Syllabus and Examination pattern for Undergraduate Medical Course Part I

(A) NOTIFICATION

Ref. :

(1) Medical Council of India Regulation on Graduate Medical Education, 1997.
(2) Amendment of the regulations on graduate medical education notified by Government of India from time to time:
   a. Gazette Notification dated 29.05.1999.

In exercise of the powers, conferred under section 26 of Krishna Institute of Medical Sciences Deemed University, the Board of Management in its meeting held on 13th August, 2005, has been pleased to approve the Bye-law pertaining to MBBS course as given in schedule here to Annexed.

The Bye-law as above shall be effective for the students admitted to MBBS course Phase I from the academic year 2005-06 onwards.

By Order
Registrar

(B) INTRODUCTION

The Medical Council of India has notified the following regulations from academic year 1997-98. These regulations recommend:

(1) That the medical curriculum should be oriented towards training students to undertake the responsibilities of a physician of first contact who is capable of looking after the preventive, promotive, curative and rehabilitative aspects of medicine.

(2) The training though broad based and flexible should aim to provide an educational experience of the essentials required for health care in our country.

(3) To undertake the responsibilities of service situations which is a changing condition and of various types. It is essential to provide adequate placement training tailored to the needs of such services as to enable the graduates to become effective instruments of implementation of those requirements. To avail of opportunities and be able to conduct professional requirements the graduate shall endeavour to have acquired basic training in different aspects of medical care.

(4) The importance of the community aspects of health care and of rural health care services is to be recognized. This aspect of education and training of graduates should be adequately recognized in the prescribed curriculum. Its importance has been systematically upgraded over the past years and adequate exposure to such experiences should be available throughout all the three phases of education and training. This has to be further emphasized and intensified by providing exposure to field practice areas and training during the internship.
period. The aim of the period of rural training during internship is to enable the fresh graduates to function efficiently under such settings.

(5) The educational experience should emphasize health and community orientation instead of only disease and hospital orientation or being concentrated on curative aspects. As such all the basic concepts of modern scientific medical education are to be adequately dealt with.

(6) There must be enough experiences to be provided for self learning. The methods and techniques that would ensure this must become a part of teaching-learning process.

(7) The medical graduate of modern scientific medicine shall endeavour to become capable of functioning independently in both urban or rural environment. He/she shall endeavour to give emphasis on fundamental aspects of the subjects taught and on common problems of health and disease avoiding unnecessary details of specialization.

(8) The importance of social factors in relation to the problem of health and diseases should receive proper emphasis throughout the course and to achieve this purpose, the educational process should also be community based than only hospital based. The importance of population control and family welfare planning should be emphasized throughout the period of training with the importance of health and development duly emphasized.

(9) Adequate emphasis is to be placed on cultivation logical and scientific habits of thought, clarity of expression and independence of judgment, ability to collect and analyse information and to correlate them.

(10) The educational process should be placed in a historic background as an evolving process and not merely as an acquisition of a large number of disjointed facts without a proper perspective. The history of Medicine with reference to the evolution of medical knowledge both in this country and the rest of the world should form a part of this process.

(11) Lectures should be supplemented by use of active methods related to demonstrations and first hand experience. Students will be encouraged to learn in small groups, through peer interactions so as to gain maximal experience through contacts with patients and the communities in which they live. While the curriculum objectives often refer to areas of knowledge or science, they are best taught in a setting of clinical relevance and hands on experience for students who assimilate and make this knowledge a part of their own working skills.

(12) The graduate medical education in clinical subjects should be based primarily on out-patient teaching, emergency departments and within the community including peripheral health care institutions. The out-patient departments should be suitably planned to provide training to graduates in small groups.

(13) Clinics should be organized in small groups of preferably not more than 10 students so that a teacher can give personal attention to each students with a view to improve this skill and competence in handling of the patients.

(14) Proper records of the work should be maintained which will form the basis for the students’ internal assessment and should be available to the inspectors at the time of inspection of the college by the Medical Council of India.
Maximal efforts have to be made to encourage integrated teaching between traditional subject areas using a problem based learning approach starting with clinical or community cases and exploring the relevance of various pre-clinical disciplines in both understanding and resolution of the problem. Every attempt be made to de-emphasize compartmentalization of disciplines so as to achieve both horizontal and vertical integration in different phases.

Every attempt is to be made to encourage students to participate in group discussions and seminars to enable them to develop personality, character, expression and other faculties which are necessary for a medical graduate to function either in solo practice or as a team leader when he begins his independent career. A discussion group should not have more than 20 students.

Faculty members should avail of modern educational technology while teaching the students and to attain this objective, Medical Education units / Departments be established in all medical colleges for faculty development and providing learning resource material to teachers.

To derive maximum advantage out of this curriculum the vacation period to students in one calendar year should not exceed one month during the 4 ½ years MBBS course.

In order to implement the curriculum in to, State Government and Institutional Bodies must ensure that adequate financial and technical inputs are provided.

OBJECTIVES OF MEDICAL EDUCATION TRAINING PROGRAM

1. National Goals :
At the end of undergraduate program, the medical student shall endeavour to 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 fulfill his /her social obligations towards realization of this goal.

b. Learn every aspect of National policies on health and devote himself / herself to its implementation.

c. Achieve competence in practice of holistic medicine, encompassing promotive, preventive, curative and rehabilitative aspects of common disease.

d. Develop scientific temper, acquire education experience for proficiency in profession and promote healthy living.

e. Become exemplary citizen by observation of medical ethics and fulfilling social and professional obligations, so as to respond to national aspirations.

2. Institutional Goals :
In consonance with the national goals each Medical Institution should evolve Institutional goals to define the kind of trained manpower (or professionals) they intend to produce. The undergraduate students coming out of a medical Institute should :

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 and rehabilitative medicine in respect to the commonly encountered health problems.
c. Appreciate rationale for different therapeutic modalities, be familiar with the administration of the ‘essential drugs’ and their common side effects.
d. Be able to appreciate the socio-psychological, cultural, economic and environmental factors affecting health and develop human 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.
f. Be familiar with basic factors which are essential for the implementation of the National Health Programs including practical aspects of the following
   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
g. Acquire basic management skills in the area of human resources, materials and resources management related to health care delivery.
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.
l. All efforts must be made to equip the medical graduate to acquire the skills as detailed in APPENX B.

(D) REGULATIONS GOVERNING M.B.B.S. DEGREE COURSE : ELIGIBILITY FOR ADMISSION, MIGRATION, ATTENDENCE, DURATION AND TRAINING PERIOD

(I) Admission to Medical Course
(a) Eligibility criteria
No candidate shall be allowed to be admitted to the medical curriculum of first Bachelor of Medicine and Bachelor of Surgery (MBBS) course until:

a.1 Age
He/she has completed the age of 17 years on or before first day of July of the year when the prescribed academic session of the said course is to commence.

a.2 Qualifying Examination
He/she has passed qualifying examination as under:
   a. The higher secondary examination or the Indian School Certificate Examination which is equivalent to 10+2 Higher Secondary Examination after a period of 12 years study, the last two years of study comprising of Physics, Chemistry, Biology and Mathematics or any other elective subject with English at a level not less than the core course for English as prescribed by the National Council for Education Research and Training after the introduction of the 10+2+3 years educational structure as recommended by the National Committee on education.
   
   Note: Where the course content is not as prescribed for 10+2 education structure of the National Committee, the candidates will have to undergo a period of one year pre-professional training before admission to the Medical College.

OR

KRISHNA INSTITUTE OF MEDICAL SCIENCES DEEMED UNIVERSITY, KARAD.
b. The Intermediate examination in science of an Indian University / Board of other recognized examining body with Physics, Chemistry and Biology which shall include a practical test in these subjects and also English as a compulsory subject.

OR

(c) The pre-professional / pre medical examination with Physics, Chemistry and Biology, after passing either the higher secondary school examination, or the pre-university or an equivalent examination. The pre-professional / pre-medical examination shall include a practical test in Physics, Chemistry and Biology and also English as a compulsory subject.

OR

(d) The first year of the three years degree course of a recognized university with Physics, Chemistry and Biology including a practical test in these subjects or provided the examination is a “University Examination” and candidate has passed 10 + 2 with English at a level not less than a core course.

OR

(e) 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) and further that he/she has passed the earlier qualifying examination with the following subjects - Physics, Chemistry, Biology and English.

OR

(f) Any other examination which, in scope and standard is found to be equivalent to the Intermediate science examination of an Indian University Board, taking Physics, Chemistry and Biology including a practical test in each of these subject and English.

Note : The Pre-medical course may be conducted either at Medical College or a Science College.

- Marks obtained in Mathematics are not to be considered for admission to MBBS Course.
- After the 10+2 course is introduced, the integrated courses should be abolished.
- 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.

a.3 Marks

a. 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 not less than 50% marks taken together in Physics, Chemistry and Biology in the qualifying examination. In respect of candidates belonging to Scheduled casts, Scheduled Tribes or Category I, the marks obtained in Physics, Chemistry and Biology taken together in qualifying examination be not less than 40% instead of 50%.

b. 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 not less than 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 the competitive examination. In respect of candidates...
belonging to Scheduled casts, Scheduled Tribes or Category I, the marks obtained in Physics, Chemistry and Biology taken together in qualifying examination and competitive entrance examination be not less than 40% instead of 50% as stated above. (vide amendment to MCI Regulations, 1997, notified in Gazette of Government of India dated 29.05.1999.)

(II) Migration

(1) Migration from one medical college to other 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 the Medical Council of India. Only in exceptional cases on extreme compassionate grounds, provided following criteria are fulfilled. Routine migrations on other grounds shall not be allowed.

(2) Both the colleges, i.e. one at which the students is studying at present and one to which migration is sought, are recognized by the Medical Council of India.

(3) The applicant candidate should have passed first professional MBBS examination.

(4) The applicant candidate submits his application for migration, complete in all respects, to all authorities concerned within a period of one month of passing (declaration of results) the first professional Bachelor of Medicine and Bachelor of Surgery (MBBS) examination.

(5) The applicant candidate must submit an affidavit stating that he/she will pursue 18 month of prescribed study before appearing at IIInd professional bachelor of Medicine and Bachelor of Surgery (MBBS) 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.

