note: In theory, Practical and certification of skill sections, topics with corresponding competency numbers as mentioned in volume 1 of competency based undergraduate curriculum for Indian Medical Graduate (2018) prescribed by Medical Council of India, have been mentioned.*

## 5. SCHEME OF EXAMINATION:

### A. INTERNAL ASSESSMENT (IA):

#### **THEORY INTERNAL ASSESSMENT:**

- A minimum of **THREE** Theory Internal Assessments (IA) to be conducted. 3<sup>rd</sup> Internal assessment must be conducted similar to the university examination pattern.
- **Components of Theory IA:** (Marks distribution given in table below)
  - Marks obtained in Theory IA written papers
  - Continuous assessment marks shall be calculated based on scoring in written tests/ assignments/ creative writing experiences of AETCOM modules
  - Log book assessment of ECE, SDL, Seminars, Quiz etc.

#### **PRACTICAL INTERNAL ASSESSMENT**

- A minimum of **THREE** Practical Internal Assessments (IA) to be conducted. 3<sup>rd</sup> Internal assessment must be conducted similar to the university examination pattern.
- **Components of Practical IA:** (Marks distribution given in table below)
  - Marks obtained in Practical IA exams
  - Viva/oral examination should assess approach to clinical context in the concepts of basic sciences.

- Record book evaluation
- Log book assessment of skill competencies acquired in specified subject and AETCOM.

The distribution of internal assessment marks shall be as mentioned below:

<b>Theory IA</b>	<b>Maximum Marks</b>	<b>Practical IA</b>	<b>Maximum Marks</b>
Theory IA written paper	70	Practical IA exam and Viva Voce	70 <i>(50+20)</i>
Continuous assessments 10. Written tests (Part completion tests/ system based tests) – 20 marks 11. Written tests for ECE and/or SDL topics and/or creative writing experience of AETCOM (Logbook assessment) – 5 marks 12. Participation in ECE and SDL sessions – 5 marks	30	Continuous assessments 10. Record book evaluation – 10 marks 11. Log book assessment of skill competencies acquired in specified subject – 15 marks 12. Participation in SGT and AETCOM – 5 marks	30
<b>TOTAL</b>	<b>100</b>		<b>100</b>

## **FINAL INTERNAL ASSESSMENT MARKS**

**The final Internal assessment (IA) marks will be calculated as follows:**

**Average of all 3 IA will be considered as Final IA marks in Theory and Practical separately.**

Level of participation in ECE, SDL and AETCOM modules shall be assessed using the format given in annexure.

A clear record of all components that add to the internal assessment marks needs to be maintained by the institution/departments and retained by them for at least 5 years after completion of the examination.

The internal and formative assessments provide ideal opportunities for students and teachers to identify learning gaps. Teachers should provide high quality feedback to each student to enable them to bridge these learning gaps.

The format for providing feedback is shown in annexure.

The results of IA shall be displayed on the notice board within 1-2 weeks of the test. Suitable remedial measures for students who are either not able to score qualifying marks or have missed on some assessments due to any reason shall be taken by college.

Formative assessments also enable the early identification of students who are struggling to achieve the intended learning outcomes. Early and appropriate targeted remediation must be planned for such students.

## **B.SUMMATIVE ASSESSMENT: (University examinations)**

### **Eligibility for University Examinations**

- **Attendance**

Attendance requirements are 75% in theory and 80% in practical /clinical for eligibility to appear for the examinations in that subject. In subjects that are taught in more than one phase – the learner must have 75% attendance in theory and 80% in practical in each phase of instruction in that subject.

AETCOM sessions: 75% attendance in Professional Development Programme (AETCOM Module) is required for eligibility to appear for final examination in each professional year.



- **Internal Assessment Marks**

Learners must secure at least 50% marks of the total marks (combined in theory and practical / clinical; not less than 40 % marks in theory and practical separately) assigned for internal assessment in a particular subject in order to be eligible for appearing at the final University examination of that subject.

- **Certifiable competencies and Log book**

Learners must have completed the required certifiable competencies for that phase of training and completed the log book appropriate for that phase of training to be eligible for appearing at the final university examination of that subject.

**Pass criteria:**

- **University Theory examination:** In subjects that have two papers, the student must secure at least 40% marks in each of the papers with minimum 50% of marks in aggregate (both papers together) to pass.
- **University Practical Examination:** Student shall secure 50% marks in university practical examination and viva voce (together) to be declared pass.
- Student shall obtain 50% marks in university conducted examination separately in Theory and Practical (practical includes Practical/clinical and Viva voce) in order to be declared as passed in that subject.
- Internal assessment is considered under separate heading of passing. Students should secure at least 50% of the total marks (combined in Theory and Practical, not less than 40% in theory and practical separately) assigned for internal assessment in order to be declared successful at the final university examination of that subject.

