MANIPAL UNIVERSITY

Manipal College of Dental Sciences, Mangalore

(A Constituent College of Manipal University)

INFORMATION BOOKLET FOR 1st BDS STUDENTS
2016-17

MANIPAL UNIVERSITY

The Manipal University (MU), established in 1993 under Section 3 of the UGC Act 1956, Government of India has 22 constituent institutions comprising Medical, Dental, Engineering, Architecture, Nursing, Allied Health, Pharmacy, Management, Communication, Information science, Hotel Management, Biotechnology and Regenerative Medicine. The university offers Bachelors, Masters and Doctoral degrees in various specialties. Among the above institutions the flagship institutions, viz. KMC, Manipal and Manipal Institute of Technology, Manipal have completed 60 years of service to the society in the field of medicine, health care and engineering.

The professional institutions were granted deemed university status because of their excellent track record and academic excellence. Today, Manipal University has students representing 53 countries. The university is accredited with "A" grade according to the National Assessment and Accreditation Committee (NAAC). The university provides quality education to over 30,000 students of which 13,407 where admitted to one of the 400 courses the university provides through its 22 institutes last year. It also has an active alumni base of over 1,26,654 students across the world.

Manipal Group of institutions are located on scenic campuses, which provide high quality lifestyle and ideal environment for study. All campuses have excellent infrastructure for academic activities, sports and other extracurricular activities. Manipal University has been compared with Nalanda of yore for its excellent academic reputation, experienced and dedicated faculty, outstanding clinical facilities, and a world-class environment that supports education.

Besides being an ISO 9001:2008 and ISO 14001:2004 certified University, it is home to many top 10 ranked institutions of India. Manipal University has won the prestigious IMC Ramakrishna Bajaj National Quality Award and International Asia Pacific Quality Award during 2007-2008 and has been ranked first among the private universities of India by a survey.

The Mentor

MANIPAL UNIVERSITY

The Manipal University and Medical group has invested 6 decades of pioneering work in the social sector. The group has ventured beyond the boundaries created by history, geography, nationality, gender levels, social and economic development and has found opportunities in education and health care.

The motto of Manipal University is "To enrich and preserve life to inspire and be inspired."

The Founder
Dr. T.M.A. Pai

The late Dr. Tonse Madhava Anantha Pai (1898 - 1979), physician, educationist, banker and philanthropist, is the founder and builder of modern Manipal. He established educational, medical, banking and industrial enterprises of national importance and repute.

Manipal is an eloquent testimony to the vision, motivation and labour of Dr. T.M.A. Pai. His zeal, dedication and infinite energy inspired others, motivating them to collective effort. This was the spirit of Dr. T.M.A .Pai. This is the spirit of Manipal. "We must have a residential university in Manipal", were Dr. T.M.A. Pai's prophetic words.

The aspiration of late Dr. T.M.A. Pai to turn Manipal into a university town, after his success in establishing a string of secondary schools and colleges of humanities and the crowning achievement of starting a medical college on public private partnership basis (the first of its kind in India), was realized in 1993 with the conferment of a deemed university status on Manipal University (Formerly known as Manipal Academy of Higher Education).

MANIPAL UNIVERSITY

ADMINISTRATORS

Dr. Ramdas M. Pai
President and Chancellor

Dr. H.S. Ballal
Pro Chancellor

Dr. H. Vinod Bhat
Vice Chancellor

Dr. V. Surendra Shetty
Pro Vice Chancellor

Dr. Narayana Sabhahit
Registrar

Dr. Suma Nair
Director - Student Affairs

MANIPAL UNIVERSITY

Manipal College of Dental Sciences, Mangalore

ADMINISTRATORS

Dr. Mohan Baliga
Associate Dean

Dr. Dilip G. Naik
Dean

Dr. Ashita Uppoor
Associate Dean

MCODS, Mangalore: Heads of the Departments

Dr. Junaid Ahmed
(Oral Medicine)

Dr. Premalatha K.
(Oral Surgery)

Dr Neeta Shetty
(Conservative Dentistry)

Dr. Siddharth Shetty
(Orthodontics)

Dr. Arathi Rao
(Paedodontics)

Dr. Deepa G. Kamath
(Periodontics)

Dr. Shobha Rodrigues
(Prosthodontics)

Dr. Karen Boaz
(Oral Pathology)

Dr. Rajesh G.
(Public Health Dentistry)

Dr. Ravindra Kotian
(Dental Materials)

KMC, Mangalore: Heads of the Departments

Dr. Vasudha Saralaya
(Anatomy)

Dr. Bhagyalakshmi K
(Physiology)

Dr. Poornima Manjrekar
(Biochemistry)

MANIPAL UNIVERSITY

Dr. V. SURENDRA SHETTY
Pro Vice Chancellor, Manipal University

Message from Pro Vice Chancellor

The Manipal University has a long tradition of offering quality professional education. I congratulate you on achieving a place in the B.D.S. programme of Manipal College of Dental Sciences, Mangalore, a constituent college of Manipal University, and a premier dental institute of India.

I hope that over the next five years you will enrich yourself not only academically, but also develop a holistic approach to life by participating in the co-curricular and extra-curricular activities that the Manipal University offers. On behalf of the university, I welcome you to the large and growing family of students who have been influenced, moulded and shaped by the "Manipal" ethos.

I wish you an enjoyable and memorable learning experience at MCODS, Mangalore.

MANIPAL UNIVERSITY

Dr. Dilip G. Naik
Dean
Manipal College of Dental Sciences, Mangalore

Message from Dean

The Manipal College of Dental Sciences (MCODS), Mangalore, has just completed 29 years of vibrant contribution to the field of dentistry. The years have seen it grow by leaps and bounds to occupy its rightful place as a premier dental institute of academic excellence in India.

On behalf of the management, faculty and staff of MCODS, Mangalore, I extend a warm welcome to you on a promising journey of dental undergraduate studies that will culminate in the award of the degree of Bachelor of Dental Surgery.

MCODS, Mangalore, a constituent college of Manipal University, has a proven track record of moulding dental students to excel in various dental post-graduate entrance examinations and admissions to reputed International Universities. Graduates from MCODS, Mangalore are successful practitioners of quality dentistry both in India and abroad. The teaching faculty at MCODS, Mangalore encourage and inculcate the spirit of learning in students.

This information booklet aims at orienting the new B.D.S. students to the rules and regulations of this Institution and those governing the BDS course with examination pattern, subjects of study, assessment, syllabus, clinical training etc. This would definitely help you during the entire course of the BDS programme. I hope that your study at MCODS, Mangalore and consequent stay in this beautiful coastal city will promise to be an enriching experience as it has been for hundreds of students who have graduated from this institution. I wish you all a happy and fruitful stay at Mangalore.

Introduction:

Founded in 1987, the Manipal College of Dental Sciences, Mangalore (A constituent college of Manipal University) is the country's first dental college to admit 100 students to BDS course from the very first year of inception along with the simultaneous commencement of post-graduate programs. Today the college is composed of campuses at Light house hill road, Attavar, and Bejai. Each of these campuses has a distinct role and mission. The quality of education, social orientation, and a strong campus feeling form the basis of our education.

MCODS, Mangalore offers undergraduate, post-graduate, diploma, and certificate courses in various branches of dentistry. Global recognition of the quality of training imparted was substantiated by the recognition conferred on it by the Malaysian Dental Council in 2003 and as a center for training for the award of MFDS by the Royal College of Surgeons, Glasgow.

MCODS, Mangalore is a constituent college of Manipal University, which is accredited with highest "A" grade by the National Assessment and Accreditation Committee (NAAC). The institute follows the ISO 9001:2008 and 14001:2004 standards, imparting quality healthcare to the patients as well as high-class education to the students.

MCODS, Mangalore is spread over three locations conveniently accessible in the city, namely Light House Hill Road, Attavar and Bejai with dedicated facilities in each of them. A total of 311 dental chairs, state of the art dental equipment, centrally air-conditioned library, lecture halls with stadium type seating and continuing professional development (CPD) rooms with audio-visual aids, phantom head simulation laboratories for preclinical training and access to the newer generation of dental materials ensure delivery of optimal training to the undergraduate and postgraduate students. The institute has a mobile dental clinic with two automated dental units that help give treatment in peripheral nodal centers and areas with limited access to dental care. MCODS, Mangalore successfully conducted 439 dental camps screening and treating 35,402 patients in the year 2015. The institute also provides segregated hostel facilities for both male and female students with transport provided from the hostels to the institute.

The students of MCODS, Mangalore consistently excel in academics and extracurricular activities. Students of MCODS, Mangalore have consistently achieved top ranks in various national competitive postgraduate entrance examinations and performing well in various international universities. Our college is presently ranked 6th among all private dental colleges of India and 13th among all the dental colleges as per a survey by Outlook India Magazine. The pioneering teacher guardian programme helps students acclimatize to the new campus life in Mangalore, provide academic counselling, enlighten students on professional ethics and conduct and act as a channel of communication for the institute, students and parents.

The dedicated teaching faculty are up to date with recent advances in dentistry and contribute to the dental scientific temper by way of research, grants, publications in various international and national journals (91 publications in 2015) and scientific presentations at various international and national forums. The faculty has found a permanent place in the field of dentistry by being authors of books that are sought after by students in India and Abroad. The faculty has authored 16 textbooks, 35 chapters, and 13 monographs.

This booklet is meant to orient the First BDS students joining the course. The students shall be responsible for knowing the contents of this document and for observing the published regulations diligently. In this document, an attempt has been made to provide a concise overview of the rules and regulations governing the BDS degree, programme, curriculum of the BDS course as per DCI regulations 2007, which include the academic calendar, time-table, syllabus, list of reference books and model question paper of 3 exam going subjects of first academic year. Any necessary modifications will be notified during the next four years and these should be followed as well.

Degrees offered:

BDS, MDS in all the specialties, PG Diploma in Dental Materials, Certificate Course in Restorative Dentistry, Certificate course in CBCT, Dental Mechanics and Ph.D.

Regulations Governing The BDS Programme

Duration of the programme:

The duration of undergraduate dental training programme for BDS degree is four years with 240 teaching days in each academic year. In addition to this, the student has to undergo one year of compulsory rotatory internship.

DCI Regulation:

"Any student who does not clear the BDS Course in all the subjects within a period of 9 years, including one year Compulsory Rotatory paid Internship from the date of admission shall be discharged from the course"

Course Curriculum:

In the BDS curriculum, subjects are taught in the form of lectures and demonstrations. This course as a whole is an integration of Basic Sciences, Clinical Dentistry and Practical or Laboratory Skills.

The undergraduate course consists of three main components:

The first component consists of subjects common to Medicine and Dentistry like Anatomy, Physiology and Biochemistry, Pharmacology, Pathology, Microbiology, General Medicine and General Surgery.

The second component runs concurrently with the first and deals with the special aspects of oral and dental tissues, through the subject of Oral Anatomy and Oral Pathology.

Finally, the third component is based on the foundations of the first two and deals with the clinical and technical aspects of dentistry as is required for general dental practice.