Note 1

i. Migration during clinical course of study shall not be allowed on any ground.

ii. All application 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.

iii. 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 2 Compassionate grounds criteria.

i. Death of supporting guardian.

ii. Illness of the candidate causing disability.

iii. Disturbed conditions as declared by Government in the Medical College area.

(III) Attendance

Every candidate should have attendance not less than 75% of the total classes conducted in theory, practical and clinical jointly in each calendar year calculated from the date of commencement of the term to the last working as notified by the University in each of the subjects prescribed to be eligible to appear for the University examination. (vide Medical Council of India Notification on Graduate Medical Education

(IV) Training period and Time Distribution

(1) Every student shall undergo a period of certified study extending over 4½ academic years from the date of commencement of his study for the subject comprising the medical curriculum to the date of completion of the examination followed by one year compulsory rotating Internship. The 4½ years course has been divided into three phases.

i. Phase I - 1 year, consisting of two terms of 6 months each.

ii. Phase II - 1½ years, consisting of three terms of 6 months each.

iii. Phase III - 3½ years, after Phase I, consisting of seven terms of 6 months each.

(2) The first year shall be occupied in the study of Phase I (Pre Clinical) subjects of Human Anatomy (650 hours), Physiology including Bio-Physics (480 hours), Bio-Chemistry (240 hours) and Introduction to Community Medicine including Humanities (60 hours). Rest of the time shall be equally divided between Anatomy and Physiology plus Biochemistry combined.

(3) After passing pre-clinical subjects in Phase-I, the Phase-II shall be of 3 terms (1½ years), devoted to Para Clinical and Clinical subjects. Para Clinical subjects shall consist of Pathology, Pharmacology, Microbiology, Forensic Medicine & Toxicology and part of Community Medicine. During this phase the clinical subjects i.e. Medicine and its allied specialities, Surgery and its allied specialities and Obstetrics and Gynecology shall be taught concurrently.


(V) TEACHING HOURS

Distribution of teaching hours in Phase I subjects

<table>
<thead>
<tr>
<th>Methods</th>
<th>Subject/Number of Hours</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Anatomy</td>
</tr>
<tr>
<td>Lectures</td>
<td>175 hrs</td>
</tr>
<tr>
<td>Tutorials</td>
<td>65 hrs</td>
</tr>
<tr>
<td>Group Dissection</td>
<td>75 hrs</td>
</tr>
<tr>
<td>Practical/ Demonstration</td>
<td>70 hrs</td>
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<tr>
<td>Dissection</td>
<td>270 hrs</td>
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<tr>
<td>TOTAL</td>
<td>655 hrs</td>
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FIRST M.B.B.S. CURRICULUM

HUMAN ANATOMY

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.

Objectives
At the end of the course the student shall be able to
1) Comprehend the normal disposition, clinically relevant interrelationships, functional and cross sectional anatomy of the various structures in the body.
2) Identify the microscopic structure and correlate elementary ultra structure of various organs and tissues and correlate the structure with the functions as pre requisites for understanding the altered state in various disease processes.
3) 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 shall be able to locate the site of gross lesions according to the deficits encountered.
4) Demonstrate knowledge of the basic principles and sequential development of the organs and systems, recognize the critical stages of development and the effects of common teratogens, genetic mutations and environmental hazards. He/She shall be able to explain the development basis of the major variations and abnormalities.

Skills
At the end of the course the students shall be able to:
1) Identify an locate all the structures of the body and mark. The topography of the living anatomy.
2) Identify the organs and tissues under the microscope.
3) Understand principles of karyotyping and identify the gross congenital anamolies.
4) Understand principles of newer imaging techniques and interpretation of C T scan, sonogram etc.
5) Understand clinical basis of some common clinical produre i.e. intramuscular and intravenous injection, lumbar puncture and kidney biopsy etc.

Integration
From the integrated teaching of other basic sciences, students shall be able to comprehend and regulation and integration of various organs and system in the body and thus interpret the anatomical basis of disease process.

COURSE CONTENT

THEORY

Cross Sectional Anatomy & Endoscopic Anatomy
Superior Extremity - Shoulder region, Mid Arm (Insertion of coraco-brachialis), Mid forearm level (compartments of forearm), Hand. Inferior Extremity Mid thigh (Passing through adductor canal), Knee joint, cross section of Leg (Compratments), Sagittal section of foot (arches) Adbomen - cross section of Inguinal Canal, Cross section of Rectus sheath at different level, Transpylonic plane, Subcostal plane, Transtubercular plane, Peritoneal reflexion in pelvis, supracolic & Infracolic, compartments, Vertical Tracing of peritoneum, Endoscopic view of G.I. tract and Urinary tract. Thorax - Suprasternal notch (Inlet of Thorax), Mid Manubrosternum level - (sup. Medinastium.), Sternal Angle, Sterno - xiphisternal Joint (Post medistinum), Endoscopic view of trachea and bronchi.
H.N.F.
Glabella, Nasion (orbit), Nasal Cavity, C-4 level (deep cervical fascia), C-6 level (trachea, oesophagus), Endoscopic view of pharynx and larynx and sinuses

Brain

Must Know
Organs seen & their disposition

Desirable to know
Description of organs

Nice to know
Applied Imp

Applied Anatomy
Superior Extremity
Mammary Gland, Clavipectoral fascia, Brachial plexus, Erb’s, Klumpky’s Saturday night, crutch, Winging of scapula, Wrist drop, claw hand, Ape thumb, deformity, Carpal tunnel syndrome, Shoulder Joint, Supination & pronation, Colle’s fracture, Whitlow, space of parona, Radial & Ulnar bursa, Dupytrons contracture, Grips

Inferior Extremity
Femoral ring, Femoral hernia, Adductor canal, Stabilization of pelvis, Sciatica, Sleeping foot, Foot drop, Hammer toe, Injury to menisci, Cruciate ligaments, Locking & unlocking, Blood supply of Head of Femur, Congenital dislocation, Perthe’s disease, prosthesis, Club foot, pes cavus, Walking mecanism, swing and stance phase

Abdomen

Thorax
Intercostal block, Pleural tapping, Bronchopulmonary segments, Ischaemic heart Diseases, Tracheo-bronchial fistula, Atrial flutter, Fibrillation, Ectopic beats, Pericarditis, Mediastinal flutter, Mediastinal syndrome

H.N.F.
Parapharyngeal spaces, deep cervical fascia, Carotid sheath, Thyroid & Parotid gland, Structures in Mid line, Lacrimation, Epistaxis, sinusitis, Aphasia-tonsilitis, Otitis media, Torticollis

Brain
Meningitis, Venous sinuses, Pitutary tumours, Hemiplegia, Strokes and, syndromes, Facial palsy

Must Know
Anatomical basis, Boundaries, Etiology.

Desirable to know
Sings & Symptoms.

Nice to know
Treatment, Counselling & Follow up.
General Anatomy


Must know
Classification, Defination, Distribution, parts, Structure.

Desirable to know

Nice to know
Kinsiology, Skin gafts, Effect of Hormones.

Regional Anatomy
A) Superior extremity

Osteology
Clavicle, Scapula, Humerus, Radius, Ulna & Hand articulated.

Must know
Identification with side, Anatomical position, parts, Joints formed, Muscular attachments, Nerves & vessels related.

Desirable to know
Ossification, function, peculiarities, line of Wt transmission, capsular attachment.

Nice to know
Common site of fractures carrying angle, subluxation Other angles.

Arthrology
Shoulder girdle, Elbow, Radioulnar & wrist Joints. 1st carpometacarpal Joint.

Must know
Bones taking part, type, classification, movements with Muscles involved, structures giving stability.

Desirable to know

Nice to know
Applied, Fall on outstreched Hand, Midcarpal, MP & IP Joints.

Myology

Must know
Muscles with origin, insertion, Nerve supply, And Action, Identification.

Desirable to know
Blood supply groups of muscles, Boundaries of Intermuscular spaces. Triangle of auscultations. Anatomical Snuff Box.

Nice to know
Volkmann’s ischaemic contracture, extensor Expansion.
Angiology
Axillary, Brachial, Ulnar, Radial & Palmar arches, veins,
**Must know**
Formation, end, Branches of Tributaries.
**Desirable to know**
Course, relation, variation.
**Nice to know**
Applied Importance, Collateral circulation. Axillary group of Lymph nodes. Lymphatic drainage of Breast

Neurology
Brachial Plexus, Radial, Median, Ulnar, Axillary & Musculocutaneous Nerve.
**Must know**
Formation Origin, Root Value, Branches and distribution.
**Desirable to know**
Relations, course, variations.
**Nice to know**
Applied Importance.

Miscellaneous
Mammary gland, clavipectoral fascia, Interosseous membrane. Axilla boundaries.

B) INFERIOR EXTREMITY

Osteology
Hip bone, Femur, Patella, Tibia, Fibula, Articulated foot.
**Must know**
Identification with side, Anatomical position, parts, Joints formed, muscular attachments, Nerves and Vessels related.
**Desirable to know**
Ossification, capsular attachment, functions peculiarities, Line of weight transmission.
**Nice to know**
Fractures, dislocation, angles, calcar femorale, calcaneal Spur, March facture, Nutrient artery.

Arthrology
Hip Joint, knee joint Ankle Joint, subtalar & talocalcaneo navicular Joints.
**Must know**
Bones taking part, type, classification, movements with Muscles involved, structures, giving stability.
**Desirable to know**
**Nice to know**
Fractures, dislocations, Bucket Handle injury to Medial Meniscus, Bursitis.

Myology
Compartments with muscle display.
**Must know**
Identification, Origin, insertion, Nerve supply & action.
**Desirable to know**
Blood supply, Groups of muscles, Layers of sole.
**Nice to know**
Extensor expansion, peripheral Heart, white or antigravity muscles.
Angiology
Femoral, popliteal anterior and posterior tibial. Common peroneal, plantar arch, dorsalis pedis artery Superficial and deep veins, perforators. Inginal group of Lymph nodes.
Must know
Formation, end, branches or Tributaries.
Desirable to know
Course, Relations, Variations.
Nice to know
Applied importance, Collateral circulation popliteal aneurysm. Intermittant claudication.

Neurology
Lumbar & Sacral plexus formation sciatic, femoral, obturator, tibial and common peroneal Nerve.
Must know
Origin, root value, Branches & distribution.
Desirable to know
Relation, course & variations.
Nice to know
Sciatica, foot drop, I.M. Injection.