**MARKS DISTRIBUTION FOR UNIVERSITY EXAMINATION**

THEORY			THEORY TOTAL	PRACTICAL		PRACTICAL TOTAL
	Written paper	MCQ's		Practical	Viva Voce	
PAPER 1	80	20	<b>200</b>	80	20	<b>100</b>
PAPER 2	80	20				

## THEORY UNIVERSITY EXAMINATION:

**Written paper: Paper-1: 100 marks + Paper 2: 100 marks = 200 marks**

**Time: 3 hours for each paper**

The pattern of questions in each paper shall be as mentioned below:

Type of Question	Number of Questions	Maximum Marks for each question	Total
Multiple Choice Questions (MCQs)	20	01	20
Structured Long essay questions (SLEQ)	02	10	20
Short essay questions (SEQ)	08	05	40
Short answer questions (SAQ)	10	02	20
<b>Total marks</b>			100

The question papers shall be based on the blue print of question paper setting.  
The weightage of marks allotted for each topic shall be strictly adhered to.

A MINIMUM OF 20% up to a MAXIMUM OF 40% marks shall be allocated to assess the higher order thinking of the learner.

The questions framed shall be with appropriate verbs without any ambiguity or overlap.

**Distribution of topics for Paper 1 and Paper 2 for University summative examination:**

<b>Sl. No.</b>	<b>Paper 1 Topics</b>	<b>Weightage of Marks</b>	<b>Sl. No.</b>	<b>Paper 2 Topics</b>	<b>Weightage of Marks</b>
1	Cell, subcellular organelles and membrane transport	2-8	1	Protein and amino acid Chemistry and Metabolism*	15-25
2	Extra cellular matrix	2-6	2	Immunology, Plasma proteins	2-6
3	Enzymes	7-15	3	Nucleic acid Chemistry and metabolism*	5-9
4	Carbohydrate Chemistry and Metabolism including homeostasis*	15-25	4	Molecular Biology	10-20
5	Lipid Chemistry and Metabolism including homeostasis*	15-25	5	Molecular Biology Techniques and gene therapy	8-15
6	Biological Oxidation	2-6	6	Biochemistry of Cancer	3-9
7	Vitamins	7-12	7	Heme Metabolism	5-12
8	Minerals	7-12	8	Organ function tests	5-12
9	Nutrition and Dietetics	4-9	9	Detoxification & xenobiotics	2-6
10	Acid Base Balance	5-12	10	Free radicals & Antioxidants	2-6
11	Water & Electrolyte Balance	2-5	11	Clinical Chemistry	2-8

**Note:**

- *Weightage of marks assigned to topics may add to more than 100.*
- *Long essay question should be from the topics with weightage of 10 or MORE THAN 10%.*
- *\* Long essay question must not come from basic Chemistry*
- *The topics to different paper are generally evaluated under those sections. However, a strict division of the subject may not be possible and some overlapping of topics is inevitable. Students should be prepared to answer overlapping topics.*

## BLUE PRINT FOR QUESTION PAPER SETTING

(To be filled by the question paper setter)

- Total marks under each type of question from each topic needs to be entered by QP Setter.
- It should be in accordance with SDMU guidelines.

### BIOCHEMISTRY - BLUE PRINTING OF QUESTION PAPER

A SL. NO.	B BIOCHEMISTRY PAPER 1 Topics	C Weightage of Marks as per SDMU guideline	D MCQs 1X20Q= 20 marks	E SLEQ 10X2Q= 20 marks	F SEQ 5X8Q= 40 marks	G SAQ 2X10Q= 20 marks	H Total marks (D+E+F+G)	I HOTS including Case vignette based questions (20-40 Marks)	
								Q No.	Marks
1	Cell, subcellular organelles and membrane transport	2-8							
2	Extra cellular matrix	2-6							
3	Enzymes	7-15							
4	Carbohydrate Chemistry and Metabolism including homeostasis*	15-25							
5	Lipid Chemistry and Metabolism including homeostasis*	15-25							
6	Biological Oxidation	2-6							
7	Vitamins	7-12							
8	Minerals	7-12							
9	Nutrition and Dietetics	4-9							
10	Acid Base Balance	5-12							
11	Water and Electrolyte Balance	2-5							
<b>Total Marks (Question wise)</b>			<b>20</b>	<b>20</b>	<b>40</b>	<b>20</b>	<b>100</b>	<b>Total HOTS</b>	
<p><i>* Long essay question must not come from basic Chemistry</i>  <i>Long essay question should be from the topics with weightage of 10 or MORE THAN 10.</i>  <i>Multiple Choice Questions (MCQs); Structured Long essay questions (SLEQ); Short essay questions (SEQ); Short answer questions (SAQ)</i></p>									