Students attend dental clinics from third year onwards. In addition to this, students also attend lectures, demonstrations and clinics in General Medicine and General Surgery in Third year. This is mainly to orient them to the role of dentists in general practice.

Attendance:

1. As per the existing regulations of the Dental Council of India, a student must attend 75% of lectures and 75% of practicals /clinicals to be eligible to appear for the University examination. All leaves including 'MEDICAL LEAVE ' is permissible within 25%. There is no provision for conducting extra classes/ assignments to make up the attendance shortage.

2. Students who are not permitted to appear for University examination due to shortage of attendance would have to make up the attendance along with the junior batch by paying the casual fee specified by the University.

Pattern of examination:

Evaluation is a continuous process and is achieved by

1. Formative or Internal Assessment
2. Summative or University Examination

   Evaluation is carried out by

   a) Written examination b) Practical examination

   c) Clinical test d) Viva Voce

Internal Assessment:

1. Calculation of the Internal assessment marks involves the average of all three sessional examination marks that would form the basis (Theory + viva and practical examination separately) in that subject. In case a student is not able to attend any of the sessional examinations due to health reasons or any other emergencies, a committee constituted by the Dean will look into the matter (case by case basis). In such a case the average of 2 sessional exams will be taken in accordance with the university rules. There shall be no scope for conducting extra exams.

2. **A student must secure a minimum of 30% marks in the Internal Assessment (03 out of 10) in each of the subjects, theory and practical / clinical separately, failing which as per University rules he/she will not be permitted to appear for the University examination in that particular subject(s)**. To be eligible to appear for the next University examination he/she is required to improve his/her marks by appearing in the sessional examination

As a part of the green initiative, the university has introduced the use of e-pads for writing examinations. The students would give their internal assessments on electronic tablets (e-pads) which are comfortable to write and draw. This procedure would save paper and the turn-around time for results would also be faster.

Criteria for pass and classification of successful candidates:

For declaration of pass in a subject, a candidate is required to secure 50% marks in the University examination both in Theory and Practical/Clinical examinations separately, as stipulated below.

A candidate is required to secure 50% marks in the University theory, Viva Voce, and Internal assessment combined together. In the University Practical/Clinical examination, a candidate is required to secure 50% of University practical marks and Internal assessment combined together.

In case of Preclinical Prosthetic Dentistry and Preclinical Conservative Dentistry in II BDS, where there is no written examination, minimum pass is 50% (Practical and Viva voce combined together in University examination including Internal assessment i.e. 50 out of 100 marks.)

Successful candidates who obtain 65% of the total marks or more shall be declared to have passed the examination in First Class. Other successful candidates will be placed in Second Class. A candidate who obtains 75% and above is eligible for Distinction. Only those candidates who have been declared pass in the university examination in the first attempt will be eligible for distinction or class.

Unsuccessful Candidates:

Students who have failed in the examination can appear for supplementary examination conducted within six months after regular examination. A candidate can only appear twice for the university examination in an academic year.

A candidate who fails in only one subject in university examination is permitted to go the next higher class. However, the candidate must appear for the university examination (six months after the regular examination) in that subject and complete it successfully before he/she is permitted to appear for the next higher examination.

A student, who does not clear the first BDS University Examination in all subjects within three years from the date of admission, shall be discharged from the course.

Guidelines for appearing for the examination:

Except when prevented by illness or other sufficient cause, a student who fails to present himself/herself for examination at the time and place indicated in the published timetable will be deemed to have failed in that part of the examination. Misreading of the time table will not be regarded as a 'sufficient cause'.

Candidates without the possession of Identity card and Hall ticket (Hall ticket is for university exam only) will not be allowed to enter the examination hall.

No candidate would be permitted to enter the examination room after the lapse of half-an-hour from the commencement of examination, and no candidate will be allowed to leave the examination room until after the expiration of half-an-hour from the commencement of the examination. No extra time will be provided for late comers.

Malpractice is strictly forbidden and indulgence in any form of the same may result in debarring of the candidate.

In addition, students are expected to strictly abide by the rules and regulations as specified in the hall ticket issued by the University and the candidate found guilty will not be permitted to take practical and viva-voce examination till clearance is obtained from an appropriate authority.

Identity Card/SBI-MAHE Combo Card/Medicare

The SBI-MAHE Combo card is issued to each student. This card functions as Student identity card, Access control card, Medicare card, SBI ATM Card.

As part of issue of this card, it is mandatory to open an account with SBI, Lalbagh branch, Mangalore.

Loss of Identity Card should be reported, to the Students Section. A duplicate Identity card will be issued only on payment of Rs. 500/-. You are required to produce the valid Identity card whenever you appear for an examination. Without valid Identity Card no student will be permitted to appear for the examination.

MCODS, Mangalore - Set Up

CENTRE FOR BASIC SCIENCE: BEJAI(Only for I BDS)	
Pre-clinical Dental Anatomy and Histology, Prosthodontics and Dental Material Laboratories-Fourth Floor – Nursing Block Anatomy, Physiology, Biochemistry, Lecture hall 1 & 2 – Basic Science Block	
DENTAL BLOCK - LIGHT HOUSE HILL CAMPUS	
Ground floor: Reception Department of Oral Medicine & Radiology Department of Conservative Dentistry and Endodontics Department of Oral & Maxillofacial Surgery	**First floor:** Dean Chamber Dean's Office Board Room Pro Vice Chancellor Office Administrative Office Accounts Section Department of Periodontology Department of Paedodontics & Preventive Dentistry Seminar Room
Second floor: Department of Orthodontics and Dentofacial Orthopedics Department of Oral Pathology & Microbiology Department of Dental Materials Phantom Head laboratory Pre-Clinical Prosthodontics / Dental Materials Laboratory	
KMC BLOCK - LIGHT HOUSE HILL CAMPUS	
Ground floor Department of Prosthodontics and Crown & Bridge Central Laboratory	**Third floor:** Lecture Hall
DENTAL BLOCK - ATTAVAR CAMPUS	
Ground floor: Dean and Associate Dean Chambers Reception Lecture Hall 1& 2 PG laboratory for Prosthodontics	**First floor:** Department of Oral Medicine &Radiology Department of Conservative Dentistry and Endodontics Department of Paedodontics & Preventive Dentistry PG laboratory for Conservative Dentistry
Second floor: Department of Oral & Maxillofacial Surgery Department of Prosthodontics Department of Implantology UG laboratory for Prosthodontics Board Room	**Third Floor:** Department of Periodontology Department of Public Health Dentistry Central Autoclave Room

Subjects of Study:

First BDS	
Exam Going Subjects	**Non Exam Going Subjects**
General Anatomy Including Embryology, Osteology & Histology	Dental Materials
General Human Physiology	Pre-clinical Prosthodontics
Biochemistry	
Dental Anatomy, Histology & Embryology	
Second BDS	
Dental Pharmacology & Therapeutics	Oral Pathology & Microbiology
General Pathology	
Microbiology	
Dental Materials	
Pre-clinical Prosthodontics	
Pre-clinical Conservative Dentistry	
Third BDS	
General Medicine	Oral Medicine & Radiology
General Surgery	Oral & Maxillofacial Surgery
Oral Pathology & Microbiology	Conservative Dentistry & Endodontics
	Periodontology
	Paedodontics & Preventive Dentistry
	Orthodontics & Dentofacial Orthopedics
	Prosthodontics & Crown & Bridge
	Public Health Dentistry
Final BDS Part I	
Oral Medicine & Radiology	Paedodontics and Preventive Dentistry
Periodontology	Conservative Dentistry & Endodontics
Orthodontics & Dentofacial Orthopedics	Prosthodontics & Crown & Bridge
Public Health Dentistry	Oral & Maxillofacial Surgery
Final Year Part II	
Paedodontics and Preventive Dentistry	
Conservative Dentistry & Endodontics	
Prosthodontics & Crown & Bridge	
Oral & Maxillofacial Surgery	

DISTRIBUTION OF MARKS FOR EXAM GOING SUBJECTS:

Subject	Theory					Pracical / Clinics			
	MCQ**	Descriptive	Viva voce	Innternal Asessment	Total	University	Internal Assessment	Total	Grand Total
First Year BDS									
Anatomy	10	60	20	10	100	90	10	100	200
Physiology	5	30	10	5	50	45	5	100	200
Biochemistry	5	30	10	5	50	45	5		
Dental Anatomy & Oral Histology	10	60	20	10	100	90	10	100	200
Second Year BDS									
Pharmacology	10	60	20	10	100	90	10	100	200
Pathology	5	30	10	5	50	45	5	100	200
Microbiology	5	30	10	5	50	45	5		
Dental Materials	10	60	20	10		90	10	100	200
Pre-Clinical Prosthodontics	-	-	-	-	-	80*	20	100	100
Pre -Clinical Conservative	-	-	-	-	-	80*	20	100	100
Third Year BDS									
General Medicine	10	60	20	10	100	90	10	100	200
General Surgery	10	60	20	10	100	90	10	100	200
Oral Pathology and Oral Microbiology	10	60	20	10	100	90	10	100	200
Final Year BDS – Part I									
Public Health Dentistry	10	60	20	10	100	90	10	100	200
Periodontology	10	60	20	10	100	90	10	100	200
Orthodontics & Dentofacial Orthopedics	10	60	20	10	100	90	10	100	200
Oral Medicine and Radiology	10	60	20	10	100	90	10	100	200
Final Year BDS – Part II									
Prosthodontics and Crown & Bridge	10	60	20	10	100	90	10	100	200
Conservative Dentistry and Endodontics	10	60	20	10	100	90	10	100	200
Oral and Maxillofacial Surgery	10	60	20	10	100	90	10	100	200
Paedodontics and Preventive Dentistry	10	60	20	10	100	90	10	100	200

* 60 marks for Practical work and 20 marks for Viva-voce

**No negative marking for MCQ

Curriculum of First Year BDS *

Academic Calender for First BDS	
Commencement of the Course	15.09.2016
Last Working day of the I term	24.12.2016.
Mid-Term Vacation	25.12.2016 to 15.01.2017.
First sessional Examination	27, 28, 30.01.2017.
First Sessional Practical examination	31/1, 1, 2, & 3.02.2017.
Commencement of the II term	16.01.2017.
Second sessional Examination	21, 22, 24.04.2017.
Second Sessional Practical examination	25, 26, 27, 28.04.2017.
Third sessional Examination	30/6, 01/7, 03.07.2017.
Third Sessional Practical examination	04, 05, 06, 07.07.2017
Last date for submission of Internal Assessment	20.07.2017.
Last Working Day of the II term	20.07.2017.
University Theory Examination	01, 03, 05.08.2017.
University Practical Examination	07,08,09,10, 11.08.2017.
Annual vacation	12.08.2017 to 17.09.2017.
Commencement of the next academic year	18.09.2017.
Available working days from 15.09.2016 to 20.07.2017.	About 243 days. I Term: about 14 weeks: 84 days. II Term: about 26 weeks: 157 days.