Miscellaneous
Femoral Triangle - contents, Sheath, Canal, Ring. Iliotibial tract, Saphenous opening, Adductor Canal Arches of foot- Talipus - Equinovarus, Clawing of Toes.

C) ABDOMEN
Abdominal Organs
Stomach, spleen liver, biliary apparatus, pancreas, small & large Intestine, vermiform appendix, kidneys, ureters, suprarenal glands.
Must know
Morphology, Blood supply, Lymphatics, Nerve supply.
Desirable to know
Applied, Peptic ulcer, splenic circulation, stabilising Factors, Gallstones, Renal stones, Ureter sites of Constriction.
Nice to know

Pelvic Viscera
Urinary bladder, Urethra, Prostate, Uterus, Ovaries. Uterine tubes, Rectum & Anal anal.
Must know
Morphology, relation blood supply, nerve supply.
Desirable to know
Supports, Applied importance like Fistula, fissure.
Nice to know
Treatment, Investigations.

Perineum
Scrotum, Testes, Epididymis, Spermatic cord, Ischiorectal fossa Pudendal canal, perineal spaces, penis, vagina, urogenital & Pelvic diaphragm, perineal muscles.
Must know
Situation, structure, dimensions, formation.
Desirable to know
Blood supply, Nerve supply.
Nice to know  
Ischiorectal abscess, Herniation Superficial inguinal Pouch.

Abdominal Wall - Anterior and posterior.  
Rectus sheath, Inguinal Canal, Thoracolumbar fascia, psoas Major, quadratus lumborum, Thoraco abdominal diaphragm.

Must know  
Formation, Extent, boundaries.

Desirable to know  
Parts, Blood supply, Applied.

Nice to know  
Hernia operations, Incisions, psoas abscess.

Peritoneum  
Greater & lesser, omentum, epiploic foramen, Pouch of Douglas, paracolic gutter lesser sac

Osteology  
Lumbar vertebra, sacrum, bony pelvis

Must know  
Identification, classification, attachments, sex Determination, anatomical postion.

Desirable to know  
Ossification, Relations of vessels & Nerves. Various indices.

Nice to know  
Types of female pelvis, applied.

Arthrology  
Intervertebral Joints, Lumbosacral, sacroiliac, sacrocaccygeal & Symphysis pubis.

Must know  
Type, bones participating, movements.

Desirable to know  
Muscles involved in these movements.

Nice to know  
Applied, disc Prolapse.

Angiology  
Portal vein, Inferior vena cava, Abdominal arota.

Must know  
Origin, termination, branches tributaries. Level-II- Course & relations, portosystemic anastomosis.

Desirable to know  
Applied.

Neurology  
Lumbar & sacral plexus.

Must know  
Formation, branches.

Desirable to know  
Distribution.

Nice to know  
Applied.

D) THORAX  
Thoracic wall  
Thoracic inlet, Intercostal space.
Must know
- Boundaries, Contents, Muscles, Respiratory Movements.

Desirable to know
- Accessory muscles, Nerve block.

Nice to know
- Applied, Barrel chest, Herpes Zoster.

Mediastinum
Must know
- Definition, divisions, boundaries & Contents.

Desirable to know
- Disposition of contents.

Nice to know
- Applied, Mediastinitis.

Pleura and Lungs
Must know
- Pleural reflections, recesses, Morphology of lung, bronchopulmonary segments, root & Hilum.

Desirable to know
- Function of recesses, pulmonary Lig. Blood supply & Nerve supply, relations.

Nice to know
- Pleural effusion, bronchoscopy, Lobectomy, segmental resection, postural Drainage.

Pericardium and Heart
Must know
- Divisions of pericardium with sinuses. Anatomical position Heart, dimensions Surfaces & borders, interior of all chambers, Vessels of Heart.

Desirable to know
- Relations, conducting system with Nerve supply.

Nice to know
- Referred pain, Ischaemic diseases, Fallot's Tetrology etc.

Osteology
- Sternum, ribs, thoracic vertebra.

Must know
- Identification, parts Anatomical position, Attachments classification.

Desirable to know
- Ossification, relations.

Nice to know
- Flail chest, fractures, pleural reflection on 12th rib.

E) HEAD, NECK & FACE
Myology

Must know
- Boundaries & contents of Triangles, Origin, Actions Nerve supply, insertion.

Desirable to know
- Relations spaces, spread of infections, Blood Supply of Face.

Nice to know
- Damage, Applied, investigations, dangerous area of face, Facial Nerve palsy, Squint.
Gland
Thyroid, parathyroid, parotid, submandibular sublingual pituitary, Lacrimal gland.
**Must know**
Type, classification, Dimensions, surfaces & Borders, Duct.
**Desirable to be**
Relations, blood supply, Nerve supply, coverings Intraglandular structures.
**Nice to know**
Applied.

Viscera
Scalp, palate, tongue, pharynx, Larynx, orbit, Lacrimal apparatus, eye ball, nasal cavity, paransal air sinuses, palatine tonsil, Ear- Middle ear, part of external and internal ear, Meninges.
**Must know**
Dimensions, extension, parts, structure.
**Desirable to know**
Relations, Blood supply, Nerve supply, Lymphatics.
**Nice to know**
Applied, investigations, treatment, phonation, Deglutition.

Osteology
Skull as a whole, Interior of skull cranial fossae, skullcap, mandible, Hyoid, cervical vertebrae & vertebral column as a whole, Fetal skull.
**Must know**
Different Norma, points, Foramina, structures, passing through, Number & type of bones.
**Desirable to know**
Age & sex determination, fontanellae, Craniometry. Dental Formula.
**Nice to know**
Fractures, Cervical rib.

Arthrology
T.M. Joint, Atlanto axial Joints, Sutural Joints.
**Must know**
Type, Bones taking part, movements.
**Desirable to know**

Angiology
Subclavian, Carotid system, Ext. & internal, Jugular veins, venous sinuses, Lymphatic drainage of HNF.
**Must know**
Origin, end, Branches & Tributaries.
**Desirable to know**
Parts, relations, Course, Variations.
**Nice to know**
Collateral circulation, aneurysm, cervical, Rib, emissary vein.

Neurology
Cranial Nerves, brachial & cervical plexus. Parasymp & symp. ganglion.
**Must know**
Number, component, nuclei, distribution,
**Desirable to know**
Course, relations
**Nice to know**
Applied, Reflex pathways.
F) BRAIN AND SPINAL CORD (NEUROANATOMY)

Spinal Cord
Must know
Gross features, enlargements, covering, extent, Filum terminale, cross section with ascending & Descending tracts, spinal segments.

Desirable to know
Vertebral correlation, nuclei, Blood supply.

Nice to know
Trauma, myelography, Applied, Lamellar pattern.

Brain
Dimensions, parts, attachment of cranial nerves.

Medulla oblongata
Must know
Cross sectional study at different levels with Cranial Nerve nuclei & Inf. olivary nucleus

Desirable to know
Blood supply, Organisation and column theory of cranial Nerve nuclei. Tuber cinerum.

Nice to know
Syndromes.

Pons
Must know
Cross sectional study at different regions.

Desirable to Know
Relations, Blood supply.

Nice to Know
Syndromes, Pontine haemorrhage.

Cerebellum
Must Know
Divisions, lobes, nuclei, dimensions, relations, Peduncles, classification.

Desirable to Know
Internal structure, connections.

Nice to Know
Dysfunction, ataxia, hypotonia.

Midbrain
Must Know
Cross sections at Sup. & Inf colliculus & display of gray & white matter. Red nucleus, substantia nigra.

Desirable to Know
Lemnisci, sup. Colliculus.

Nice to Know
Syndromes.

Cerebrum
Must Know
Sulci, classification, Gyri, functiona areas, surfaces. Borders, poles, lobes, basal nuclei, corpus callosum Classification of white matter, internal capsule.

Desirable to Know
Claustrem, amygdala, septal nuclei, Olfactory area, Structures forming limbic lobe, Blood supply.
Nice to Know
Applied Importance.

Diencephalon
Must Know
Parts, nuclei of Thalamus, nuclei of hypothalamus, Geniculate bodies, Epithalamus, Nuclei belonging to Subthalamus, Relation, Functions.

Desirable to Know
Connections, Blood supply, visual & auditory pathway.

Nice to Know
Syndromes, Applied.

Ventricular System
Must Know
Classification, situation, parts, boundaries. Communications, C.S.F. Circulation.

Desirable to Know
Choroid plexus, recesses.

Nice to Know
Applied, Hydrocephalous

Blood Supply
Arteries & veins.

Must Know
Circle of Willies formation, branches & distribution.

Desirable to Know
Blood brain barrier, End arteries.

Nice to Know
Hemiplegia.

HISTOLOGY
I) General Histology

Microscope
Must Know
Light Microscope, Parts. Magnification, resolution.

Desirable to Know
Histological Techniques, H & E staining, special Stains.

Nice to Know
Electron & other types of microscopes.

Cytology
Must Know
Cell definition, Cell membrane, Cytoplasm, Nucleus, Cell Organelles.

Desirable to Know
Endoplasmic reticulum, cytoplasm, cell cycle, cell division, Cell transport, Micro villi structure.

Nice to Know
Applied importance, Barr body, lpyknotic- Types of nuclei.

Epithelium
Must Know
Definition, classification structure & functions.

Desirable to Know
Nice to Know
   Myoepithelial cells, Basement membrane

Connective Tissue
Must Know
   Classification, structure, fibres, Ground substance.
Desirable to Know
   Mucosubstances in ground substance, cells.
Nice to Know
   Inflammation, Oedema, hyaluronidase enzyme, Scurvy.

Cartilage
Must Know
   Classification, types, perichondrium, functions.
Desirable to Know
   Nutrition and repair
Nice to Know
   Chondroma.

Bones
Must Know
   Classification, structure, periosteum developing bone, bone cells, osteon.
Desirable to Know
   Nutrition & repair.
Nice to Know
   Growth Hormones, Osteoma, Osteomyelitis.

Muscle
Must Know
   Classification, Structure, Functions, Myofilaments.
Desirable to Know
   E.M. picture of striated muscle, Intercalated disc. Syncitium, sarcoplasmic reticulum, connective tissue Coverings.
Nice to Know

Nervous System
Must Know
   Neurons, Classification, parts, Nerve fibres.
Desirable to Know
   Synapses, myelinations, ganglia, nucleus
Nice to Know
   Connective tissue coverings, injury, walarian degeneration.