A	B	C	D	E	F	G	H	I	
SL. NO.	BIOCHEMISTRY PAPER 2 Topics	Weightage of Marks as per SDMU guideline	MCQs 1X20Q = 20 marks	SLEQ 10X2Q = 20 marks	SEQ 5X8Q = 40 marks	SAQ 2X10Q = 20 marks	Total marks (D+E+F+G)	HOTS including Case vignette based questions (20-40 Marks)	
								Q No.	Marks
1	Immunology, Plasma proteins	2-6							
2	Protein and amino acid Chemistry and Metabolism*	15-25							
3	Nucleic acid Chemistry and metabolism*	5-9							
4	Molecular Biology	10-20							
5	Molecular Biology Techniques and gene therapy	8-15							
6	Biochemistry of Cancer	3-9							
7	Heme Metabolism	5-12							
8	Organ function tests	5-12							
9	Detoxification & xenobiotics	2-6							
10	Free radicals and Antioxidants	2-6							
11	Clinical Chemistry	2-8							
<b>Total Marks (Question wise)</b>			<b>20</b>	<b>20</b>	<b>40</b>	<b>20</b>	<b>100</b>	<b>Total HOTS</b>	
<p><i>* Long essay question must not come from basic Chemistry</i>  <i>Long essay question should be from the topics with weightage of 10 or MORE THAN 10.</i>  <i>Multiple Choice Questions (MCQs); Structured Long essay questions (SLEQ); Short essay questions (SEQ); Short answer questions (SAQ)</i></p>									

## **PRACTICAL UNIVERSITY EXAMINATION**

<b>Total</b>	<b>- 100 Marks</b>
<b>Practical exercises</b>	<b>- 80 marks</b>
<b>Viva voce</b>	<b>- 20 marks</b>

- 1. Exercise 1: Spotters/OSPE - 10 Marks**
- 2. Exercise 2: Qualitative analysis of Normal or Pathological constituents of Urine - 20 Marks**
- 3. Exercise 3: Quantitative estimation and interpretation - 25 Marks**
- 4. Exercise 4: Case studies - 25 Marks**

### **Exercise 1: Spotters/OSPE (10 Marks)**

### **Exercise 2: Qualitative analysis of Normal or Pathological constituents of Urine (20 Marks)**

Selection, principle and performance of tests	: 10 marks
Interpretation and Discussion	: 10 marks

**Alphabetically arranged test procedures shall be given.**

### **Exercise 3: Quantitative estimation and interpretation (25 Marks)**

Principle, Performance, Calculation and Result	: 15 Marks
Interpretation and Discussion	: 10 marks

**Procedure sheets shall be given.**

### **Exercise 4: Case studies (25 marks)**

Total No. of case reports: 2

1 Major Case study for 15 marks and 1 Minor Case study for 10 marks

Suggested Major Case studies: Organ function tests/Diabetes mellitus/Acid base disorders/Myocardial infarction/ Dyslipidemia/PEM

## 6. EARLY CLINICAL EXPOSURE (ECE): 30 hours

CLINICAL SKILLS - 12 hours (all 4 session topics needs to be entered in log book)

Suggested cases for hospital visit (Other topics can also be given)-

- Anaemia
- Jaundice
- Renal failure
- Diagnostic lab visit

BASIC SCIENCE CORRELATION - 18 hours

Suggested topics (Other topics can also be given) -

- Biochemical basis of myocardial infarction
- Biochemical basis of complications of diabetes mellitus
- Laboratory evaluation of Anemia
- Critical alerts in Biochemistry lab test results

## 7. SELF DIRECTED LEARNING (SDL): 20 hours

(Minimum of any 4 needs to be entered in log book)

**Suggested topics for log book entry preferably in the form of concept mapping**

(Other topics can also be given)

- RBC membrane composition and Biochemical basis of Hereditary spherocytosis
- Advanced glycated end products and complications of Diabetes Mellitus
- Hormonal basis of osteoporosis
- Cardiovascular risk assessment scores

## 8. INTEGRATION

- May be conducted in the form of sharing/nesting/correlation using CBL/PBL/ Case study approach and involving various departments concerned.
- Department involved may be chosen according to the topic and may be conducted as Horizontal/ Vertical form of integration as per the MCI CBME document.



Suggested topics:

<b>SL. NO.</b>	<b>Topics / areas of integration</b>	<b>Suggested Departments to be involved</b>
1	Liver dysfunction	Biochemistry, Physiology, Anatomy, Medicine, Pathology
2	Renal system disorders	Biochemistry, Physiology, Nephrology.
3	Nutritional disorders	Biochemistry, Pediatrics, Medicine, Community medicine
4	Anaemia	Biochemistry, Physiology, Medicine, Pathology
5	Endocrine disorders	Biochemistry, Physiology, Medicine
6	Inborn errors of metabolism	Biochemistry, Pediatrics
7	Metabolic disorders	Biochemistry, Physiology, Medicine
8	Acid base/ electrolyte disturbances	Biochemistry, Physiology, Medicine

## **RECOMMENDED BOOKS**

### **TEXT BOOKS: (Recent editions)**

1. DM Vasudevan. Textbook of Biochemistry for Medical students
2. Lippincotts' Illustrated reviews – Biochemistry
3. Rafi MD. Textbook of Biochemistry for Medical students (2<sup>nd</sup> edition)
4. Dinesh Puri. Textbook of Medical Biochemistry
5. U Satyanarayana. Biochemistry
6. Pankaja Naik. Biochemistry
7. S.K.Gupta. Biochemistry for MBBS
8. Namrata Chhabra. Case oriented approach towards Biochemistry
9. Divya shanti D'sza, Sowbhagyalakshmi. An easy guide to Practical Biochemistry.
10. G. Rajgopal and Toora. Practical Biochemistry 4<sup>th</sup> edition