* subject to change

Time-table for First BDS

Days	9 am to 11 am	11 am – 12 Noon	12 pm – 1 pm	2.30 pm – 5 pm	
Monday	DA/DH Practical (Batch A) Physiology Practical (Batch B)	DA/DH Lecture L. H. 2	Biochemistry Lecture L. H. 2	DA/DH Practical (Batch B)	
Tuesday	DA/DH Practical (Batch B) Physiology Practical (Batch A)	Dental Materials Lecture L. H. 2	DA/DH Lecture L. H. 2	DA/DH Practical (Batch A)	
Wednesday	Prosthetics Practical (Batch A) Biochemistry Practical (Batch B)	Anatomy Lecture L. H. 2	Physiology Lecture L. H. 2	Dental Materials Lecture L. H. 2 (2.30–3.30 pm)	DA/DH Lecture L. H. 2 (3.30-4.30 pm)
Thursday	Anatomy Dissection	Physiology Lecture (Demo Room)	Anatomy Lecture L.H.2	Physiology Lecture L. H. 2 (2.30 – 3.30 pm)	Biochemistry Lecture L. H. 2 (3.30 – 4.30 pm)
Friday	Anatomy Dissection	Biochemistry Lecture (Demo Room)	Anatomy Lecture (Demo Room)	DA/DH Practical (Alternate Batch A/B)	
Saturday	Prosthetics Practical (Batch B) Biochemistry Practical (Batch A)	First term: Dental Materials Practical Second term: Prosthetics Practical		Physiology Lecture L.H.2 (2.30 – 3.30 pm)	Teacher-Guardian Meeting (3.30 – 4.30 pm)

ANATOMY Theory (Total Lectures 100 hours)	
SL.No.	Description
	Gross Anatomy including Embryology (Lectures)
1	Anatomical position, terms, planes and subdivisions of Anatomy
2	Skin, superficial fascia & deep fascia
3	Cardiovascular system
4	Lymphatic system, regional lymph nodes
5	Osteology – including ossification & growth of bones
6	Myology – including types of muscle tissue & innervation
7	Arthrology – including classification of joints
8	Nervous system – CNS & peripheral nerves
9	Scalp, face & temporal fossa, lacrimal apparatus
10	Neck –Deep fascia of neck, posterior triangle, suboccipital triangle, anterior triangle, anterior median region of neck, deep structures of neck
11	Cranial cavity –meninges, dural venous sinuses, cranial nerves, major parts of the brain, pituitary gland, trigeminal ganglion, middle meningeal artery
12	Orbital cavity –bony orbit, muscles of the eyeball, supports of the eyeball, vessels in the orbit, Ophthalmic nerve, III, IV, VI cranial nerves, Ciliary ganglion, sympathetic & parasympathetic nerves
13	Parotid region including the gland, nerves and vessels
14	Temporomandibular joint, muscles of mastication, infratemporal fossa, Facial nerve maxillary artery, mandibular nerve
15	Submandibular Region
16	Pharynx including palatine tonsil & auditory tube
17	Palate –hard and soft palate –gross anatomy & structure
18	Walls of nasal cavity, paranasal air sinuses, Pterygopalatine fossa, Maxillary Nerve
19	Oral cavity, tongue
20	Larynx
	Embryology
21	Oogenesis, spermatogenesis, fertilization, primitive streak, bilaminar & trilaminar embryonic disc, Neural crest, intra embryonic mesoderm –formation & fate, notochord formation & fate, neural tube formation, embryonic folding, umbilical cord, fetal membranes & placenta. Pharyngeal arches, pouches & clefts, development of face, tongue, palate, thyroid, pituitary gland, salivary glands, tooth development in brief.
22	Mitosis, meiosis, chromosomes, gene structure, Mendelism, modes of inheritance, common genetic disorders
23	Student presentation
24	Tutorials and formative assessment
25	Class tests

	Practical: Histology (72 hours)
26	Cell, basic tissues –epithelium, connective tissue including cartilage and bone, muscle tissue, nervous tissue: peripheral nerve, optic nerve, sensory ganglion, sympatheticganglion, skin, classification of glands, salivary glands (serous, mucous & mixed gland), blood vessels, lymphoid tissue, tooth, lip, tongue, oesophagus, stomach, duodenum, ileum, colon, vermiform appendix, liver, pancreas, lung, trachea, epiglottis, thyroid gland, parathyroid gland, suprarenal gland & pituitary gland, kidney, ureter, urinary bladder, ovary & testis
	Practical: Dissection (122 hours)
27	Introduction to Anatomy Dissection, Anatomical position, planes & terms, General anatomy
28	Scalp –extent, layers, blood supply, nerve supply, superficial dissection of face, muscles of facial expression, facial artery, facial vein, facial nerve on the face
29	Posterior triangle –boundaries, subdivisions, contents including spinal accessory nerve, supraclavicular part of brachial plexus
30	Suboccipital triangle
31	Cranial cavity, dural folds, dural venous sinuses, cranial nerves, pituitary gland, trigeminal ganglion, middle meningeal artery
32	Anterior triangle of the neck –subdivisions, contents & midline structures of the neck
33	Deep structures of the neck –thyroid gland, parathyroids, trachea, oesophagus, prevertebral muscles, cervical sympathetic trunk, vagus nerve
34	Subclavian artery & its branches
35	Deep dissection of face, facial artery, facial nerve, lacrimal apparatus, Eyelid
36	Parotid region
37	Orbit & its contents
38	Temporal & infratemporal regions, muscles of mastication, maxillary artery & its branches, temporomadibular joint, mandibular nerve & its branches
39	Submandibular region, submandibular gland, facial artery, digastric, mylohyoid, hyoglossus & its relations, lingual nerve, Otic ganglion, hypoglossal nerve, lingual artery
40	Pharynx –subdivisions, auditory tube, palatine tonsil, soft palate, hard palate
41	Cavity of nose, nasal septum, lateral wall of nose, maxillary nerve, pterygopalatine fossa
42	Larynx -cartilages, membranes, muscles, interior.
43	Oral cavity & tongue
44	Radiology –skull, AP & lateral views, paranasal air sinuses, plain X-ray of neck
45	Osteology demonstrations –foetal skull, adult skull, individual bones of the skull, hyoid bone & cervical vertebrae
	Demonstration of other regions (5 Hrs)
46	Meninges, parts of brain, ventricles of brain
47	Thoracic wall, heart chambers, pericardium, coronary arteries, lungs – surfaces, pleural cavity
48	Diaphragm, peritoneal cavity, organs in the abdominal & pelvic cavity
	Clinical procedures (4 Hrs)
49	Intramuscular injections: Demonstration on a dissected specimen and on a living person of the following sites of injection. 1. Deltoid muscle and its relation to the axillary nerve & radial nerve, 2. Gluteal region and the relation of sciatic nerve, 3. Vastus lateralis muscle. Intravenous injections & venesection: 1. Median cubital vein, 2. Cephalic vein, 3. Basilic vein, 4. Long saphenous vein.
50	Arterial pulsations: Demonstration of arteries on a dissected specimen and feeling of pulsation of the following arteries on a living person.1. Superficial temporal, 2. Facial, 3. Carotid, 4. Axillary, 5. Brachial, 6. Radial, 7. Ulnar, 8. Femoral, 9. Popliteal, 10. Dorsalis pedis.Lumbar Arterial pulsations: Demonstration of arteries on a dissected specimen and feeling of pulsation of the following arteries on a living person.1. Superficial temporal, 2. Facial, 3. Carotid, 4. Axillary, 5. Brachial, 6. Radial, 7. Ulnar, 8. Femoral, 9. Popliteal, 10. Dorsalis pedis.Lumbar puncture: Demonstration on a dissected specimen of the spinal cord with cauda equinae & epidural space and the intervertebral space between L4 & L5.
51	Dissection tutorials
52	Table tests
	Total Dissection 122 hours
	Total practical (Histology + Dissection) 194 hours

Recommended Books:

1. B.D. Chaurasia's Human Anatomy –Volume III, 6th Ed.
2. Cunningham's Manual of Practical Anatomy –Vol. –III, 15th Ed., by Romanes GJ, Oxford Medical publication.
3. Text book of Histology, 2nd Ed., by Latha V. Prabhu
4. Di Foire's Atlas of Histology, 10th Ed., by Victor P. Eroschenko
5. Human Embryology, 8th Ed., by Inderbir Singh & G P Pal

Reference Books:

1. Snell's Clinical Anatomy for Medical Students, 5th Ed, Little Brown& company, Boston.
2. RJ Last's Anatomy, 9th Ed., Mc Minn.
3. Gray's Anatomy, 38th Ed., Williams, Churchill Livingstone
4. Grant's Atlas of Anatomy, James E Anderson, Williams & Wilkins.
5. Functional Histology, 2nd Ed., Wheater, Burkitt & Daniels, Churchill Livingstone.
6. Langman's Medical Embryology, 6th Ed., Sadler.
7. The Developing Human, 7th Ed., Moore & Persaud, Saunders.
8. Surface and Radiological Anatomy, 2nd Ed., A. Halim
9. Emery's Elements of Medical Genetics, Peter D. Turnpenny & Sian Ellard, Elsevier.

MODEL QUESTION PAPER SUBJECT: ANATOMY

PART I: 20 MCQ	15 MINUTES	10 MARKS
PART II: DESCRIPTIVE PAPER	2 HOURS 45 MINUTES	60 MARKS

Draw diagrams and flowcharts wherever appropriate

1. Describe the submandibular gland under the following headings
   a. Parts
   b. Relations
   c. Duct
   d. Secretomotor nerve supply (1+6+1+2=10 mark)
2. Describe the palatine tonsil under the following headings
   a. Capsule
   b. Relations
   c. Blood supply
   d. Applied anatomy (2+4+2+2=10 mark)
3. Write short notes on:
   3a. Development of tongue
   3b. Histology of kidney
   3c. interior of larynx
   3d. Vocal cord
   3e. Sensory supply of lateral wall of the nose
   3f. Thyroid gland
   3g. Digastric muscle
   3h. Maxillary artery
   3i. Cavernous sinus
   3j. Frontal sinus (4x10=40 mark)

HUMAN PHYSIOLOGY
Syllabus (Theory : 120 hours)