Vessels
Must Know
   Classification, Coats, Lining epithelium, functions.
Desirable to Know
   Arterioles, Capillary, Sinusoids, Pericytes.
Nice to Know
   Atherosclerosis, Aneurysm.

E) LYMPHOID SYSTEM
   Thymus, spleen, palatine tonsil, Lymph node.
Must Know
   Classification, identification criteria, parts & functions.
Desirable to Know

Nice to Know
- Autoimmunity, Blood thymus barrier, Organ transplantation, Graft rejection.

F) INTEGUMENTARY SYSTEM
Skin and its appendages.

Must Know
- Classification-Thick & Thin, parts, epithelium. Various cells, functions, structure of appendages.

Desirable to Know
- Repair, Blood & Nerve supply.

Nice to Know
- Applied- Albinism, Melanoma, Acne.

II) SYSTEMIC HISTOLOGY
Oral Cavity
- Lip, Tongue, Tooth, Salivary Glands.

Must Know
- Structure identification, parts, classification, Papillae in tongue.

Desirable to Know
- Taste buds, striated ducts, E.M. picture of serous cells.

Nice to Know
- Applied, Periodental lig, structure of Enamel, Incremental lines.

G.I. Tract
- Oesophagus, stomach fundic & Pyloric, duodenum, jejunum, ilium, vermiform Appendix, Colon.

Must Know
- Basic 4 layer Organization, modification, Identification, Glands, Types of Glands, Secretions.

Desirable to Know
- Differentiation of muscle coat, function of secretions, Lymphoid tissue.

Nice to Know
- E.M. picture of gland cells, Ulcer, ‘M’cells.

Glands
- Liver, Gall bladder, pancreas.

Must Know
- Type of Gland, Coats or parts, structure & functions, Islet’s

Desirable to Know
- Hepatic lobule, Portal Lobule, centro- acinar cells, islets or Langerhans, Kuffer cells.

Nice to Know
- Hepatic acinus, fatty degenerations of liver, & cells of Pancreas, Diabetes mellitus.

Respiratory System
- Epiglottis, Trachea, Lung

Must Know
- Coats structure with lining epithelium, differentiation between different parts.

Desirable to Know
- Pneumocyte I, Pneumocyte II, dust cells, Claracells.

Nice to Know
- Heart failure cells, Bronchial Asthma, Hyaline membrane disease.
Urinary System
Kidney, Ureter, Urinary Bladder, Urethra.

Must Know
Nephron, parts, Cortex & medulla, functions, Lining epithelium, Collecting system, coats in ureter and Urinary bladder.

Desirable to Know
Juxtaglomerular apparatus, cells in transitional epithelium, podocytes.

Nice to Know
Diabetes incipidius, essential hypertension, Renal stones.

Male Reproductive System
Testis, epididymis, vas deferens, seminal vesicle, Prostate, Penis.

Must Know
Identification coats, lining epithelium, Functions.

Desirable to Know
Blood testis barrier, stereocilia of penis Hormone secretion, Leydigs cells, spermatogenesis.

Nice to Know
Prostatic concretion, vasectomy, semen examination, Immotile sperm.

Female Reproductive System
Ovary, Uterine tube, Uterus in different stages, active & passive mammary gland, vagina placenta, umbilical cords.

Must Know
Identification, coats with structure, different stages of follicles, Whatons jelly.

Desirable to Know
Hormonal control, blood placental barrier, phases of menstrual Cycle, remnants seen in umbilical cord. Corpus Luteum.

Nice to Know
Milk secretion, Colostrums, Haufbaur Cells.

Endocrine system
Pituitary, Thyroid, Parathyroid, Adrenal

Must Know
Identification, parts Structure, Hormones secreted.

Desirable to Know
Hypothalamo- hypophyseal system, pituicytes Herring Bodies, ‘C’ Cells of Thyroid, Development of Adrenal Cortex & Medulla.

Nice to Know
Gigantism, Acromegaly, Cushing syndrome phaeochromocytoma.

G) NERVOUS SYSTEM
Peripheral- Craniospinal ganglion Autonomic ganglion. Central- Spinal Cord, Cerebellum, Cerebrum.

Must Know
Identification, Structure, parts, functions.

Desirable to Know
Connections, Development, Neuroglia.

Nice to Know
Applied Degeneration, Syndromes.

H) SPECIAL SENSES
Must Know
Identification. Layers, structure, function

Desirable to Know
M. Picture, Canal of Schlemm, spaces of Fontana.

Nice to Know
Epiphora, Chalazion, Cataract, Glaucoma.

I) EMBRYOLOGY
DEVELOPMENTAL ANATOMY
Introduction Scope of Embryology
Term of Reference - e.g. Cranial, rostral, caudal, dorsal, ventral.

Mitosis & Meiosis
Must Know
Various phases.

Desirable to Know
Various subphases of Meiosis.

Nice to Know
Non-disjunction, Cell culture.

Gametogenesis
Organs of reproduction in male & female stages of gametogenesis.

Must Know
stages of gametogenesis. Regulation of Ovulation.

Desirable to Know
Structure of sperm and ovum.

Nice to Know
Sperm count, Viability of ovum, sperm. Safe period, contraception.

Menstrual cycle
Various Phases - structural changes in the endometrium.

Must Know
Various Phases.

Desirable to Know
Hormonal Control of menstrual cycle.

Nice to Know
Time of Ovulation- Various tests

Fertilization Cleavage- Implantation
Various stages of fertilization, cleavage, formation of blastocyst, implantation.

Must Know
Various stages- Effects of fertilization Normal sites.

Desirable to Know
Acrosomal reaction, Zonal reaction, Ectopic pregnancy.

Nice to Know
Invitro-fertilization- IVF. Parthenogenesis.

Formation of Germ Layers:
Formation endoderm, Ectoderm, Yolk sac, Amniotic Cavity. Bilaminar & laminar- disc.
Intra Embryonic Mesoderm - Primitive Streak, formation of notochord, Somites.

Must Know
Formation of three germ layers folding of embryo.

Desirable to Know
Congenital mal-formations, Nucleus Pulposus- remnant's of notochord.

Nice to Know
Signs of pregnancy- Pregnancy test Role of Teratogens Congenital anomalies, allantois.
Differentiation of germ layers
   Derivatives of mesoderm, Endoderm, Ectoderm.

Must Know
   Fate of each germ layer. Intra-embryonic mesoderm, Fate of somites.

Foetal Membranes
   Chorion Amnion, Yolk sac, Allantois umbilical cord.

Must Know

Desirable to Know
   Various anomalies of placenta.

Nice to Know
   Chorion villus biopsy & amniocentesis.

Multiple Pregnancies
Must Know
   Monozygotic & dizygotic twins,

Desirable to Know
   Siamese twins.

Integument
Must Know
   Development of mammary gland, skin & appendages.

Desirable to Know
   Anomalies of mammary gland.

SYSTEMIC EMBRYOLOGY
Cardio-vascular System
Must Know
   Development of heart chambers, septa. Foetal circulation and changes at birth.
   Development of major veins. aortic arch arteries- Formation & fate.

Desirable to Know
   Anomalies of heart. Anomalies of Aortic arch arteries.

Nice to Know
   Development of Inf. Vena Cava & Various anomalies.

Respiratory System
Must Know
   Development of larynx, trachea, Bronchi, Lungs.

Desirable to Know
   Anomalies of Respiratory system. Tracheoesophageal fistulae.

Nice to Know
   Respiratory distress syndrome.

Alimentary System
Must Know
   Hind gut - Fate of cloaca Development of Rectum, Anal Canal. Development of diaphragm.

Desirable to Know
Urogenital System
Must Know

Development of Ext. Genitals
Development of Ext. genitalia, differentiation.
Desirable to Know
  Anomalies of kidney urinary bladder, Male urethra, Testies, ovary.
Nice to Know
  Hermaphroditism.

Pharyngeal arche, Pouches & clefts
Must Know
  Fate of Pharyngeal arches pouches & clefts.
Desirable to Know
  Anomalies- Branchial cyst. Fistula.

Development of tongue, thyroid gland
Must Know
  Development of Tongue & Thyroid gland.
Desirable to Know
  Anomalies of Tongue & thyroid gland.

Development of face & palate
Must Know
  Formation of face & palate.
Desirable to Know
  Anomalies of face & palate.

Development of nervous system
Must Know
  Neural tube. Fate of fore brain Mid brain & Hind brain Vesicles. Hypophysis cerebri, Fate of Neural Crest cells.
Desirable to Know
  Anomalies of C.N.S. Spina bifida, Anencephaly. Hydrocephalus.

Development of eye ball
Must Know
  Development of retina, Choroid, cornea, lens.
Desirable to Know
  Anomalies of Eye ball.

K) GENETICS
Introduction
  Mendalism, classification of chromosomes, Karyotyping, sex chromatin and Lyon's Hypothesis.

Chromosomal Anomalies

Modes of inheritance
  Pedigree pattern Autosomal dominant inheritance. Autosomal recessive, Sex linked inheritance X linked recessive & X linked - dominant Inheritance.
Blood groups and Genetics
A B O & Rh blood group system.
Desirable to Know
incompatibility.
Genetic Counselling
Eugenetics.

L) RADIOLOGICAL ANATOMY
Introduction

Limb

M) SURFACE ANATOMY
Surface Marking
Surface Anatomy - Living
a) Upper Limb

b) Lower Limb

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popliteal, ant. Tibial, post tibial, dorsalis pedis artery. Miscellaneous - Ligamentum patellae.

c) Abdomen

d) Thorax
Bony land marks - Sternal angle, counting of ribs, counting of spines.; Joints - Manubriosternal, sternoxiphisternal.; Others - Apex beat, positions of nipple, apex of lung, Triangle of Auscultation

e) H.N.F.