**REFERENCE BOOKS: (Recent editions)**

1. Harpers' Illustrated Biochemistry
2. Marshall and Bangert. Clinical Chemistry
3. Stryer. Biochemistry
4. Baynes and Dominiczak. Medical Biochemistry
5. Bhagavan and Ha. Essentials of Medical Biochemistry with clinical cases
6. Devlin T. Textbook of Biochemistry with clinical correlation
7. James Watson. Molecular biology of gene

**Note:** *A single textbook may not cover the entire curriculum. Referring to more than one book is recommended.*

\*\*\*\*\*

## **COMMUNITY MEDICINE (Including Humanities)**

### **1. GOAL**

Broad goal of teaching undergraduate medical students is to prepare the students to function effectively as Community and Primary Care Physician.

### **2. OBJECTIVES**

#### **2.1 Knowledge**

The student shall be able to:

- i. Enumerate the principles and practice of medicine in hospital and community setting.
- ii. Describe the natural history and role of agent, host and environmental factors in health and disease.
- iii. Describe the concepts of community health and levels of health care with related health interventions.
- iv. Explain the principles of sociology and identify social factors related to health, disease and disability.
- v. Describe and analyse the role of socio-cultural beliefs in health and disease and their impact on individuals, family, and community.
- vi. Describe the elements of normal psychology and social psychology.
- vii. Describe the various health education and effective communication methods.
- viii. Describe the demographic pattern of the country and its relation to health.
- ix. Describe vital statistics and various methods used to collect the vital statistics in India.
- x. Describe the health care delivery system in India
- xi. Describe the organizations and functions of primary health centre, community health centre and district level health centre.
- xii. Describe uses and interpretation of basic bio-statistical data.
- xiii. Describe the basics of research in medical field.

#### **2.2 Skills**

At the end of the course, the student shall be able to:

- i. To practice principles of medicine in hospital and community settings.
- ii. Interpret health and illness behaviour at individual and community level.

- iii. Demonstrate art of communication with patients including history taking and role of social aspects of diseases.
- iv. To formulate a research plan to undertake projects funded by ICMR, other universities and funding agencies.
- v. Demonstration of various government agencies involved in delivery of health care services to community.

### Family Adoption Programme

Targets to be achieved by students:

- i. Learning communication skills and inspire confidence amongst families
- ii. Understand the dynamics of rural set-up of that region
- iii. Screening programs and education about ongoing government sponsored health related programs
- iv. Learn to analyse the data collected from their families
- v. Identify diseases/ ill-health/ malnutrition of allotted families and try to improve the standards

### 3. TEACHING HOURS AND COURSE CONTENT

<b>A. Total Teaching hours</b>	<b>: 87 hrs.</b>
<b>Lectures plus small group discussion plus Self Directed Learning</b>	<b>: 52 hrs.</b>
<b>Foundation Course</b>	<b>: 8 hrs.</b>
<b>Family Adoption programme</b>	<b>: 27 hrs.</b>

#### B. COURSE CONTENT THEORY:

SL. NO.	Topic and Competencies	Hrs.	Teaching learning methods
1.	<b>Concepts of Health and Disease (CM1.1, CM1.2, CM1.3, CM1.4, CM1.5, CM1.6, CM1.7, CM1.8)</b> <b>Core:</b> Concept of public health Concept of holistic health and its relativeness to determinants of health	17	Lecture/ small group discussions

	<p>Characteristics of agent, host and environmental factors in health and disease and Multi factorial aetiology of disease</p> <p>Natural history of the disease</p> <p>Various levels of preventions with application of interventions</p> <p><b>Non –core:</b></p> <p>Right to Health</p> <p>Sustainable Development Goals</p> <p>Difficulties in measurement of health</p> <p>Health for All</p> <p>Millennium Development Goals</p> <p><b>Evolution of Medicine:</b></p> <p>History of Medicine- Medicine in Antiquity</p> <p>Modern Medicine</p> <p>Introduction to Community Medicine</p>		
2.	<p><b>Relationship of social and behavioural factors to health and disease (CM2.1, CM2.2, CM2.3, CM2.4, CM2.5)</b></p> <p><b>Core:</b></p> <p>Introduction to Social sciences and steps to perform clinic-social cultural and demographic assessment of the individual, family and community</p> <p>Socio-cultural factors, family (types), its role in health and disease and demonstrate in a simulated environment the correct assessment of socio-economic status</p> <p>Barriers to good health and health seeking behaviour</p> <p>Social psychology, community behaviour and community relationship and their impact on health and disease</p> <p>Poverty and social security measures and its relationship to health and disease</p> <p><b>Non- core:</b></p> <p>Social mobility</p> <p>Social organization</p> <p>Health and Illness behavior</p>	4	Lecture/ small group discussions
3.	<p><b>Principles of health promotion and Education (CM4.1, CM4.2)</b></p> <p><b>Core:</b></p>	1	Lecture