Sl. no.	Description
1.	**GENERAL PHYSIOLOGY, BLOOD & BODY FLUIDS** • Cell - structure & functions, Transport Mechanism across cell membrane • Body fluid - compartments, principle of estimation, Concept of Homeostasis • Composition of blood, hematocrit, plasma proteins & their functions • RBC morphology, Functions, ESR, Erythropoiesis & Factors influencing Erythropoiesis • Hemoglobin - synthesis, functions, degradation and jaundice • Anemia • WBC - Morphology & functions • Platelets, hemostasis, coagulation, anticoagulants • Blood groups - types, determination, significance, transfusion • Blood volume - methods of determination (not in detail), regulation • Lymph - formation & functions & reticulo-endothelial system
2.	**NERVE-MUSCLE PHYSIOLOGY** • Nerve - structure of neuron, types, properties, resting membrane potential • Nerve action potential - ionic basis, properties, propagation, velocity of conduction in nerve fibers • Classification of nerve fiber, Compound action potential • Degeneration & regeneration of nerves • Muscle - Structure, types, differences • Contractile filaments of skeletal muscle fiber, Excitation – contraction, Coupling • Types of skeletal muscle fibers, smooth muscle types • Neuromuscular junction - structure & transmission, Neuromuscular blockers, Disorders • Autonomic nervous system - organization, salient features & functions
3.	**CARDIOVASCULAR SYSTEM** • Functional anatomy of the heart - importance of circulation, heart as a mechanical pump, Pacemaker tissue of the heart • Cardiac muscle - properties, significance, E-C coupling, Role of specialized conducting system • Cardiac cycle - definition, events, ECG changes, JVP, Heart sounds • ECG - definition, leads, waves, uses • General principles of circulation - organization & functions of vascular system, dynamics of blood flow • Cardiovascular regulatory mechanisms - local auto-regulatory & systemic regulatory mechanisms (chemical & neural) • Heart rate - normal value, factors affecting, control mechanisms • Cardiac output - definition, normal value, variation, methods of measurement, regulation • Blood pressure - definition, components, functions, normal variants, determinants of blood pressure, regulation • Physiology of shock - definition, types/classification, characteristic features • Special circulation (salient features) - coronary circulation, triple response
4	**RESPIRATORY SYSTEM** • Functional anatomy - organization of respiratory system, internal & external respiration, major processes involved, respiratory passages & functions, respiratory membrane, non- respiratory functions of respiratory system • Mechanics of Respiration - ventilation: relationship between lungs & pleura, concept of intra- pleural pressure, mechanics of quiet inspiration & expiration, muscles of respiration & their actions • Lung volumes, capacities & measurement, Pulmonary & alveolar ventilation, Dead space, Pulmonary circulation - salient features • Lung compliance, Elastic behavior of lungs, Role of surfactant • Gaseous exchange - Factors determining, Fick's Principle, Diffusion Capacity • Transport of Oxygen & delivery to tissues, Oxygen dissociation curve • Transport of Carbon dioxide, Haldane effect • Regulation of respiration - Chemical & Neural • Hypoxia - definition, types, features & treatment, Acclimatization • Applied aspects - Asphyxia, Cyanosis, Dyspnoea, Apnoea, Artificial respiration, Decompression sickness, Cardio-respiratory adjustments during exercise
5	**GASTROINTESTINAL SYSTEM** • Functional anatomy of gastrointestinal tract - organization & structure of GIT, innervation, functions, structure of small intestine & large intestine, Gastro-intestinal hormones • Physiology of salivary secretion - types of salivary glands, histology, innervation, composition, functions, mechanism of secretion, regulation of secretion, applied aspects • Mouth & esophagus - Mastication, Deglutition: definition, stages, upper & lower esophageal sphincters, applied aspects • Stomach - Functional anatomy, Gastric secretion: composition, phases, mechanism of HCL secretion, regulation, functions, regulation of gastric motility & emptying, applied aspects • Pancreas - Functional anatomy, Pancreatic secretion: composition, functions, regulation • Liver & Gall bladder - Functional anatomy, Functions of liver, Biliary secretion, functions of bile & gall bladder • Small intestine - secretion, function, movement of small intestine

	• Large intestine - functions, movements & defecation • Digestion & absorption - Carbohydrates, Fats, Proteins, Applied aspects
6	**RENAL PHYSIOLOGY, THERMOREGULATION** • Functional anatomy of the kidney - Structure of kidney & nephrons, Functions, Juxtaglomerular apparatus • Innervation of kidney, Blood supply of kidney: renal blood vessels, peculiarities of renal circulation, Organization & functions of glomerulus • Mechanism of urine formation - Glomerular filtration: definition, GFR: definition, normal value, mechanism of filtration, , factors influencing, determination, regulation, filtration fraction • Tubular functions - sodium, glucose & water • Mechanism of concentration & dilution of urine - Components, Examples, Counter current multipliers, Counter current exchangers, Role of urea • Acidification of urine - renal regulation of acid base balance, Applied aspects • Physiology of Micturition - Functional anatomy & innervation of urinary bladder, Micturition reflex, Cystometrogram, Applied aspects • Kidney function tests - Concept of clearance, Various blood/urine examinations, Significance • Skin & temperature regulation - Functions of skin, Sweat glands: types, differences, Normal body temperature, Factors affecting body temperature, Heat gain & heat loss mechanisms, Temperature regulatory mechanisms
7	**CENTRAL NERVOUS SYSTEM** • Organization of nervous system - Central nervous system: brain & spinal cord, Peripheral nervous system: somatic & autonomic nervous system • Synapse - Functional anatomy: structure, types & classification of synapses, Electrical events at synapses: EPSP, IPSP, Properties of synapses • Receptors - Definition, Functions, Classification, Cutaneous receptors: mechanor eceptors, thermo-receptors, pain ceptors, Electrical & ionic events in receptors, Properties of receptors • Reflexes - Definition, Reflex arc, Monosynaptic reflexes: stretch reflex, Polysynaptic reflexes: withdrawal reflex, General properties • Sensory system - Components, Ascending (sensory) tracts in the spinal cord, Somatosensory cortex, Somatic sensation: touch-pressure, proprioception & kinesthesia, temperature, pain (especially from face) & others (itch, vibratory sense, two point discrimination, stereognosis) • Motor system - Motor areas, Descending (motor) tracts: pyramidal & extrapyramidal tracts, Applied aspects: upper motor neuron (UMN) & lower motor neuron (LMN) lesions • Autonomic nervous system (ANS): Organization, Differences between sympathetic & parasympathetic divisions, Physiology of EEG & Sleep • Vestibular apparatus - Functional anatomy, Function: Role in regulation of posture • Control of body movement & posture - Levels of motor control system, Postural reflexes: posture in spinal, decerebrate, mid brain & decorticate animals, mechanism of normal standing posture • Reticular formation, Cerebellum & Basal ganglia - Reticular formation: features & functions, Cerebellum: functional anatomy, functions, lesions/dysfunctions, Basal ganglia: functions, Parkinson's disease • Thalamus & Hypothalamus - Thalamus: classification of nuclei & functions, Hypothalamus: functional anatomy, functions • Cerebral hemisphere (Cerebrum) - Functional anatomy, Functions of parietal, frontal, prefrontal, occipital, temporal & limbic lobe, Applied aspects • Higher functions of the nervous system - Language (speech), Neurophysiology of learning & memory • Cerebrospinal fluid (CSF) & Blood brain barrier (BBB) - CSF: formation, circulation & functions, BBB: development & functions
8	**SPECIAL SENSES** • Introduction & Smell (Olfaction) - Introduction: differences between general & special sensibility, Olfaction: olfactory receptors, olfactory pathways, physiology of olfaction, characteristic features of olfaction, applied aspects • Taste - Receptors/Taste buds, Pathways, Physiology of taste, Applied aspects • Ear- Functional anatomy, Auditory pathways, Physical properties of sound, Mechanism of hearing, Hearing tests, Applied aspects: deafness, tinnitus • Eye - Functional anatomy, Visual pathway & defects, Image forming mechanisms & defects, Visual acuity, Visual reflexes, Physiology of color vision
9	**ENDOCRINE SYSTEM** • General principles of endocrinology - Endocrine glands: definition, Hormone: definition, characteristic features, classification, mechanisms of action, regulation of secretion • Pituitary gland - Functional anatomy, Anterior pituitary: GH (actions, control of secretion), physiology of growth, prolactin (actions, control of secretion), Posterior pituitary: ADH (control of secretion, actions), oxytocin (actions, control of secretion), Intermediate lobe of pituitary: MSH, Applied aspects: gigantism, acromegaly, diabetes insipidus • Thyroid gland - Functional anatomy, Thyroid hormones: formation, secretion, transport, metabolism, actions, regulation of secretion, Applied aspects: goiter, myxedema, cretinism, Grave's disease • Parathyroid - Calcium metabolism, Phosphate metabolism, Physiology of bone, Hormones regulating calcium metabolism: vitamin D, parathormone, calcitonin, Applied aspects: rickets, osteomalacia, hypo-parathyroidism, hyper-parathyroidism • Adrenal cortex - Functional anatomy, Adrenocortical hormones: transport, metabolism, excretion, Glucocorticoids: regulation of secretion: role of ACTH, actions: Cushing's syndrome, Mineralocorticoids: aldosterone (actions, regulation of secretion), Sex hormones, Applied aspects: primary & secondary hyper-aldosteronism (Conn's disease), primary & secondary adrenocortical insufficiency (Addison's disease)

	• Adrenal medulla - Functional anatomy, Adrenaline & Nor-adrenaline: actions, regulation of secretion, Applied aspects: hypo-secretion & hyper- secretion of hormones (Phaeochromocytoma) • Endocrine pancreas - Functional anatomy, Glucagon: actions, regulation of secretion, Insulin: structure, actions, regulation of secretion, Applied aspects: diabetes mellitus, glucose tolerance test, hypoglycemia
10	**SPECIAL SENSES** • Introduction & Smell (Olfaction) - Introduction: differences between general & special sensibility, Olfaction: olfactory receptors, olfactory pathways, physiology of olfaction, characteristic features of olfaction, applied aspects • Taste - Receptors/Taste buds, Pathways, Physiology of taste, Applied aspects • Ear- Functional anatomy, Auditory pathways, Physical properties of sound, Mechanism of hearing, Hearing tests, Applied aspects: deafness, tinnitus • Eye - Functional anatomy, Visual pathway & defects, Image forming mechanisms & defects, Visual acuity, Visual reflexes, Physiology of color vision
11	**REPRODUCTIVE SYSTEM** • Physiology of reproduction - Sex determination & sex differentiation, Abnormalities of human sex development: males (Klinefelter's syndrome), females (Turner's syndrome), true hermaphroditism, pseudo hermaphroditism, Puberty: onset, stages, delayed & precocious puberty, Reproductive hormones • Male Reproductive system - Functional anatomy, Seminal fluid (semen), Endocrine function of the testes: testosterone, estrogen, Control of testicular activity, Applied aspects: cryptorchidism (undescended testes), removal of testes • Female Reproductive system - Functional anatomy, Ovarian hormones: estrogen, progesterone & relaxin, Removal of ovaries, Menopause, Female sexual cycles: changes in ovaries, uterus (menstrual cycle) & vagina, gonadotropin secretion • Physiology of Contraception - Contraceptive methods in males & females • Physiology of Pregnancy - Fertilization & implantation of the ovum, Placental hormones, Pregnancy diagnostic tests, Maternal changes in pregnancy, Parturition, Breast & lactation