Recommended Books
b. Human Anatomy - Datta - Text book
c. Chaurasiya Human Anatomy - Text book
e. Regional Anatomy by Last
f. Surgical Anatomy - Mc Gregor
g. Sahana’s Human Anatomy
h. Anatomy for surgeons - Hollinshead.
i. Human Histology - Inderbir - Singh - Text book
k. Histology - Ham
l. Histology - Wheater
m. Human Embryology - Inderbir - Sing - Text book
n. Medical embryology - Langman
o. Embryology - Hamilton Boyd
p. Clinical Embryology - Snell
q. General Anatomy - Chaurasia
r. General Anatomy - Datta
s. Neuro Anatomy - InderbirSingh
t. Neuro Anatomy - Clinical - Snell
u. Neuro Anatomy - Carpenter
v. Genetics - Gangane
w. Medical Genetics - Emerie
x. Surface Anatomy & Radiology - Omar
y. Surface Anatomy & Radiology - Halim Das
z. J.S.P.Lumley at all - M.Cq.In Anatomy.
aa. Clinical Anatomy - Vishram Sing
bb. Cross Sectional Human Anatomy - David Dean & (Sprial Bpund) - T.E. Herbener.
c. Digital Human Anatomy & Endoscopic Ultrasonography - Bhutani

Teaching Methods and Hours
1. Total No. of Hours - 655 hrs.
   Theory didactic lectures - 175 hrs.
   Non lecture teaching - 140 hrs.
   Practical/Demonstration - 340 hrs.

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### Topic wise/System wise distribution of teaching hours:

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Topic/System</th>
<th>No. of Hours</th>
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<tbody>
<tr>
<td>1.</td>
<td>Histology (Gen &amp; Syst)</td>
<td>112 hrs.</td>
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<tr>
<td>2.</td>
<td>Embryology</td>
<td>035 hrs.</td>
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<td>4.</td>
<td>General Anatomy</td>
<td>010 hrs.</td>
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<td>6.</td>
<td>Upper extremity</td>
<td>067 hrs.</td>
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<tr>
<td>7.</td>
<td>Lower extremity</td>
<td>067 hrs.</td>
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<td>8.</td>
<td>Thorax</td>
<td>044 hrs.</td>
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<tr>
<td>12.</td>
<td>Radiology &amp; Surface Anatomy</td>
<td>010 hrs.</td>
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### Scheme of Examination

#### Internal Assessment

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<tr>
<th>Midterm (Periodic) I and II</th>
<th>Terminal Examination + Preliminary Examination</th>
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<tbody>
<tr>
<td>Theory</td>
<td>Theory</td>
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<tr>
<td>25 + 25 = 50</td>
<td>25 + 25 = 50</td>
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<tr>
<td>A 50/5 = 10</td>
<td>B 50/5 = 10</td>
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1) Theory Marks to be send to the University out of 20  = (A) + (C) = 20
2) Practical Marks to be send to the University out of 20  = (B) + (D) = 20

### University Examination -Distribution of Marks

<table>
<thead>
<tr>
<th>PATTERN OF EXAMINATION</th>
<th>ANATOMY</th>
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<tbody>
<tr>
<td>1.</td>
<td>2 Papers 50 Marks each</td>
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<tr>
<td>THEORY</td>
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<tr>
<td>Written Paper</td>
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<tr>
<td>No. of Papers &amp; Maximum Marks for each paper</td>
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<tr>
<td>2.</td>
<td></td>
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<tr>
<td>Viva-Voce</td>
<td>20</td>
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<tr>
<td>3.</td>
<td></td>
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<tr>
<td>Internal Assessment (Theory)</td>
<td>20</td>
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<tr>
<td>A.</td>
<td>TOTAL THEORY 140</td>
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<tr>
<td>PRACTICAL</td>
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<tr>
<td>1.</td>
<td></td>
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<tr>
<td>Practicals</td>
<td>40</td>
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<tr>
<td>2.</td>
<td></td>
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<tr>
<td>Internal Assessment (Practical)</td>
<td>20</td>
</tr>
<tr>
<td>B.</td>
<td>TOTAL PRACTICALS 60</td>
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<td>GRAND TOTAL A+B</td>
<td>200</td>
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### Nature of Question Paper

**Paper I** - 50 marks
**Paper II** - 50 marks

**Section A**

| Q. No.1 | Multiple Choice Question (30 - MCQs) | 15 marks |

**Section B**

| Q. No. 2 | Write in brief (Five out of Six) | 10 marks |
| Q. No.3  | Write short notes (any two of three) | 8 marks |

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Section C
Q. No. 5 Long question( anyone of two ) - 9 marks
Q. No. 6 Write short notes (Any two out of three) - 8 marks

PATTERN OF VIVA VOCE AND PRACTICAL EXAMINATION
(i) Viva examination (Orals) : Total marks - 20 marks
(ii) Practical examination : Total marks - 40 marks
HUMAN PHYSIOLOGY

GOAL:
The broad goal of teaching undergraduate students in Physiology aims at providing the students comprehensive knowledge of the normal functions of the organ systems of the body to facilitate an understanding of the physiological basis of health and diseases.

EDUCATIONAL OBJECTIVES:
At the end of the course, the students will be able to:
1) Describe the normal functions of all the organ systems, their regulatory mechanisms and interactions of the various systems for well-coordinated total body function.
2) Understand the relative contribution of each organ system in the maintenance of the milieu interior (homeostasis).
3) Explain the physiological aspects of normal growth and development. Analyze the physiological responses and adaptation to environmental stresses.
4) Comprehend the physiological principles underlying pathogenesis and treatment of disease.
5) Correlate knowledge of physiology of human reproductive system in relation to National Family Welfare Program.

SKILL:
At the end of the course the student shall be able to:
1) Conduct experiments designed for study of physiological phenomena.
2) Interpret experimental/investigative data.
3) Distinguish between normal & abnormal data derived as a result of tests which he/she has performed and observed on experimental animals/human subjects in the laboratory.

INTEGRATION:
At the end of the integrated teaching the student shall acquire an integrated knowledge of organ structure and function and its regulatory mechanisms.

COURSE CONTENT
THEORY

MEDICAL ETHICS
Must know:

SOCIAL ENVIRONMENT
Must know:
Introduction, Social organization, social institution, Social dynamics, Traditions and customs, Interaction between the social and the physical environments, Brain, behavior and environment, memory, intelligence, personality, Social stress and disease, Social concept of health, Further reading

GENERAL PHYSIOLOGY
Must know:
Introduction to Physiology, Branches of Physiology, Functional organization of human body, External and internal environment, Homeostasis, Biofeedback mechanisms, Cell Physiology, Cell as a living unit of body and its’ organelles, Transport across cell membrane.
Desirable to know:
- Genes and Genetic code.

HEMATOLOGY
Must know

Desirable to know:
- Plasma proteins, role of liver in plasma protein synthesis, relationship of diet & plasma protein synthesis, Common Haemoglobinopathies (Hbs, Hbc, Thalassaemia), Types of jaundice, Polycythemia - effects on haemodynamics, Blood group: M.N. system, other blood groups, Thrombocytosis, thrombocytopenia purpura, Classification of haemorrhagic diseases, D.I.C.

Nice to know:
- Blood component therapy, Effects of splenectomy, Plasmapheresis,

NERVE-MUSCLE
NERVE
Must know

Desirable to know:
- Experimental techniques to study the mechanism of genesis of R.M.P. & A.P. patch clamp, voltage clamp Methods of recording of A.P.

Nice to know:
- Methods of measurement of Nerve conduction velocities in Human subjects. Diseases affecting nerve conduction velocity.
MUSCLE
Must know
Desirable to know
Heat liberated during various phases of contraction, Fenn effect Recording of muscle activity E.M.G. (in brief)
Nice to know
Myopathies and other Muscles disorders

RESPIRATORY PHYSIOLOGY
Must know
Desirable to know
Method of determination of dead space, residual volume, functional residual capacity, Oxygen therapy - indications, uses & hazards of hyperbaric oxygen, Space Physiology.
Nice to know
Positive pressure breathing

CARDIOVASCULAR PHYSIOLOGY
Must know:
 Introduction, functions & importance of the system, General organization - Greater and lesser circulation, Structure of heart, pericardium, myocardium, endocardium, nerve supply, histology, details of cell junctions, syncytium, contractile & conducting fibers, Properties of cardiac muscle, Functional tissues of heart, pacemaker potential, action potential of cardiac muscle, Generation & conduction of cardiac impulse ECG, lead arrangement, normal waves & their significance with reference to lead II, Cardiac cycle-pressure - volume changes, heart sounds & their clinical significance, correlation of pressure, volume, ECG, and heart sounds in cardiac cycle. Heart rate & its regulation, Haemodynamics - definition, blood flow, resistance, Cardiac output, normal values, physiological variations, factors affecting cardiac output - details, regulation, measurement - principles, Blood pressure, Normal levels, measurement, determinants,

Desirable to know:
Ion channel & receptors (physiological, pharmacological & clinical significance), E.C.G. - electrical axis of heart, heart blocks, arrhythmia's, ischaemia, infarctions, murmurs & their clinical significance, Cardiac failure

Nice to know:
Patho - physiology of oedema, hypertension, angina and MI

RENNAL PHYSIOLOGY
Must know:
General introduction, structure & functions of kidney with special reference to nephron in detail, Renal circulation, special features from functional point of view, Formation of urine, Glomeruler stage - GFR (definition, dynamics, factors affecting & measurement), Concept of clearance to study renal physiology for Tubular stage - Reabsorption & secretion of: Sodium, potassium, glucose : details of handling of water - concentration & dilution of urine, Secretion of H+ ions. Role of kidney in acid - base balance, Physiology of micturition, basic reflex & control, cystometrogram, Disorders of micturition, Artificial kidney, basic principles of dialysis, Renal function tests

Desirable to know:
Experimental studies for renal functions

Nice to know:
Renal transplant and diuretics

BODY TEMPERATURE REGULATION
Must know:
Skin - structure, blood flow and functions, Regulation of body temperature, Hyperthermia, Hypothermia

ALIMENTARY SYSTEM
Must know:
Desirable to know:
- Gastric mucosal barrier, disorders of secretion, peptic ulcer, inhibitors of gastric secretion, Effects of vagotomy, Barium meal studies, endoscopy, biopsy, Patho - physiology of small intestinal motility, paralytic ileus, diarrhea, obstruction, Patho - physiology of colonic motility, irritable bowel syndrome, drugs used, constipation, Gall stone

Nice to know:
- disturbances of esophageal motility, spasm, achalasia, hiatus hernia

NUTRITION:
Must to know:
- Concept of balanced diet, Factors affecting caloric requirements, Requirements of various nutrients, sources, daily needs, Nutrition under special conditions - pregnancy, lactation, growing child, SDA of food and BMR, Control of food intake.