	<p>Methods of health education with their advantages and limitations</p> <p>Methods of organizing health promotion, education and counseling activities at individual, family and community settings with art of interviewing</p> <p><b>Non-core:</b></p> <p>Health Communication Process and its function</p> <p>Contents and principles of health education</p> <p>Patient communication</p> <p>Planning a health education programme</p>		
4.	<p><b>Demography(CM9.1, CM9.3, CM9.4, CM9.7)</b></p> <p><b>Core:</b></p> <p>Introduction to Demography, demographic cycle and vital statistics</p> <p>Demographic process and its trends in India with causes of declining sex ratio and its social and health implications</p> <p>Causes and consequences of Urbanization and population explosion in the control of health and disease</p> <p>Sources of vital statistics including census, SRS, NFHS, NSSO etc.</p> <p><b>Non-core:</b></p> <p>Urban and rural divide in health and development</p>	7	Lecture/ small group discussion/ DOAP
5.	<p><b>Health Care of the community (CM17.1, CM17.2, CM17.3, CM17.5)</b></p> <p><b>Core:</b></p> <p>Concept of health care of the community</p> <p>Community diagnosis</p> <p>Visit to family</p> <p>Primary health care, its components and principles</p> <p>Health care delivery in India</p> <p>Visit to Anganwadi, Sub-centre, PHC, UHTC, RHTC (Primary health care)</p> <p>Visit to SDM Hospital (Tertiary level)</p> <p><b>Non-core:</b></p> <p>Primary health care in India</p> <p>Community participation</p>	4	Lecture

6.	<b>Research Methodology and Biostatistics(CM6.2, CM6.4)</b> <b>Core:</b> Introduction, definition, methods of collection, classification, interpretation of the data, methods of presentation of statistical data Frequency distribution, Tabular and diagrammatic representation, measures of central tendency and measures of dispersion <b>Non-core:</b> Introduction to research and scope of research in Medicine Use of statistical tables	7	Lecture/DO AP/SGD
7	<b>Nutrition (CM 5.3, CM 5.4)</b>	4	Lecture/ Small Group Discussion
8	<b>Important public health events of last 5 years ( CM 20.1)</b>	1	Lecture

### Foundation Course:

### Field Visits: Total 8 hrs.

1. Visit to Urban Health Training Centre – 2 hrs.
2. Visit to Rural Health Training Centre – 3 hrs.
3. Introduction to Family Adoption Programme (visit to PHC, SC, Anganwadi & Panchayat – 3 hrs.

### Family Adoption program – 27 Hours

9 Visits x 3 Hrs. = 27 Hrs.

### ASSESSMENT:

- No Summative assessment for community medicine subject in phase 1 MBBS.

## **FORMATIVE ASSESSMENT**

Department shall conduct the following formative assessments in the first Professional Year

- First IA along with the first IA of core subjects
- Second IA along with the second IA of core subjects

### **Formative Assessment in the first Professional Year:**

#### **Theory tests:**

- A minimum of **TWO** theory tests shall be conducted
- Formative assessment theory marks shall be calculated based on scoring in written tests, class tests/ tutorials/ seminars/ assignments and log book assessment of SDL/ AETCOM

**Practical tests:** No practical tests will be conducted in the first professional year.

#### **THEORY INTERNAL ASSESSMENT:**

- A minimum of **2** Internal Assessments (IAs) to be conducted
- One of the internal exams will be conducted like preliminary exams
- Learners who have not completed the required number of internal assessment exams for genuine reasons will be given a chance of remediation
- Formative assessment marks shall be calculated based on scoring in written tests and AETCOM modules.
- **Formative assessment: based on day-to-day assessment of SDL/Class tests/ MCQs/ Tutorials/ Seminars/ Assignments [records of activities used for assessment to be maintained by the department]**
- Written exams will include MCQ's [MCQs not exceeding 20%]/ Structured Long Essay Questions/ Short essay questions/ Short Answer questions
- 30% of marks will be for higher order thinking
- Content under Noncore category cannot be assessed in Summative assessments. However, the same can be assessed in Formative assessments.