Practical (60 hours)	
Sl. No.	Topic
1	**BLOOD** 1. Study of microscope, heamocytometer & pipettes 2. Estimation of red blood corpuscles 3. Total leucocyte count 4. Differential leucocyte count 5. Haemoglobinometry 6. Blood groups 7. Bleeding time & clotting time 8. Hematocrit 9. ESR
2	**AMPHIBIAN (SKELETAL MUSCLE) EXPERIMENTS** 10. Simple muscle curve 11. Two successive stimuli 12. Tetanus 13. Fatigue
3	**CLINICAL EXAMINATION** 14. Pulse & blood pressure 15. Vital Capacity 16. CVS examination - heart sounds 17. RS examination - breath sounds 18. Vision & Hearing tests 19. Cardio-Pulmonary Resuscitation (CPR)

Recommended Book:

1. Human Physiology for BDS - A. K. Jain, 4th edition

Reference Books:

1. Textbook of Medical Physiology - Guyton, 12th edition
2. Review of Medical Physiology - Ganong, 23rd edition

MODEL QUESTION PAPER SUBJECT: GENERAL PHYSIOLOGY

PART I : 10 MCQ	10 MINUTES	5 MARKS
PART II : DESCRIPTIVE PAPER	1 HOUR & 30 MINUTES	30 MARKS

1. Name the sites of production of erythrocytes during fetal & adult life. Describe the different stages of erythropoiesis & explain the factors regulating erythropoiesis (2+5+3=10 marks)
2. Write short notes on: (5x4=20 marks)
   (a). Draw & Label various waves & time intervals associated with normal lead II electrocardiogram ($2^1/_2 + 1^1/_2 = 4$)
   (b). What is pulmonary surfactant & explain its functions. Add a note on the effects of a lack of surfactant in lungs ($^1/_2+2^1/_2+1=4$)
   (c). Differentiate between first & second heart sound (4 marks)
   (d). Draw & explain oxygen dissociation curve for normal adult hemoglobin. Enumerate the factors shifting the curve to the right (2+2=4 marks)
   (e). With the help of a diagram list the steps involved in Excitation contraction coupling in skeletal muscle (4 marks)

BIOCHEMISTRY
Theory (Lectures : 90 hours)

S.No.	Description
	Introduction, aims, objectives, scope of biochemistry
1	**PROTEINS** Chemistry: Classification of amino acids based on chemical nature (structure), nutritional essentiality, metabolic fate. Classification of proteins based on function, chemical nature (Composition), based on shape Four levels of structural organization of proteins- briefly, Denaturation of proteins Peptide bond, two important examples of biologically important peptides. isoelectric point of proteins Plasma proteins: Classification and separation by electrophoresis. Functions of Albumin, A brief account of immunoglobulins Digestion of proteins in GI tract. Protein metabolism:- Transamination, deamination (ammonia metabolism), urea cycle. Transmethylation. List of important compounds formed from Glycine, Phenylalanine, tyrosine, tryptophan (Creatine phosphate in detail) Inborn errors of amino acid metabolism (Phenyl ketonuria, Alkaptonuria, Homocystinuria, Albinism)
2	**ENZYMES** Definition, Specificity - (Group, Absolute, Optical), active site Classification with examples Proenzymes and activation, cofactors and coenzymes, Factors affecting enzyme activity Inhibition - Competitive inhibition, its importance in medicine, non-competitive inhibition, allosteric regulation Covalent modification and regulation by induction/repression Isoenzymes (LDH, CK), Enzymes in clinical medicine (Diagnostic enzymes)
3	**CARBOHYDRATES** Chemistry: Definition, classification with examples. Sources of important carbohydrates, Sugar derivatives Structure of starch and glycogen Heteropolysaccharides / Mucopolysaccharides – examples and functions. Isomerism of carbohydrates: Epimers, D and L sugars, optical isomerism, anomers, Mutarotation, Inversion (Invert sugar), Aldose, Ketose isomerism. Digestion of dietary carbohydrates in GI tract, absorption of glucose, Glucose transporters, lactose intolerance Metabolism: Glycolysis citric acid cycle, gluconeogenesis, cori's cycle. Steps of glycogenesis and glycogenolysis – Glycogen storage disorders (Von Gierke's disease, Mc Ardle's disease only) Oxidative phase of HMP shunt. Importance of HMP shunt including G-6-PD deficiency. Formation of glucuronic acid Blood sugar, hormonal regulation of blood sugar, Evaluation of glycemic status (HbA_{1c}, GTT) Diabetes mellitus LIPIDChemistry: Definition, biological importance, classification of lipids with examples, Functions of phospholipids. Cholesterol – Normal serum cholesterol level, Ring structure, Biologically important products formed. Bile salts and their function Digestion and absorption of dietary lipids, Metabolism: B-oxidation of palmitic acid and its energetics Ketone bodies - Formation, Utilization, Conditions where ketosis occur Fatty acid synthesis (requirement, I step, fatty acid synthase complex), lipolysis, lipogenesis (in adipose tissue). Cholestrol biosynthesis (till mevalonate in detail). Any two hypocholesterolemic drugs, Lipoproteins – Classification, functions, composition. Atherosclerosis. Lysozomal storage disorders (Niemann Pick disease, Gaucher's disease, Tay Sach's disease only). Membrane structure and transport.

4	BIOLOGICAL OXIDATION Integration of metabolism, ETC and one inhibitor each. Oxidative phosphorylation (Definition), High energy compounds (3 examples).
5	NUCLEIC ACIDS : Chemistry: Introduction to nucleotides, structure of DNA and RNA, forms and functions of RNA Metabolism: Sources of carbon and nitrogen of purine ring, formation of uric acid, Gout Definition, steps, inhibitors of replication, transcription, translation. Antifolate drugs. Genetic code, Mutation (HbS in detail) . Cancer: Definition of oncogenes and one example. Oncogenic viruses (examples)
6	PORPHYRINS : Heme synthesis (1st step, ferrochelatase step only), Heme degradation Jaundice: classification and evaluation. Hemoglobinopathies (HbS, β thelassemia). Liver function test: Plasma protein pattern, Serum enzyme levels Detoxification: 4 mechanisms with 1 example each.
7	VITAMINS: All water and fat soluble vitamins, Vitamin A, B complex, D and C dealt in detail. (Sources, requirements, function, deficiency, hyper vitaminosis, antivitamins). Oxygen toxicity (definition and types of free radicals and antioxidants).
8	MINERALS: Calcium, phosphorus, Iron, Fluoride –Sources, RDA, uptake, functions, disorders. Role of other trace elements. Brief introduction to thyroxine synthesis. Normal values of serum electrolytes.
9	HORMONES: Overview of hormones, Introduction to second messengers- cyclic AMP, calcium ions, Inositol triphosphate. Mechanism of action of steroid hormones.
10	ACID BASE BALANCE: Acid base regulation- Blood buffers, role of lungs, name the renal mechanisms Acid base imbalance-evaluation, anion gap
11	NUTRITION: Calorimetry – energy requirements and its calculation, specific dynamic action, respiratory quotient, basal metabolic rate.Nutritional aspects of carbohydrates, lipids and proteins, balanced diet, protein calorie malnutrition, nitrogen balance, essential amino acids and fatty acids, dietary fibers
12	FUNCTION TEST: Kidney function test: Serum urea and creatinine, Creatinine clearance test, proteinuria
13	STRUCTURAL COMPONENTS: Connective tissue: Collagen and elastin

Practical: 50 hours

S. No.	Description
1.	Color reactions with the given protein solution
2.	Reactions of monosaccaharides (glucose, fructose)
3.	Reactions of disaccharides (lactose, maltose, sucrose)
4.	Reactions of polysaccharides (dextrin, starch)
5.	Reactions of Non-protein nitrogen substances
6.	Identification of NPN substances
7.	Analysis of normal urine
8.	Analysis of abnormal constituents of urine
9.	Analysis of saliva
10.	Determination of blood glucose
11.	Serum total protein estimation
12.	Urine creatinine estimation
13.	Jaundice charts
14.	Acid base balance charts
15.	Glucose tolerance test charts
16.	Serum lipid profiles- MI, angina charts
17.	Protein electrophoresis – clinical data evaluation
18.	Profiles of hypothyroidism and hyperthyroidism
19.	Profiles of hyper and hypoparathyroidism
20.	Repetition and Revision classes

Recommended Books

1. Essentials of Biochemistry, by Dr.U.Satyanarayana, Publisher: Books and Allied Private Limited, Calcutta
2. Text Book of Biochemistry for Dental students, by DM Vasudevan and Srikumari S. Publisher: Jaypee Medical Publishers, New Delhi.

Reference Books

1. Lippincott's illustrated reviews: Biochemistry. Eds Champe, Harvey and Ferrier Publishers: Lippincott Williams Wilkins.
2. Harper's Review of Biochemistry. Publisher: Lange Medicals

Model Question Paper Subject: Biochemistry (Part B)

PART I : 10 MCQ	10 MINUTES	5 MARKS
PART II : DESCRIPTIVE PAPER	1 HOUR 20 MINUTES	30 MARKS

1. Describe the functions of vitamin A — 5 marks
2. Outline the pathway of anaerobic glycolysis. — 5 marks
3. Write Short notes on:
   - 3A. Structure of immunoglobulin
   - 3B. Ketogenesis
   - 3C. Factors affecting BMR
   - 3D. Coenzymic role of vitamin B12 — 4x3 marks
4. 4A. What are trace elements? Give two examples
   - 4B. Explain Wobble hypothesis
   - 4C. Name any 2 competitive inhibitors and their role in treatment of diseases
   - 4D. What is the normal serum total bilirubin level? How is it formed in the body? — 4x2 marks

DENTAL ANATOMY, ORAL HISTOLOGY AND EMBRYOLOGY
(Theory Lectures : 105 hours)