ENDOCRINE SYSTEM
Must know:

Desirable to know:
- Radioimmuno assays

Nice to know:
- Experimental studies

REPRODUCTIVE PHYSIOLOGY
Must know:
- Sex chromosomes sex determination, sex differentiation, Functional anatomy of reproductive system, Puberty changes in males & females and its control, Spermatogenesis : stages & regulation, Testosterone actions & regulation, Male sexual act, Menstrual cycle & ovarian cycle, Phases & hormonal regulation, Menopause, Ovulation indicators & importance, Fertilization, implantation of ovum, contraception.

PREGNANCY AND PERINATAL PHYSIOLOGY
Must Know:
- Functions of placenta, Physiology of pregnancy, Maternal changes during pregnancy, Parturition : in brief - stages and mechanism, Lactation initiation & maintenance and control, Advantages of breast-feeding.

Desirable to know:
- Sex chromosomes : Barr bodies, Development of genitals & gonads

Nice to know:
- Precocious & delayed puberty, IVF

SPECIAL SENSES
Must know:
- Eye

Functional anatomy of eye, optics, refractive error, microscopic, structure of retina with retinal circuits, image formation. Pupillary reflexes, accommodation reaction, colour vision - physiological & neural basis, accepted theory of colour vision, classifications, basis of colour blindness and tests of colour blindness, significance. Aqueous humor - formation, circulation & functions, Glaucoma Structure of rods and cones, receptor potential and Photo chemistry, of vision (photopic & scotopic vision,
dark & light adaptation). Visual pathway - processing of information at different levels in visual pathway, organisation of visual cortex. Effect of lesion at different levels in visual pathway.

**Ear**


**Taste**

Functional anatomy of taste buds, different taste modalities, pathway, factors affecting taste sensation.

**Smell**

Functional anatomy of receptors, primary olfactory sensations, pathway, factors affecting smell sensation, disorders of smell & taste

**Desirable to know:**

Resolution of images, Electro-physiology of internal ear : cochlear microphonics (endocochlear potential)

**Nice to know:**

Electro-physiology of retina, Theories of hearing

**AUTONOMIC NERVOUS SYSTEM**

**Must Know:**

Introduction, The control of visceral functions, Divisions of the autonomic nervous system, Organization of the autonomic nerves, The sympathetic division, The parasympathetic division, Chemical transmitters, Adrenergic receptors, Cholinergic receptors, Visceral afferent fibres, Special features of autonomic functions, Higher control of autonomic functions.

**CENTRAL NERVOUS SYSTEM**

**Must know:**

Outline of nervous system, Synapse; definition, physiological anatomy, sequence of events of synaptic transmission, properties, (state the property & its significance), significance of synaptic transmission, applied aspect, Neurotransmitters - in brief, Receptors : definition, classification, properties, significance, Sensations : different modalities , classification with examples and significance, Sensation of touch, pain proprioception, details of each Reflexes, definition, classification (basis of classification with example), reflex arc & its components, properties (state each property with basis & importance), Polysynaptic reflexes : withdrawal reflex, Stretch reflex - definition, muscle spindle (details with innervation, role of gamma motor neurons) role of supra spinal control - in brief, functions of stretch reflex (regulation of muscle tone) inverse stretch reflex.

**Tracts**

Ascending & descending tracts, details of each tracts - (situation & extent in spinal cord, origin, course & termination, collaterals, applied aspect tests) Ascending tracts : Basic plan of somato sensory pathway for conscious sensation, pathway from head, face region Descending tracts : pyramidal tracts - details, extra pyramidal tracts Differences between UMN & LMN lesions Sections at various levels in CNS: Spinal transection - spinal animal Complete - 3 stages - spinal shock, stage of recovery, stage of reflex failure - details of each stage Incomplete transaction Hemisection, Low midbrain section - decerebrate animal : decerebrate rigidity (classical & ischaemic) mechanisms, characteristics features, physiological significance, High midbrain section - High decerebrate animal Thalamic or Decorticate animal.

**Posture & equilibrium**

Definition, classification of postural reflexes (Details of each reflex and its function), Regulation of posture (integrating centers at various levels of CNS), Vestibular apparatus

**KRISHNA INSTITUTE OF MEDICAL SCIENCES DEEMED UNIVERSITY, KARAD.**
Physiological anatomy, mode of function of utricle, & saccule and semicircular canals, vestibulocochlear & vestibulospinal, reflexes

Thalamus
Functional classification of thalamic nuclei, with their connections of different nuclear groups, functions of thalamus, thalamic syndrome.

Hypothalamus
Functional classification of different hypothalamic nuclei, connections in brief, functions in details.

Limbic system
Parts of limbic system, connections in brief, functions.

Reticular formation
Introduction, anatomy in brief, functional division, Ascending reticular activating system - details with connections & role in wakefulness-sleep cycle, applied aspect Descending reticular system - role in regulation of muscle tone by pontine & medullary regions Visceral centers.

E.E.G.
Definition, different waves, characteristics & functional significance of each wave, physiological variation, clinical application in brief.

Wakefulness and sleep
Concept of alertness & wakefulness with their physiological basis, Definition of sleep, sleep cycle - types of sleep, functions of sleep.

Cerebellum
Introduction, functional classification, intracortical circuit, deep cerebellar nuclei, connections of different lobes, functions of cerebellum, cerebellar function tests, effects of lesion in brief

Basal Ganglia
Introduction, classification of nuclei, connections, intracortical circuits, functions, lesions - Parkinsonism

Cerebral Cortex
Gross anatomy & divisions, concept of Broadmann’s mapping with diagram, Parietal lobe - anatomical & functional divisions, details of each functional part as regards connections, topographic organisation, and functions Frontal lobe - excitomoter cortex - anatomical & functional parts, details of each part as regards connections, topographic organization, functions. Prefrontal cortex - different areas, connections in brief, functions, effects of lobectomy Temporal lobe, occipital lobe: functions

Speech
Afferent and efferent mechanisms and role of cortical centers in speech, concept of cerebral dominance, development of speech, vocalization.

Memory
Definition, stages, types, physiological basis, factors affecting, applied amnesia in brief.

Learning
Definition, types with examples, stages, factors influencing, role of motivation (positive & negative reinforcement, reward & punishment), physiological basis - role of different parts of CNS, structural, biochemical changes.

Conditional reflexes
Definition, difference between unconditional & conditional reflexes, development of conditional reflexes, properties, significance.

CSF
Introduction, composition, normal CSF pressure, formation & circulation, functions, applied aspect brief, blood brain barrier, blood CSF barrier.

Desirable to know:
General nervous system, Neurotransmitters - details susceptibility of synapse to hypoxia drugs etc., Mechanisms of referred pain, differences between superficial & deep pain, central analgesia system, supra-spinal control of stretch reflex - details. Thalamus - applied aspects - effects of lesions, Hypothalamus - applied aspects - effects of lesions,
Reticular formation - effects of lesion EEG - Method of recording, abnormal patterns, Cerebellum - Embryology, evolution, effects of stimulation & ablation, Cerebral cortex - effects of stimulation & ablation in different regions

**Nice to know:**
Experimental studies - effects of stimulation & ablation, Sleep, wakefulness - effects of sleep deprivation, disorders

**Specialized integrative physiology**

**Must know**

**Lecture demonstrations.**

**Must know**
Reticulocyte and its clinical significance Bone marrow structure and cellular elements. Lung volumes and capacities, measurements, physiological values and clinical significance Audiometry. Blood transfusion

**Practical**

**A) Hematology**
Study of Microscope, Study of Human and Frog RBC Separation of cells and plasma, Estimation of Hb% and study of Neubauer chamber, Total RBC count, Total WBC count, Differential WBC count, B.T.C.T., Blood groups and Blood indices

**B) Clinical examination and Human experiments**
Stethography, Spirometry, Ergography, Perimetry, Tests for physical fitness. Clinical examination of all systems.

**Demonstrations**
Reticulocyte count, Platelet count, P.C.V., E.S.R. fragility bone marrow examination, triple response and capillary circulation. E.M.G. S.D. curve, conduction velocity of nerve (Human), E.C.G., E.E.G., Audiometry, H.R.T. (Human reaction time). Visit to blood bank. Visit to the wards to show common disorders or video tapes (list given in appendix I), X-rays (list given in appendix II).

**Animal experiments on frogs (demonstrations only)**

**Skeletal muscle (G.S. Preparation)**

**Cardiac muscle**
Normal cardiogram, effect of variation of temperature on frogs heart. Properties of cardiac muscle, Effect of vagal stimulation and phenomenon of vagal escape, Effect of drugs (Acetyl choline, Adrenaline, Nicotine) on frog’s heart, Perfusion of isolated frogs heart with effects of Na+, K+ and Ca++, and demonstration of Starling’s law.

**Books recommended:**
1) Textbooks of Physiology
   - Guyton
   - Ganong
   - Jain AK
   - Sembulingam
   - Textbook of Physiology
   - Review of Medical Physiology
   - Text Book of Physiology
   - Essentials of Medical Physiology

KRISHNA INSTITUTE OF MEDICAL SCIENCES DEEMED UNIVERSITY, KARAD.
2) Reference Books
Best and Taylor - Physiological basis of medical practice
Berne & Levy - Principles of Physiology
Bijlani -

3) Practicals:
C.L. Ghai - Text book of Practical Physiology

Teaching Methods and Hours
1. Total No. of Hours - 480 hrs.
   Theory didactic lectures - 167 hrs.
   Non lecture teaching - 113 hrs.
   Practical / Demonstration - 200 hrs.