DEPARTMENT OF COMMUNITY MEDICINE								
Integrated phase-wise Internal Assessment								
THEORY		Phase 1		Phase 2		Phase 3-1		Final Total
		IA-1	IA-2	IA-3	IA-4	IA-5	IA-6	
Written	Theory#	30	25	30	25	50	75	
	MCQ	10	10	10	10	10	20	
	AETCOM*	--	05	--	05	--	05	
FA	Formative assessment: SDL/Class tests/ MCQs/ Tutorials/ Seminars/ Assignments	05	05	05	05	10	10	
	Logbook	05	05	05	05	10	10	
<b>Total</b>		<b>50</b>	<b>50</b>	<b>50</b>	<b>50</b>	<b>80</b>	<b>120</b>	
<p align="center"><b>FINAL THEORY IA MARKS = 100 (final total divided by 4)</b></p> <p align="center">* To be included as a question in theory paper</p> <p align="center"># Pandemic module to be included in theory exam</p> <p align="center">IA-6 is Preliminary exam and hence to be conducted as two theory papers of 100 marks each, and average of both papers is used for tabulation</p>								

**Note: Summative assessment shall be conducted at the end of MBBS 3<sup>rd</sup> Professional Year Part 1.**

#### **RECOMMENDED TEXT BOOKS**

1. Text Book of Preventive Medicine by Park.
2. Methods in Bio-statistics by B.K. Mahajan.

\*\*\*\*\*

**ANNEXURES**  
**LOG BOOK FOR MBBS PROFESSIONAL YEAR 1**

SL. NO.	CONTENT
1.	<b>BONAFIDE CERTIFICATE</b>
2.	<b>PARTICULARS OF THE STUDENT</b>
3.	<b>GUIDELINES</b>
4.	<b>ANATOMY</b> <ol style="list-style-type: none"> <li>a. Certification of skill acquisition</li> <li>b. Early clinical exposure sessions</li> <li>c. Self-directed learning topics</li> <li>d. Record book evaluation</li> <li>e. Feedback to student</li> </ol>
5.	<b>PHYSIOLOGY</b> <ol style="list-style-type: none"> <li>a. Certification of skill acquisition</li> <li>b. Early clinical exposure sessions</li> <li>c. Self-directed learning topics</li> <li>d. Record book evaluation</li> <li>e. Feedback to student</li> </ol>
6.	<b>BIOCHEMISTRY</b> <ol style="list-style-type: none"> <li>a. Certification of skill acquisition</li> <li>b. Early clinical exposure sessions</li> <li>c. Self-directed learning topics</li> <li>d. Record book evaluation</li> <li>e. Feedback to student</li> </ol>
7.	<b>AETCOM MODULES</b>
8.	<b>COMMUNITY MEDICINE FIELD VISITS</b>
9.	<b>SEMINARS PRESENTED/ATTENDED</b>
10.	<b>CONFERENCE/CME/WORKSHOP ATTENDED</b>
11.	<b>SCIENTIFIC PROJECT PRESENTATIONS/ REPORTS/ OUTREACH ACTIVITIES</b>
12.	<b>ACHIEVEMENTS/ AWARDS</b>

\*Annexures can be modified as per the requirements of individual departments

## **BONAFIDE CERTIFICATE**

This is to certify that this log book is the bonafide record of Mr./Ms.....whose particulars along is given above.

His/ Her log of competencies acquired, are as noted in the entries in this log book as per the Competency Based Undergraduate Medical Education Curriculum, Graduate Medical Regulation 2018, during the period ..... to .....

### **Name and Signature with date and seal**

**Head, Department of Anatomy** :

**Head, Department of Physiology** :

**Head, Department of Biochemistry** :

**Head, Department of Community medicine** :

**Principal/Dean** :

## PARTICULARS OF THE STUDENT

Name of the student :

Date of Birth :

Contact no. :

Email id :

Blood group :

Father's name :

Father's contact no. :

Father's email ID :

Mother's name :

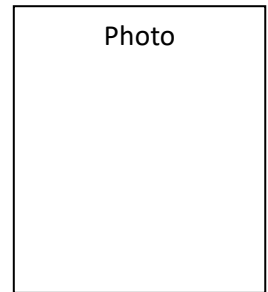
Mother's contact no. :

Mother's email ID :

Address :

Local guardian :

Contact No. :



**Signature of Student**

**Signature of Parent/Local guardian**

## **GUIDELINES**

1. The log book is a record of the academic / non-academic activities of the student.
2. Each medical student is responsible for maintaining their logbook.
3. Entries in the log book will be in accordance with activities done in all the pre-clinical departments.
4. Some sections of the logbook are subject specific and have to be scrutinized by the head of the concerned department.
5. It is the responsibility of the student to enter their activity in respective pages and get them duly signed by the supervising faculty.
6. The log book shall be kept as record work of the candidate for that department /specialty and be submitted to college/department as a Bonafide record of the candidate before appearing for the University examination.

## ANNEXURE- 1A

### CERTIFICATION OF SKILL ACQUISITION

**Subject: Anatomy**

**Year: MBBS Phase 1**

This is to certify that Mr/Ms..... of  
MBBS Phase 1 is competent to perform the following skills independently in  
accordance with MCI Competency Based Medical Education guideline.

<b>Competency number*</b>	<b>Competency Description*</b>	<b>Date of Certification</b>	<b>Name and Signature of Faculty</b>
AN 66.1	Identify epithelium under the microscope and describe the various types that correlate to its functions		

Date:

**Signature of Staff In charge**

**Signature of HOD**

*\*According to MCI CBME document*

## ANNEXURE- 1B

### CERTIFICATION OF SKILL ACQUISITION

**Subject: Physiology**

**Year: MBBS Phase 1**

This is to certify that Mr/Ms.....

of

MBBS Phase 1 is competent to perform the following skills independently in

accordance with MCI Competency Based Medical Education guideline.