S. No.	Description
	ORAL HISTOLOGY
1	INTRODUCTION AND ORIENTATION
2	DEVELOPMENT OF FACE
3	DEVELOPMENT OF TEETH Introduction, Dental lamina, vestibular lamina, Developmental stages in the formation of a tooth and root formation,
4	ENAMELPhysical properties, Chemical composition, Structure of enamel, Age changes, Amelogenesis (Formation of enamel matrix, mineralization and maturation), Clinical considerations
5	DENTIN Physical properties, Chemical composition, Structure of dentin, Innervation of dentin and theories of dentin sensitivity, Age and functional changes, Dentinogenesis
6	PULP Introduction, Development, Coronal and Radicular pulp, Apical foramen and accessory canals, Histological structures, Vasculature, lymphatics and innervation of pulp, Regressive alterations, Functions of pulp, Clinical considerations
7	CEMENTUM Introduction, Physical characteristics, Chemical composition, Structure, Cementogenesis, Functions and functional changes, Clinical considerations
8	PERIODONTAL LIGAMENT Introduction, Structure of the PDL, including cells, fibres and stroma, Functions of periodontal ligament, Clinical considerations
9	ALVEOLAR BONE Development and Histology of Bone, Structure of alveolar bone, Physiologic changes in alveolar bone, Internal reconstruction, Clinical consideration
10	SALIVA AND SALIVARY GLANDS Introduction, Classification, Histologic structure of salivary gland, Saliva:– Functions and composition, Control of salivary secretion, Age changes, Clinical considerations
11	ORAL MUCOSA Introduction, Classification, Functions of the oral mucosa, Components of the oral mucosa, Structural variation in different parts of the oral mucosa (palate, gingiva, tongue), Junctions in oral mucosa, Muco- cutaneous junction, Dento-gingival junction, Clinical considerations
12	TOOTH ERUPTION Definition, Physiological tooth movements, Pre-eruptive, eruptive and post-eruptive tooth movements, Mechanism of tooth movement, Theories of eruption, Clinical consideration
13	SHEDDING OF DECIDUOUS TEETH Definition, Pattern of shedding, Histology of shedding (including odontoclast), Mechanism of shedding, Clinical consideration
14	TEMPOROMANDIBULAR JOINT Anatomy of Temporo-mandibular joint, Clinical considerations, Muscle attachments
14	MAXILLARY SINUS Macroscopic and microscopic features, Functional importance, Clinical considerations
16	PREPARATION OF TISSUE FOR HISTOLOGIC STUDY Preparation of sections of paraffin embedded specimens, Hematoxylin and Eosin stain, Decalcification, Ground section.
	ORAL ANATOMY
1	Terminology and Nomenclature
2	Permanent Maxillary central incisors
3	Permanent Maxillary lateral incisors
4	Permanent Mandibular central and lateral incisors
5	Permanent Maxillary canines
6	Permanent Mandibular canine
7	Permanent Maxillary 1st and 2nd premolars
8	Permanent Mandibular 1st and 2nd premolars

S. No.	Description
9	Permanent Maxillary 1st molars
10	Permanent Mandibular 1st molars
11	Permanent Maxillary 2nd and 3rd molars
12	Permanent Mandibular 2nd and 3rd molars
13	Occlusion
14	Deciduous dentition
15	Differences between permanent and deciduous dentitions
16	Estimation of age on casts
	ORAL PHYSIOLOGY
1	CALCIUM AND PHOSPHORUS METABOLISM Daily requirements, absorption and function, Hormonal control of serum calcium and Phosphorous levels
2	MASTICATION Structures involved in mastication, Masticatory mandibular movements, Jaw reflexes
3	DEGLUTITION Phases of deglutition, Immature swallow, Nervous control of swallowing
4	MINERALIZATION Alkaline phosphatase theory, Collagen seeding theory, Matrix vesicle theory
5	PHYSIOLOGY OF SPEECH
6	PHYSIOLOGY OF TASTE

Practical (Dental Anatomy & Histology : 72 Hours)

S. No.	Description
1	Carving of geometric figure I Carving of geometric figure II Carving of permanent maxillary central and lateral incisors Carving of permanent mandibular central and lateral incisors Carving of permanent maxillary canines Carving of permanent mandibular canines Carving of permanent maxillary first and second premolar Carving of permanent mandibular first and second premolar Carving of permanent maxillary first and second molars Carving of permanent mandibular first and second molars Age estimation on casts based on chronology of teeth
2	**Cells:** Fat cells, Muscle cells, Fibroblasts, Fibrocytes, Endothelial cells, Chondroblasts, Chondrocytes, Osteoblasts, Osteocytes, Osteoclasts, Giant cells, Macrophages, Lymphocytes, Plasma cells , Goblet cells
3	**Development of Tooth:** Bud stage, Cap stage, Bell stage, Advanced bell stage, Root formation
4	**Enamel:** Spindle, Tufts, Lamellae, DEJ, Neonatal line , Gnarled enamel, Striae of Retzius, Hunter-Schreger bands
5	**Dentin:** Y-shaped dentinal tubules, Transverse section of dentin, Dead tracts, Contour lines, Tome's granular layer, Interglobular dentin, S-shaped dentinal tubule
6	**Pulp**: Normal pulp, Free pulp stones, Attached pulp stones, Diffuse calcification
7	**Cementum:** Cemento-Enamel Junction (edge to edge, overlap, gap), Cellular and acellular cementum, Sharpey'sfibres
8	**Bone and Periodontal Ligament:** Principal fibres, Trans-septal fibres
9	**Salivary Glands:** Mucous gland, Serous gland, Mixed gland
10	**Oral Mucosa:** Gingiva, Buccal mucosa, Vermilion border of the lip, Hard palate Soft palate, Cicumvallate papilla, Fungiform papilla, Filliform papilla
11	**Tissues and Stains:** Stratified squamous epithelium, Pseudostratified columnar epithelium, Van Geison stain, Per-iodic Acid Schiff stain, Toluidine blue stain

Recommended Books

1. Oral Histology: Orban's Oral Histology and Embryology (11th Edition) by S.N. Bhaskar/ (12th Edition) by G.S. Kumar
2. Dental Anatomy: Wheeler's Dental Anatomy, Physiology and Occlusion (8th / 9th Edition) by Major M Ash Jr.
3. Oral Physiology: Applied Oral Physiology (2nd Edition) by Christopher B. Lavelle

Reference Books:

1. Development, Oral Histology and Embryology (4th / 5th Editions) by A.R. Tencate
2. Tencate's Development, Oral Histology and Embryology (6th Edition) by A. Nanci
3. A Color Atlas & Textbook of Oral Anatomy by Berkovitz

Model Question Paper
Subject: Human Oral Anatomy including Embryology and Histology

PART I: 20 MCQs	15 minutes	10 MARKS
PART II: Descriptive paper	2 hours 45 minutes	60 MARKS

1. Enumerate the stages of tooth development. Describe in detail bell stage of tooth development. (3+7 = 10 marks)
2. Describe in detail the morphology of the permanent maxillary canine. Add a note on its chronology. (7+3 = 10 marks)
3. Write Short notes on:
   3A.Odontoblast
   3B. Enamel lamellae
   3C. Intertubular and Intratubular dentin
   3D. Functions of periodontal ligament
   3E. Langerhan's cell
   3F. Pre-eruptive tooth movements
   3G. Mesial surface of maxillary first premolar
   3H. Occlusal surface of maxillary first molar
   3I. Ridges and grooves
   3J. Oral phase of deglutition (4X10 = 10 mark)

Results:

Parents/Guardians can access the University Examination results, sessional examination results and attendance report on www.manipal.edu. The College office also sends the results and academic progress of the student by Email/ post directly to the parents at the given address.

Student Portal: (http://sis.manipal.edu): Parents and students can get information, about academic matters, tuition fee dues, hostel dues through this portal. The students and parents can access this portal using Registration No/Date of Birth.

Please also ensure that the Email ID / Postal address is to be updated whenever there is a change.

Dress code for students:

Boys

Trousers and collared shirt
Shoes and Socks
Clean white apron with name tag

Prohibited for boys:

T. Shirt
Tight fitting dirty jeans
Chappals/Sports shoes
Shorts
Ear rings
Torn trousers
Pony tails
Trousers with more than 4 pockets

Girls

Formal wear dress like Salwar Kameez, Churidar
Formal foot wear
Hair (beyond shoulder length) to be tied up
Clean white apron with name tag

Prohibited for girls:

Tight fitting dirty jeans
Torn trousers, Skirts, Shorts
Revealing deep tops/Spaghetti top/Sleeveless tops/Shirts/T shirts

Student Affairs

The Administrative Office is situated within the college premises at Light House Hill Road, Mangalore. Students are advised to contact the Administrative Office for all administration related issues, hostel related issues, mess bill payment, etc. They may meet the Dean, Associate Dean, Chief Warden, and Deputy Director –Student Affairs in their respective offices situated in the college premises.

Student Welfare

The Deputy Director- Students Affairs will provide guidance and assistance to the students in all the activities related to student welfare programme. The student counseling centre is there to help the students in the time of need. Each student is issued an identity card which bears the students name, roll number and other details. This ID card serves as the source of identification of the student at the college campus, in the library, hostel, at University Examination and to avail Medicare facilities in an emergency. It may be used as tool for identification even outside the college campus. Therefore student is required to carry their Identity Card at all times.

Students during their professional course might face several situations of physical and psychological stress. In such situations a counselor can help the students to feel more comfortable in the new setup. The Counselling Centre provides total privacy to the students and all the matters discussed are kept strictly confidential.

Contact:
Deputy Director Students Affairs
(Mangalore Campus)

Office -0824 – 24222271 Ext – 5559)
Mob: +91 9449082214
Email:ddsa.mangalore@manipal.edu

Dr. Rekha T

Ragging – Strictly Prohibited

Ragging is a criminal offence as per Karnataka Educational Act 1983 and Hon'ble Supreme Court of India. Manipal University ensures strict compliance on the prevention of Ragging of any form. Ragging is a criminal and Non-bailable offence. Ragging of students in any form is strictly prohibited within and outside the campus. The offenders shall be liable for punishment with imprisonment up to three years and fine of up to Rs.25,000/- or may be even dismissed. There is an Anti - ragging squad in operation under the overall charge of the Dean. Students are advised to bring cases of ragging (either in the college campus or in the hostel) to the personal notice of the Dean, through the Deputy Director-Students Affairs / Teacher-guardian or through their respective hostel warden. If any incident of ragging comes to the notice of the authorities, the concerned student shall be given the liberty to explain, and if his/her explanation is not found satisfactory, he / she can be expelled from the institution.

Anti Ragging Committee	
1. Dr. Ashita S. Uppoor, Associate Dean	0824 2428716 - 6137 9880038082
2. Dr. Rekha T., Dy. Director, Students Affairs MU, Mangalore Campus	0824 24222271 - 5559 9449082214
3. Col. Prem Kumar Shetty, Chief Warden MU Hostel, Mangalore Campus	902155882
4. Mr. Harishchandra P., Chief Security Officer Mangalore Campus	0824 2428716 55044 9845068101
5. Dr. P.U. Prakash Saxena, Warden Kaprigudda Boys Hostel (Medical)	9008761002
6. Dr. Junaid Ahmed, HoD of Oral Medicine & Radiology	9901470120
7. Dr. Arathi Rao, HoD of Pedodontics & Preventive Dentistry	9845242079
8. Dr. Karthik Shetty, Warden Kaprigudda Boys Hostel (Dental)	9900008040
9. Dr. Nandita Shenoy, Warden Attavar Ladies Hostel	9901730507
10. Dr. Mithun Pai, Associate Professor in Public Health Dentistry	9591955595

Teacher –Guardian Programme

The Student – teacher guardian programme has been implemented for students of first year BDS. It is an efficient process of updating attendance and also having an insight into various academic and personal issues that a student might face. This programme assigns a member of the teaching faculty to oversee the welfare of a group of students (one teacher guardian for 10 students in a group for I BDS and 25 students in a group for II, III and Final BDS).

Parents are free to contact them periodically to know the performance of the student. The Teacher guardian can be approached for advice regarding academics, examination anxiety, feeling of loneliness / depression, interpersonal relations, feeling of physical and mental stress, family issues, career planning, addiction (substance abuse) and adjustment to the new environment.