2. Topic wise / System wise distribution of teaching hours:

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Topic / system</th>
<th>No. of Hours</th>
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<tbody>
<tr>
<td>1.</td>
<td>General Physiology, cell</td>
<td>05 hrs.</td>
</tr>
<tr>
<td>4.</td>
<td>Respiratory</td>
<td>15 hrs.</td>
</tr>
<tr>
<td>5.</td>
<td>Cardiovascular</td>
<td>20 hrs.</td>
</tr>
<tr>
<td>6.</td>
<td>Renal Physiology</td>
<td>10 hrs.</td>
</tr>
<tr>
<td>7.</td>
<td>Alimentary system</td>
<td>12 hrs.</td>
</tr>
<tr>
<td>8.</td>
<td>Nutrition</td>
<td>02 hrs.</td>
</tr>
<tr>
<td>9.</td>
<td>Endocrine</td>
<td>10 hrs.</td>
</tr>
<tr>
<td>10.</td>
<td>Reproductive</td>
<td>08 hrs.</td>
</tr>
<tr>
<td>11.</td>
<td>Special senses</td>
<td>08 hrs.</td>
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<tr>
<td>12.</td>
<td>CNS (Central Nervous system)</td>
<td>50 hrs.</td>
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SCHEME OF EXAMINATION

Internal Assessment

Midterm (Periodic) I and II

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<th>Practicals</th>
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<td>25 + 25 = 50</td>
<td>25 + 25 = 50</td>
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Terminal Examination + Preliminary Examination

<table>
<thead>
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<th>Viva</th>
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<th>Practicals</th>
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<tbody>
<tr>
<td>60 + 50 + 50</td>
<td>20 + 20</td>
<td>200</td>
<td>40 + 40 = 80</td>
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A  B  C  D
50/5 = 10 50/5 = 10 200/20 =10 80/8 = 10

1) Theory Marks to be send to the University out of 20 = (A) + (C) = 20

2) Practical Marks to be send to the University out of 20 = (B) + (D) = 20

University Examination -Distribution of Marks

<table>
<thead>
<tr>
<th>PATTERN OF EXAMINATION</th>
<th>PHYSIOLOGY</th>
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<tbody>
<tr>
<td>1.</td>
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<tr>
<td>THEORY</td>
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</tr>
<tr>
<td>Written Paper</td>
<td>2 Papers</td>
</tr>
<tr>
<td>No. of Papers &amp; Maximum Marks for each paper</td>
<td>50 Marks each</td>
</tr>
<tr>
<td>2.</td>
<td>Viva-Voce</td>
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KRISHNA INSTITUTE OF MEDICAL SCIENCES DEEMED UNIVERSITY, KARAD.
<table>
<thead>
<tr>
<th>Section</th>
<th>Marks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Theory</td>
<td>140</td>
</tr>
<tr>
<td>Practical</td>
<td>60</td>
</tr>
</tbody>
</table>

**NATURE OF QUESTION PAPER**

- **Paper I** - 50 marks
- **Paper II** - 50 marks

**Section A**
- **Q. No.1** Multiple Choice Question (30 - MCQs) - 15 marks

**Section B**
- **Q. No. 2** Write in brief (Five out of Six) - 10 marks
- **Q. No.3** Write short notes (any two out of three) - 8 marks

**Section C**
- **Q. No. 5** Long question (anyone of two) - 9 marks
- **Q. No. 6** Write short notes (Any two out of three) - 8 marks

**PATTERN OF VIVA VOCE AND PRACTICAL EXAMINATION**

1. **Viva examination (Orals)**: Total marks - 20 marks
2. **Practical examination**: Total marks - 40 marks
HUMAN BIOCHEMISTRY

Goal:
The main goal of teaching Biochemistry to undergraduates is to have a sound knowledge of various biomolecules present in living cells and organisms. To orient them towards molecular level of all the chemical reactions associated with living cells and apply this knowledge in maintenance of health and effective treatment of diseases.

Educational Objectives:
At the end of the course the student should
1) be able to describe the structural and functional organization of cell and its subcellular components.
2) understand the chemistry and biological significance of various biomolecules like carbohydrates, proteins, lipids and hemoglobins.
3) have a sound knowledge of enzymes in respect to mechanism of action, classification and their use in medicine.
4) have clear concept about digestion, absorption, interconversion and assimilation of various nutrients in our diet.
5) know metabolisms of major biomolecules with their integration and regulations.
6) be able to comprehend genes, their expression, the principles and the application of genetic engineering.
7) be able to explain inborn errors of various metabolisms.
8) know the mechanism of body defense, detoxification and homeostasis of body fluids and pH.
9) have thorough understanding about nutrition in respect with vitamins, minerals, malnutrition and obesity.
10) be able to outline biochemical basis of cancer, free radicals, radioisotopes and environmental health.
11) get familiar with conventional biochemical investigations and their interpretations.

Skills:
At the end of the course the student should
1) able to handle routine/special biochemical instruments/techniques, which are used in confirming the clinical diagnosis.
2) know to analyze the biochemical data with proper interpretation.
3) be able to demonstrate commonly done biochemical screening tests.
4) be able to opine on clinical case with reference to biochemical investigations.

Integration:
The knowledge acquired in biochemistry during the course should help the student to integrate it with other sciences for better understanding of molecular events taking place in human body during health and disease.
**COURSE CONTENT**

**THEORY**

**Introduction**
**Must know**
Introduction to Biochemistry as a basic science for the study of Medicine. Its importance in clinical practice.

**Cell**
**Must know**
Structure of cell membrane, brief account of functions of its components. Organization of cellular organelles and their functions. Introduction to different transport mechanisms.

**Enzymes**
**Must know**
- Definition, Classification. Nature of active site and mechanism of enzyme action.

**Desirable to Know**
Isoenzymes with respect to LDH, CPK, ALP.

**Chemistry of proteins and amino acids :-**

**Must know**

**Desirable to Know**
- Non proteogenic amino acids and its clinical importance with various examples.

**Metabolism of Protein and amino acids :-**

**Must know**
- Dietary Proteins and its importance. Digestion and absorption of proteins. Fate of amino acids in the body (Deamination, Transamination, Transamidination, Transdeamination, Transmethylation, Decarboxylation). Formation and fate of ammonia, Synthesis of glutamate, glutamine and urea (urea cycle), Disorders of urea cycle.

**Desirable to Know**
- Maple Syrup urine disease, FIGLU test, Marphan syndrome (in brief).

**Chemistry and metabolism of purines and pyrimidines**

**Must know**
- Purine and pyrimidine bases, Nucleosides, Biologically important for nucleotides and their functions. Synthetic nucleotides and its importance. Biosynthesis of purines (only sources of purine ring & Regulatory steps), salvage pathway and breakdown of purines. Gout and Lesch Nyhan syndrome.

**Desirable to Know**
- Biosynthesis and end products of pyrimidine breakdown.
Chemistry of Nucleic acids

Must know
- Structure and functions of DNA and RNAs. Genetic code. Replication of DNA.
- Transcription, Translation - Protein biosynthesis (Activation amino acids, Initiation, Elongation and Chain termination), Inhibitors of protein biosynthesis.

Desirable to Know
- Post - Transcriptional and post translational changes. Molecular mechanism of gene expression and regulation-Lac operon model, Mutations- types, causes and its consequences.

Genetic Engineering

Must know

Desirable to Know
- Chimeric molecule and Gene Library. DNA sequencing and Gene therapy.

Hemoglobin

Must know

Metabolism of hemoglobin

Must know
- Synthesis and breakdown of hemoglobin. Fate of bilirubin. Different types of Jaundice.

Desirable to Know
- Porphyrias (in brief).

Biological oxidation

Must know

Molecular concepts of body defense and their application in medicine

Must know
- Introduction to immunology. Immunoglobulins. Types, their structure and functions; Free radicals, enzymatic and non-enzymatic antioxidants.

Vitamins

Must know
- General nature, Classification, Sources, Active forms, Metabolic role, Deficiency manifestations, Daily requirement and hypervitaminosis (as applicable). Fat soluble vitamins: Vitamin A, D, E and K. Water soluble vitamins: Thiamine, Riboflavin, Niacin, Folic acid, Vitamin B12, Pyridoxine, Biotin and Vitamin C.

Desirable to Know
- Pantothenic acid.
Nutrition
Must know
Calorific value of food, BMR, SDA, Biological value of food, balanced diet. Dietary sources of nutrients. Role of dietary fibres.
Desirable to Know
Protein energy malnutrition (PEM) - Kwashiorkor, Marasmus, Obesity.

Chemistry of carbohydrates
Must know
Desirable to Know
Glycosides and their importance.

Metabolism of carbohydrates
Must know
Desirable to Know
Regulation of glycogenesis and glycogenolysis, Glycogen storage diseases Cori's cycle. Rapaport Leubering cycle. Uronic acid pathway (only its significance). Metabolism of galactose and galactosemia. Metabolism of fructose and fructosuria.

Chemistry Lipids
Must know
Bloor's Definition and Classification of lipids (inclusive of phospholipids and fatty acids classification). Biological importance of fatty acids and triacylglycerol. Composition and biological importance of phospholipids, glycolipids, lipoproteins and steroids. Eicosanoids: role of prostaglandins.
Desirable to Know
Leukotrienes and thromboxanes (role in brief). Rancidity, acid number & iodine number.

Metabolism of Lipids
Must know
Dietary Lipids and their importance. Digestion, absorption and transport of lipids. Fatty acid oxidation β oxidation of saturated (even and odd carbons) fatty acids (Detailed calculation of energetics of palmitic acid). Role of carnitine in the oxidation of long chain fatty acids. Biosynthesis of fatty acids and its regulation (Saturated fatty acids). Fatty acid chain elongation-mitochondrial and microsomal. Formation and utilization of ketone bodies. Regulation of ketogenesis and ketosis. Cholesterol

Desirable to Know

Metabolism
Desirable to Know
Interrelationship of carbohydrate, lipid and protein metabolism.

Mineral metabolism
Must know
Sources, RDA, Biochemical role, distribution, and their Disorders : Calcium, phosphorus, Sodium, Potassium, Chlorine. Regulation of serum calcium (in brief). Sources, RDA, Biochemical role, distribution and Disorders of Trace elements : Iron, Iodine, Zinc, Fluoride, selenium and Copper.

Desirable to Know
Magnesium, sulphur, cobalt and manganese

Must know
Water and electrolyte balance, imbalance and role of hormones in their regulation.

Desirable to Know
Metabolic changes during starvation.

Nice to know
Acid base balance and imbalance.

Mechanism of hormone action.
Must know
Definition, classification and mechanism of hormone action. Role of Second messenger - cAMP, Ca ++ and phosphatidylinositol.

Environmental biochemistry
Desirable to Know
Effects of cold and heat exposure, chemical stress and water and air pollutants.