SL. NO.	Competency number*	Competency Description*	Date of Certification	Name and Signature of Faculty
1	PY6.9	Demonstrate the correct clinical examination of the respiratory system in a normal volunteer or simulated environment		
2	PY5.12	Record blood pressure and pulse at rest in a volunteer or simulated environment		
3	PY5.12	Record blood pressure and pulse in different grades of exercise in a volunteer or simulated environment		
4	PY5.12	Record blood pressure and pulse in various postures in a volunteer or simulated environment		
5	PY10.11	Demonstrate the correct clinical examination of the nervous system: Higher functions in a normal volunteer or simulated environment		
6	PY10.11	Demonstrate the correct clinical examination of the nervous system: sensory system, in a		

		normal volunteer or simulated environment		
7	PY10.11	Demonstrate the correct clinical examination of the nervous system: motor system in a normal volunteer or simulated environment		
8	PY10.11	Demonstrate the correct clinical examination of the nervous system: reflexes in a normal volunteer or simulated environment		
9	PY10.11	Demonstrate the correct clinical examination of the nervous system: cranial nerves in a normal volunteer or simulated environment		
10	PY10.20	Demonstrate Testing of visual acuity, colour and field of vision and in volunteer/ simulated environment		
11	PY10.20	Demonstrate hearing in volunteer/ simulated environment		
12	PY10.20	Demonstrate Testing for smell in volunteer/ simulated environment		
13	PY10.20	Demonstrate taste sensation in volunteer/ simulated environment		

Date:

**Signature of Staff In charge**

**Signature of HOD**

*\*According to MCI CBME document*



**ANNEXURE- 1C**  
**CERTIFICATION OF SKILL ACQUISITION**

**Subject: Biochemistry**

**Year: MBBS Phase 1**

This is to certify that Mr/Ms..... of

MBBS Phase 1 is competent to perform the following skills independently in accordance with MCI Competency Based Medical Education guideline.

<b>SL. NO.</b>	<b>Competency number*</b>	<b>Competency Description*</b>	<b>Date of Certification</b>	<b>Name and Signature of Faculty</b>
1	BI11.4	Perform urine analysis to estimate and determine normal constituents		
2	BI11.4	Perform urine analysis to estimate and determine abnormal constituents		
3	BI11.20	Identify abnormal constituents in urine, interpret the findings and correlate these with pathological states		
4	BI11.21	Demonstrate estimation of glucose in serum		
5	BI11.7, BI11.21	Demonstrate the estimation of serum Creatinine and Creatinine clearance		
6	BI11.21	Demonstrate estimation of urea in serum		
7	BI11.8, BI11.21	Demonstrate estimation of serum protein, albumin and A:G ratio		

Date:

**Signature of Staff In charge**

**Signature of HOD**

*\*According to MCI CBME document*

**ANNEXURE -2**  
**CERTIFICATION OF SKILL ACQUISITION**  
**MODEL BLANK CHECKLIST FOR ASSESSMENT**

**Competency Description with Number:**

**\*Number columns as per requirement**

Assessment criteria have to be designed by subject experts for each competency to be certified. Each criteria may be assessed by different tools (OSPE/Practical/viva) using appropriate scoring pattern.

SL. NO.	Assessment criteria	Date of each evaluation*		
1				
2				
3				
4				
5				
	<b>Overall performance (A/B/C)</b>			
	<b>Name of Evaluator</b>			
	<b>Signature of evaluator</b>			

**Overall Performance in these assessments can be graded as below:**

**A: Meets expectations (ME)-**

>80% scoring - Student is able to meet all criteria's and report the test results with appropriate interpretations independently and hence can be certified as competent.

**B: Partially meets expectations (PME)-**

50% to 80 % scoring - Students needs training in few areas to perform and report the test results with appropriate interpretations independently and hence re-evaluation is needed only for those criteria's in which students fails to meet expectations.

**C: Does not meet expectations (DME) -**

< 50% scoring - Student needs further training to perform and report the test results with appropriate interpretations independently and hence a complete re-evaluation is needed for the entire competency to certify the same.

*\*Pattern of Scoring can be modified based on requirement of each module. This is just an example.*

**Feedback to students:** After each assessment, the respective faculty shall give the feedback to students regarding the performance/areas for improvement/reassessment.