I BDS TEACHER GUARDIANS

Sl. No.	Names of the Teacher Guardians	Contact details
01.	Mrs. Prashanthi S. Madhyastha, Sr. Gr. Lect. in Dental Materials.	prashanthi.madhyast@manipal.edu Mob: 9880804623
02.	Dr. Srikant N., Addl. Prof. in Oral Pathology.	srikant.n@manipal.edu Mob: 9611144234
03.	Dr. Karuna Y M , Asst. Prof. in Pedodontics	karuna.ym@manipal.edu Mob: 9964116229
04.	Dr. Nidhin Philip Jose, Asst. Prof. in Orthodontics.	nidhin.philip@manipal.edu Mob: 9945010493
05.	Dr. Anupama Nayak P, Asst. Prof. in Pedodontics.	anupama.np@manipal.edu Mob: 9945923865
06.	Dr. Sharon J.R. Saldanha, Assoc. Prof. in Prosthodontics.	sharon.saldanha@manipal.edu Mob: 9880852730
07.	Dr. Nandita Shenoy, Assoc. Prof. in Oral Medicine.	nandita.shenoy@manipal.edu Mob: 9901730507
08.	Dr. Mahesh M., Assoc. Prof in Prosthodontics.	mahesh.n@manipal.edu Mob: 9901730507
09.	Dr. Amitha J. Lewis, Assoc. Prof in Oral Pathology.	amitha.lewis@manipal.edu Mob: 9886280363
10.	Dr. Nandita K.P., Assoc. Prof. in Oral Pathology.	nandita.kp@manipal.edu Mob: 9845332060

Administrative Office

Ms. Sheela Kamath,
Management Executive

Ms. Kirana Kumari
Students Section

MCODS, Mangalore,
Light House Hill Road
Ph No: 0824-2428716 (Ext: 5605)
Mobile: 9741947795/9663723303
Email: sheela.kamath@manipal.edu
students.mcodsmlr@manipal.edu

The above mentioned can be contacted for matters related to students like maintenance of records, examination related work, matters related to foreign students, issue of marks cards, certificates.

Foreign Students - Registration procedures

The foreign students with Student Visa are required to register with the Superintendent of Police (SP) in Mangalore, within 15 days of their arrival. They are also required to inform the Superintendent of Police at Mangalore, a week prior to their departure from India. For the convenience of the students, the Office of the Superintendent of Police functions in Mangalore on the afternoons of every Wednesdays and Saturdays. Students are advised to note this facility and make appropriate use.

Student Health Clinic

KMC, Hospital, Attavar.
Phone No: 0824 2445858.
Casualty Ph No: 5300 (Ext).
Ambulance Phone No: 9886033730 / 9739863994
The student health clinic is situated at Kasturba Medical College Hospital, Attavar, Mangalore. All the students of Manipal University (MU) are covered under MU Medicare Plan. This card entitles the bona fide students of MU for medical treatment (Out-patient / In-patient) from the Doctors and the Hospitals under MU.

In case of ill health, students should report to Casualty at KMC Hospital, Attavar, Mangalore. Student's need to keep their parents as well as their teacher guardian informed about their health related problems.
Students are advised to get treated in our own hospitals and avail the Medicare benefits.

Student Finance

Ms. Sunanda Hebbar
Senior Finance Executive
MCODS, Mangalore,
Tel No: 0824-2422271 (Ext: 5611)
Mobile: 9448351991
Email: sunanda.hebbar@manipal.edu

The office deals with all matters related to student finance. Tuition fees, Hostel utility fees & Mess fees/Utility charges should be paid here.

The yearly instalment of fee is to be paid on or before the scheduled date notified by the University every year without fail. Delayed payment beyond this date attracts interest o 12% per annum.

Student under general category should remit the fee amount by way of a demand draft in favour of Manipal University, payable at Mangalore/Manipal/Udupi and mailed to Finance Executive, Manipal College of Dental Sciences, Light house hill road, Mangalore- 575001. The fees can also be remitted through RTGS.

Beneficiary Bank	:	ICICI Bank
Name of Beneficiary:		Manipal Academy of Higher Education
Account No	:	001401015483
Branch	:	Mangalore – 575001
RTGS/IFSC Code	:	ICIC0000014

Bank details for remitting Hostel Fees

Beneficiary Bank	:	ICICI Bank
Name of Beneficiary	:	MAHE HOSTELS
Account No	:	001401020839
Branch	:	Mangalore – 575001
RTGS/IFSC Code	:	ICIC0000014

Remittance through payment gateway:

Course fee, Hostel fee, Utility and Mess advance may be remitted through payment gateway available through student portal at the University web site (www.manipal.edu > Academics > Student Portal > login with your login ID > Academic dues on clicking you will be redirected to the payment gate way).

Course fee can also be paid online to the University's bank account through State Bank of India's – State Bank – collect facility.

Remittance of Fee by Student under NRI/Foreign category

Name of Beneficiary	:	Manipal Academy of Higher Education
Address	:	Madhavnagar, Manipal – 576104 Karnataka , India.
Ph	:	+91-820-25323058/25326060
Fax	:	+91820-2570065.
Beneficiary Bank Details	:	Standard Chartered Bank 4th floor, West wing, Raheja towers, MG Road, Bangalore 560001, Karnataka, India.
Ph	:	+91-80-25323058/25326060
Fax	:	+91-80-25325373/25325546
Beneficiary Account No (USD A/c):		455-0-50
Swift Code	:	SCBLINBBXXX
IFSC Code	:	SCBL0036073

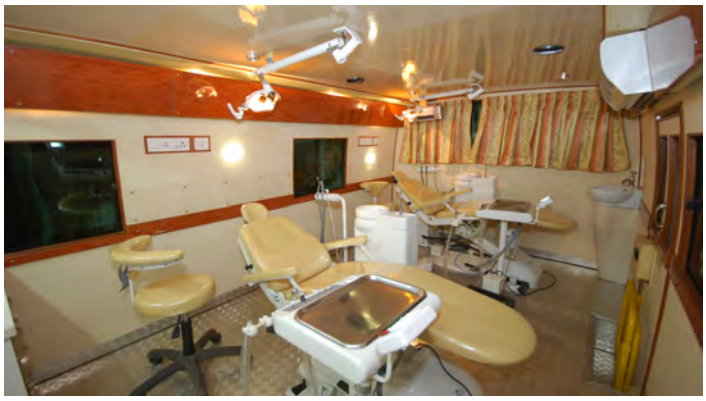
MCODS, Mangalore Contact Detail:

DESIGNATION	ADDRESS	CONTACT NUMBERS
DEAN Dr. Dilip Naik dean.mcodsmlr@manipal.edu	Office of Dean, MCODS, Mangalore	0824-2422653 [P] 0824-2425747 [R] Cell: 9845543474
ASSOCIATE DEAN Dr. Mohan Baliga	Professor, Department of Oral & Maxillofacial Surgery, MCODS, Mangalore	0824-2428716 Ext. 5653 [O] Cell: 9845543483
ASSOCIATE DEAN Dr. Ashita Uppoor	Professor, Dept. of Periodontology MCODS, Mangalore	0824-2428716 Ext. 6137 [O] Cell : 9880038082
MEDICAL SUPERINTENDENT Dr. Anand Venugopal	KMC Hospital, Attavara KMC Hospital, Ambedkar Circle	0824-2445858 Ext. 5270 0824-2444590 Ext. 5020
CHIEF SECURITY OFFICER Mr. Harishchandra P.	KMC, Mangalore LHH Road cso.mlr@manipal.edu	0824-2428716, Ext. 5544 Cell : 9845068101
MANAGEMENT EXECUTIVE Ms. Sheela Kamath	MCODS, Mangalore, LHH Road sheela.kamath@manipal.edu	0824-2428716, Ext. 5605
STUDENTS SECTION Ms. Kirana Kumar	MCODS, Mangalore, LHH Road students.mcodsmlr@manipal.edu	0824-2428716, Ext. 5604
SENIOR FINANCE EXECUTIVE Ms. Sunanda Hebbar	MCODS, Mangalore, LHH Road sunanda.hebbar@manipal.edu	0824-2428716, Ext. 5611

Details of Hostel Wardens, Mangalore

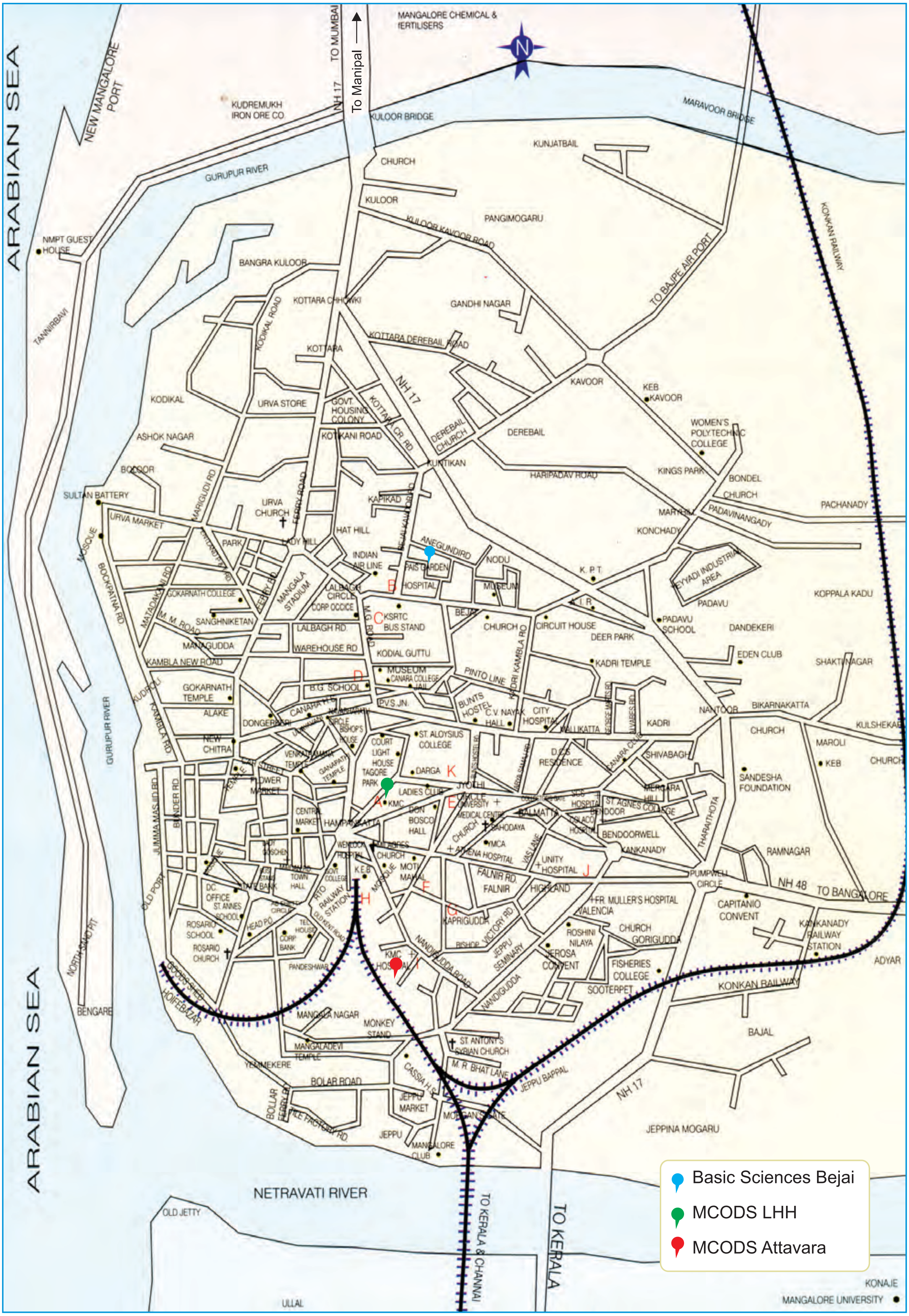
Hostel Name	Warden Name & Designation	Contact No.	Email
Chief Warden	Col (Retd.) Prem Kumar Shetty	9902155882	chiefwarden.kmcmlr@manipal.edu
Bejai Hostels Girls Block	Dr. Rukmini MS Associate Professor Dept. of Biochemistry Dr. Anupama Hegde Associate Professor Dept. of Biochemistry	9880584347 9844518344	rukmini.shetty@manipal.edu anupama.hegde@manipal.edu
Bejai Hostels Boys Block	Dr. Ganaraja Associate Professor of Physiology	9449642150	ganaraja.b@manipal.edu
Bejai Hostels Nursing Block	Ms. Ranjani P., Asst. Professor, Manipal College of Nursing, Bejai	9036252516	ranjani.p@manipal.edu