Organ function test
Must know
a) Liver function tests classification and their interpretations:
Determination of proteins, bilirubin, prothrombin time, alkaline phosphatase, Glutamate pyruvate transaminase (GPT), glutamate oxaloacetate transaminase (GOT), lactate dehydrogenase. Hepatic markers for detection of types of hepatitis.
b) Renal function tests - classification, urea clearance test, Creatinine clearance test and their interpretations:

Desirable to Know
c) Thyroid function tests classification and interpretations: T3, T4, TSH and thyroxine binding globulin (TBG).

Detoxication mechanisms
Must know
Reactions involved in detoxication - Oxidation, Reduction, Hydrolysis and Conjugation.
Desirable to Know
Role of mixed function oxidase system (MFOS) : emphasis on cytochrome P 450 as an integral part of MFOS.

Biochemical basis of cancer and carcinogenesis
Must know
Introduction, Etiology of cancer, Carcinogens and their mode of action.
Desirable to Know
Viral oncogenesis - Oncogenes and protooncogenes, DNA viruses, RNA, viruses and Oncogenic products. Biochemical mechanisms for the activation of protooncogene to oncogene.
Tumour markers, Apoptosis.

Radioisotopes
Must know
Diagnostic & therapeutic applications and radiation hazards.

Investigation techniques
Must know

Practical

1. Tests for monosaccharides : molisch’s test, Barfoed’s test, feh test, Seliwanoff’s test, Rapid furfural test and test for osazones.
2. Tests for disaccharides : Molisch’s test, Benedict’s test, Barfoed’s test, seliwan test, inversion test for sucrose and test for osazones.
3. Colour reactions of proteins : Biuret test, xanthoproteic test, million’s test, cole aldehyde test, sakaguchi test, lead acetate test, ninhydrin test.
4. Precipitation reactions of proteins : Heller’s test, lead acetate test, sulphosalicylic acid test, trichloroacetic test, precipitation by alcohol, half saturation test, full saturation test and heat coagulation test.
5. Spectroscopic examination of Hb-derivatives (oxy-Hb, Deoxy-Hb and Meth-Hb, Carboxy-Hb)
7. Estimation of Blood urea - Dam method
8. Estimation of serum creatinine, creatinine in urine - jafee’s method
9. Estimation of serum total proteins, albumin and A/G ration - Biuret. BCG.
10. Estimation of serum total bilirubin - Diazo method
13. Estimation of serum phosphorus (inorganic) - kit method, Fiske Subbarao
14. Estimation of SGPT - (ALT) - kit method
15. Estimation of SGOT (AST) - kit method.
17. Estimation of serum amylase - lodometric
18. Urine : Physical characteristics and normal, organic and inorganic constituents.
Demonstration
1. Clorimetry
2. Flamephotometry
3. Electrophoresis
4. Chromatography
5. Determination of Ph.

Recommended Books
1. Satyanarayana
2. Vasudevan
3. Chatterjee & Rana Shinde

Teaching Methods and Hours
1. Total No. of Hours - 240 hrs.
   - Theory didactic lectures - 80 hrs.
   - Non lecture teaching - 90 hrs.
   - Practical/Demonstration - 70 hrs.

2. Topic wise/System wise distribution of teaching hours:

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Topic/System</th>
<th>No. of Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Introduction to Biochemistry, Cell structure and function</td>
<td>02 hrs.</td>
</tr>
<tr>
<td>2.</td>
<td>Chemistry of Carbohydrates</td>
<td>15 hrs.</td>
</tr>
<tr>
<td>3.</td>
<td>Chemistry of Proteins</td>
<td>15 hrs.</td>
</tr>
<tr>
<td>4.</td>
<td>Chemistry of Lipids</td>
<td>09 hrs.</td>
</tr>
<tr>
<td>5.</td>
<td>Chemistry of Nucleoproteins</td>
<td>08 hrs.</td>
</tr>
<tr>
<td>7.</td>
<td>Biological Oxidation</td>
<td>05 hrs.</td>
</tr>
<tr>
<td>9.</td>
<td>Carbohydrate Metabolism</td>
<td>15 hrs.</td>
</tr>
<tr>
<td>10.</td>
<td>Protein Metabolism</td>
<td>15 hrs.</td>
</tr>
<tr>
<td>11.</td>
<td>Lipid Metabolism</td>
<td>15 hrs.</td>
</tr>
<tr>
<td>12.</td>
<td>Integration Metabolism &amp; Metabolic changes during starvation</td>
<td>03 hrs.</td>
</tr>
<tr>
<td>15.</td>
<td>Nutrition</td>
<td>05 hrs.</td>
</tr>
<tr>
<td>16.</td>
<td>Purines &amp; Pyrimidines Metabolism, Chemistry &amp; Functions of Nucleic, Acids; Protein Biosynthesis, Gene Expression, Mutations Genetic Engineering &amp; its applications</td>
<td>15 hrs</td>
</tr>
<tr>
<td>17.</td>
<td>Biochemistry of Cancer</td>
<td>03 hrs.</td>
</tr>
<tr>
<td>18.</td>
<td>Radioisotopes</td>
<td>03 hrs.</td>
</tr>
<tr>
<td>20.</td>
<td>Detoxification mechanisms</td>
<td>03 hrs.</td>
</tr>
<tr>
<td>21.</td>
<td>Kidney function tests, Thyroid function tests</td>
<td>13 hrs.</td>
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22. Mineral Metabolism 17 hrs.
25. Environmental Biochemistry 03 hrs.
26. Molecular concept of body defense 05 hrs.

**SCHEME OF EXAMINATION**

<table>
<thead>
<tr>
<th>Midterm (Periodic) I and II</th>
<th>Terminal Examination + Preliminary Examination</th>
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</thead>
<tbody>
<tr>
<td>Theory</td>
<td>Practicals</td>
</tr>
<tr>
<td>25 + 25 = 50</td>
<td>25 + 25 = 50</td>
</tr>
</tbody>
</table>

A  B  C  D

50/5 = 10  50/5 = 10  200/20 = 10  80/8 = 10

1) Theory Marks to be send to the University out of 20 = (A) + (C) = 20
2) Practical Marks to be send to the University out of 20 = (B) + (D) = 20

**University Examination -Distribution of Marks**

<table>
<thead>
<tr>
<th>PATTERN OF EXAMINATION</th>
<th>BIOCHEMISTRY</th>
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<tbody>
<tr>
<td>1. THEORY Written Paper</td>
<td>2 Papers</td>
</tr>
<tr>
<td>No. of Papers &amp; Maximum Marks for each paper</td>
<td>50 Marks each</td>
</tr>
<tr>
<td>2. Viva-Voce</td>
<td>20</td>
</tr>
<tr>
<td>3. Internal Assessment (Theory)</td>
<td>20</td>
</tr>
<tr>
<td>A. TOTAL THEORY</td>
<td>140</td>
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<tr>
<td>PRACTICAL</td>
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<td>1. Practicals</td>
<td>40</td>
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<tr>
<td>2. Internal Assessment (Practical)</td>
<td>20</td>
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<tr>
<td>B. TOTAL PRACTICALS</td>
<td>60</td>
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<tr>
<td>GRAND TOTAL A+B</td>
<td>200</td>
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**NATURE OF QUESTION PAPER**

Paper I - 50 marks
Paper II - 50 marks

**Section - A**
Q. No.1 Multiple Choice Question (30 - MCQs) - 15 marks

**Section B**
Q. No. 2 Write in brief (Five out of Six) - 10 marks
Q. No. 3 Write short notes (any two of three) - 8 marks

**Section C**
Q. No. 5 Long question (anyone of two) - 9 marks
Q. No. 6 Write short notes (Any two out of three) - 8 marks

KRISHNA INSTITUTE OF MEDICAL SCIENCES DEEMED UNIVERSITY, KARAD.
PATTERN OF VIVA VOCE AND PRACTICAL EXAMINATION

(i) Viva examination (Orals) : Total marks - 20 marks
(ii) Practical examination   : Total marks - 40 marks
PREVENTIVE & SOCIAL MEDICINE

Goals:
Teaching / training in Community Medicine to undergraduate students leading to prepare graduates to function as Community physician (problem based training) and inculcate effective leadership qualities.

Educational Objectives:
1) Orientation to social aspects of ill health including dynamics of demography in context of rural and urban communities.
2) Understand impact of urbanization / industrialization.
3) Study the cultural factors related to health and disease.
4) Study dynamics of community behaviors.
5) Observe the principles and practice of preventive medicine in hospital and community settings.
6) Describe existing health care delivery systems and its impact on the country.
7) Evaluation of National Health Programs.
8) Describe National Family Welfare program and Population Control.
9) Appreciate role of the individual, family, community and socio-cultural factors in health & disease.
10) Describe the hazards of occupations in different settings.
11) To know health information systems and its utilization in planning of health services.
12) Enunciate the principles of Primary Health Care and the National Health Policy.
13) Study the deleterious effects of environmental factors.
14) Understand the principles of health economics and communication process.
15) Use of principles of research methodology.

Skills:
1) Provide services as the first level physician at periphery.
2) Know the principles and practice of preventive medicine.
3) Learn art of communication as effective tool for health education.
4) Use of epidemiology as a tool for rational decisions relevant to community and individual level intervention.
5) Use of bio-statistics in research work including collection, analysis interpret and present hospital and community data.
6) Diagnose and manage common health ailments viz. nutrition, communicable and non-communicable diseases.
7) Handle common health emergencies.
8) Plan, implement & evaluate Health Education programmes using A.V. aids.
9) Active participation in health care services.
10) Use of computers in analysis & presentation of data.

COURSE CONTENT

THEORY

Must Know
Introduction, Health - Definition, spectrum, factors affecting, indications, Health problems - world - India; Health information system; Health care delivery system - India; Demography - Definition, cycle, trends in India, uses; Fertility & factors affecting; Family planning methods; Sociology - social factors affecting health, cultural factors. Social problems in India. Doctors patient relationship, family & health, learning, intelligence, social security, social organizations; Medical ethics; Health education & communication.
Desirable to know
Evolution of community medicine; Demography - factors affecting trend, malthus theory, National Population, Methods of census; Sociology - Health economies, concepts in sociology and psychology, hospital sociology; Hospital management.

Bio-statistics
Must know
Introduction & uses; Data types, collection & Presentation; Central tendency; Variation; Normal Distribution; Sample methods, variability; S.E. Means; S.E.X2 - test; 't' tests.
Desired to know
Sample size determination; Correlation & Regression; ANOVA.