**ANNEXURE -3**

**EARLY CLINICAL EXPOSURE SESSIONS**

**Name of the Evaluator:**

**Competency addressed:**

**Area/specialty visited:**

**ECE session:**

**Page 1**

**Objectives:**

**Narrative:**

**Basic science correlation:**

**Page 2**

**Reflections:**

**Overall Score:**

**Total Score\*:15 (Narrative-5; Basic science correlation- 10)**

*\*Pattern of Scoring can be modified based on requirement of each module. This is just an example.*

**Remarks:**

**Date:**

**Signature of Evaluator**

**ANNEXURE - 4**

**SELF DIRECTED LEARNING TOPICS**

**Name of the Evaluator:**

**Competency addressed:**

**Page 1**

**SUMMARY OF CONCEPTS LEARNT:**

**Overall Score:**

**Total Score\*:20 (Content-5; Presentation-5; Sources referred -5; Synthesis of concept-5)**

*\*Pattern of Scoring can be modified based on requirement. This is just an example.*

**Remarks:**

**Date:**

**Signature of Evaluator**

## ANNEXURE – 5

### RECORD BOOK EVALUATION

SL.NO.	Date of evaluation	Timely submission 5	Completeness 5	Neatness 5	Total score 15	Signature of faculty
1						
2						
3						
<b>1<sup>st</sup> IA (average out of 5)</b>						
4						
5						
6						
<b>2<sup>nd</sup> IA (average out of 5)</b>						
7						
8						
9						
<b>3<sup>rd</sup> IA (average out of 5)</b>						

**Record book evaluation can be done once in a month and finally reduced to 5 for final consideration in internal assessment.**

**ANNEXURE – 6**

**FEEDBACK TO STUDENTS**

**Student performance (Marks):**

**Topics:**

**Duration:**

**Date of feedback:**

**Positive points:**

**Areas of improvement:**

**Signature of student**

**Name, Signature of faculty with Date**

**ANNEXURE -7**  
**AETCOM MODULES**

**Name of the Evaluator:**

**AETCOM module description with No:**

**Page 1**

**Objectives of the session:**

**Narrative:**

**Critique:**



**Page 2**

**Reflections:**

**Active participation: Mark '0/1/2' (Not satisfactory/Satisfactory/Very good) for each of the following-**

1. Student attends the session with good preparation of subject content
2. Student interacts with staff and peers during the session for any doubts
3. Student actively discusses the relevant points and contributes appropriately
4. Student respects the views shared by others in the group
5. Student shows the evidence of referring to different learning sources

**Total -**

**Overall Score:**

**Total Score\*: 25 Marks (Narrative - 5; Critique - 5; Reflection-5; Active participation - 10)**

*\*Pattern of Scoring can be modified based on requirement of each module. This is just an example.*

**Remarks:**

**Date:**

**Signature of Evaluator**

**ANNEXURE -8**

**COMMUNITY MEDICINE FIELD VISIT**

**Objectives:**

**Narrative:**

**Reflections:**

**Remarks:**

**Date:**

**Signature of Faculty**

**ANNEXURE -9**

**SEMINAR PARTICIPATION**

<b>SL. NO.</b>	<b>Date</b>	<b>Topic</b>	<b>Level of participation [attended/ presented]</b>	<b>Department</b>	<b>Name and Signature of faculty with date</b>

**ANNEXURE -10**

**CONFERENCE/CME/WORKSHOP PARTICIPATION**

<b>SL. NO.</b>	<b>Date</b>	<b>Conference/CME/ Workshop attended</b>	<b>Level of participation [attended/ presented]</b>	<b>Department</b>	<b>Name and Signature of faculty with date</b>

**ANNEXURE -11**

**SCIENTIFIC PROJECT PRESENTATIONS/ REPORTS/ OUTREACH ACTIVITIES**

<b>SL.N O.</b>	<b>Date</b>	<b>Scientific project presentations/ Reports/ Outreach activities</b>	<b>Name and Signature of faculty with date</b>

**ANNEXURE -12**

**ACHIEVEMENTS/ AWARDS**

<b>SL. NO.</b>	<b>Date</b>	<b>ACHIEVEMENTS/ AWARDS</b>	<b>Name and Signature of faculty with date</b>

## References:

1. Medical Council of India regulations on Graduate medical education, 1997 (amended up to May, 2018)
2. Regulations on Graduate Medical Education (Amendment), 2019 published in Part III, Section (4) of the Gazette of India Vide Medical council of India Amendment notification dated 4<sup>th</sup> Nov 2019. No.MCI-34(41)/2019-Med./161726
3. Medical council of India. Competency based assessment module for undergraduate medical education training program, 2019: pg 1-30.



SDM College of Medical Sciences & Hospital



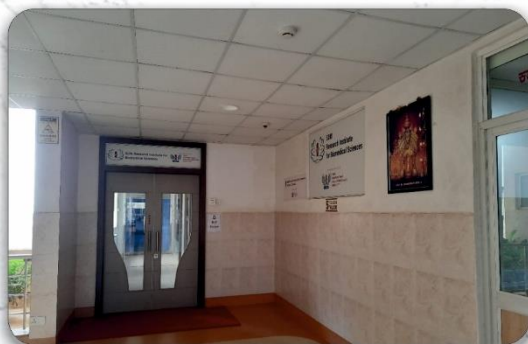
SDM College of Dental Sciences & Hospital



SDM College of Physiotherapy &  
SDM Institute of Nursing Sciences



Shri Dharmasthala Manjunatheshwara University



SDM Research Institute for Biomedical Sciences



Panoramic View of Campus