College/Hostel Timings at Centre for Basic Sciences, Bejai:	
Breakfast (at the mess)	: 7.30 am - 9.00 am
Academic Schedule	: 9.00 am - 1.00 pm
Lunch (at the mess)	: 1.00 pm - 2.30 pm
Academic Schedule	: 2.30 pm - 4.30 pm
Tea (at the mess)	: 4.30 pm - 6.00 pm
Dinner (at the mess)	: 7.30 pm - 9.00 pm
Library	: 9 .00am – 8.30 pm
Reporting time to Respective Hostels by 9.00 pm on all days.	




Marena Indoor Sports Complex

Route Map



Basic Sciences Bejai
MCODS LHH
MCODS Attavara
ARABIAN SEA
NEW MANGALORE PORT
KUDREMUKH IRON ORE CO.
NH 17
TO MUMBAI
To Manipal
MANGALORE CHEMICAL & FERTILISERS
N
KULOOR BRIDGE
MARAVOOR BRIDGE
GURUPUR RIVER
KUNJATBAIL
CHURCH
KULOOR
KULOOR KAVOOR ROAD
PANGIMOGARU
NMPT GUEST HOUSE
BANGRA KULOOR
TO BAJPE AIR PORT
KONKAN RAILWAY
TANNIRBAVI
KOTTARA CHOWKI
GANDHI NAGAR
KOTTARA
KOTTARA DEREBAIL ROAD
NH 17
KAVOOR
KEB KAVOOR
KODIKAL
URVA STORE
GOVT. HOUSING COLONY
ASHOK NAGAR
KOTTARA CR. RD.
DEREBAIL CHURCH
DEREBAIL
WOMEN'S POLYTECHNIC COLLEGE
KOTTAKANI ROAD
KUNTIKAN
HARIPADAV ROAD
KINGS PARK
BONDEL CHURCH
BOLOOR
SULTAN BATTERY
URVA CHURCH
URVA MARKET
KAPIKAD
MARTHI
PADAVINANGADY
PACHANADY
KONCHADY
HAT HILL
LADY HILL
ANEGUNDI RD.
INDIAN AIR LINE
FAIS GARDEN
NODU
MUSEUM
K.P.T.
EYYADI INDUSTRIAL AREA
KOPPALA KADU
GOKARNATH COLLEGE
MANGALA STADIUM
LALBAGH CIRCLE
CORP. OFFICE
HOSPITAL
PADAVU
A.I.R.
PADAVU SCHOOL
DANDEKERI
M. M. ROAD
SANGHNIKETAN
LALBAGH RD.
KSRTC BUS STAND
BEJAI
CHURCH
CIRCUIT HOUSE
DEER PARK
MANNAGUDDA
WAREHOUSE RD
KODIAL GUTTU
KADRI TEMPLE
EDEN CLUB
SHAKTI NAGAR
KAMBLA NEW ROAD
MUSEUM
CANARA COLLEGE
PINTO LINE
KADRI KAMBLA RD.
GOKARNATH TEMPLE
B.G. SCHOOL
P.V.S. JN.
BUNTS HOSTEL
C.V. NAYAK HALL
CITY HOSPITAL
NANTOOR
BIKARNAKATTA
KULSHEKAR
ALAKE
DONGERKERI
MALLIKATTA
KADRI
CHURCH
NEW CHITRA
ST. ALOYSIUS COLLEGE
COURT
LIGHT HOUSE
D.C.S. RESIDENCE
SHIVABAGH
MAROLI
KEB
CHURCH
GURUPUR RIVER
TAGORE PARK
DARGA
SANDESHA FOUNDATION
FLOWER MARKET
LADIES CLUB
JYOTHI CIRCLE
MERCARA HILL
KMC
ST. AGNES COLLEGE
BENDOOR
CENTRAL MARKET
HAMPANKATTA
DON BOSCO HALL
BALMATTA
BENDOORWELL
THARAITHOTA
KANKANADY
RAMNAGAR
WENLOCK HOSPITAL
CHURCH
ATHENA HOSPITAL
UNITY HOSPITAL
PUMPWELL CIRCLE
NH 48
TO BANGALORE
TOWN HALL
K.E.B.
FALNIR RD.
FALNIR
HIGHLAND
D.C. OFFICE
FR. MULLER'S HOSPITAL
VALENCIA
CAPITANIO CONVENT
KANKANADY RAILWAY STATION
ROSARIO SCHOOL
ROSARIO CHURCH
CORP. BANK
KAPRIGUDDA
CHURCH
GORIGUDDA
ROSHINI NILAYA
JEROSA CONVENT
FISHERIES COLLEGE
ADYAR
NORTH SAND PIT
BENGARE
PANDESHWAR
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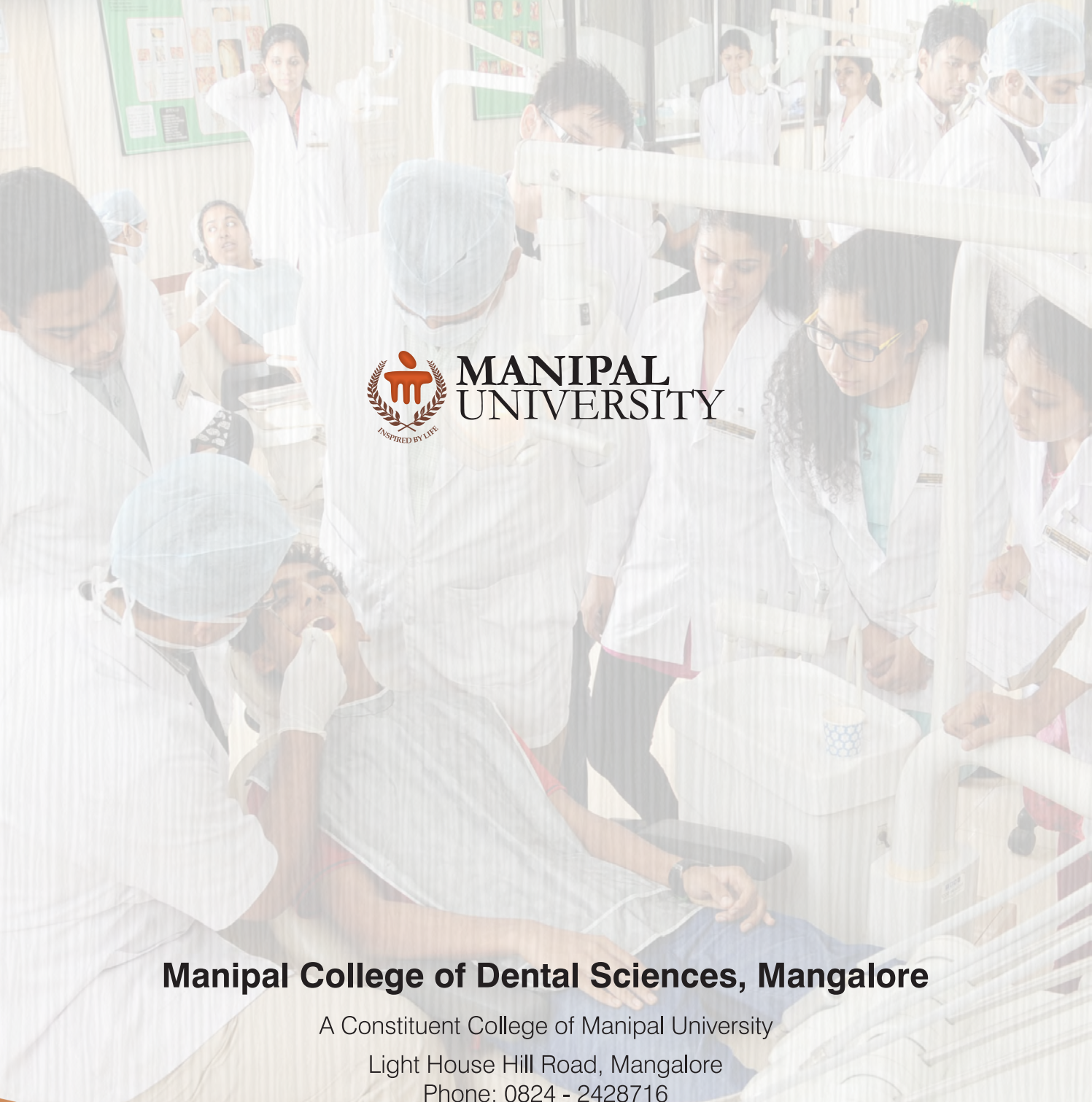
NANDIGUDDA ROAD
SOOTERPET
KONKAN RAILWAY
HOIGEBAZAR
MANGALA NAGAR
MONKEY STAND
BAJAL
MANGALADEVI TEMPLE
ST. ANTONY'S SYRIAN CHURCH
YEMMEKERE
BOLAR ROAD
M. R. BHAT LANE
JEPPU BAPPAL
NH 17
JEPPU MARKET
MORGANS GATE
JEPPINA MOGARU
JEPPU
MANGALORE CLUB
NETRAVATI RIVER
OLD JETTY
TO KERALA & CHANNAI
TO KERALA
ULLAL
KONAJE
MANGALORE UNIVERSITY



MANIPAL UNIVERSITY

INSPIRED BY LIFE

Manipal College of Dental Sciences, Mangalore

A Constituent College of Manipal University

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