DPU

Dr. D. Y. PATIL VIDYAPEETH, PUNE
(Deemed to be University)

Syllabus for
II – MBBS
(Para - Clinical Subjects)

2014 - 15
(Amended / Revised upto July 2019)

DPU

Dr. D.Y. PATIL VIDYAPEETH, PUNE
(Deemed to be University)
(Re-accredited by NAAC with a CGPA of 3.62 on a four point scale at 'A' Grade)
(An ISO 9001 : 2015 Certified University)

Dr. A. N. Suryakar
Registrar

Ref. No. : DPU/875-VII/2019
Date : 11/09/2019

NOTIFICATION

Whereas in pursuance of the following decisions taken by the Board of Management, it is hereby notified to all concerned that the **"Syllabus for II-M.B.B.S. (Para-Clinical Subjects) – 2014-15"** is **revised upto July 2019** and hereby published.

- Updation in UG syllabus of Microbiology vide **Resolution No. BM-04(i)-15, dated 31st March, 2015.**
- Adoption of **"Double Evaluation System"** for UG Answer Papers **vide Resolution No. BM-07-15 dated 31st March, 2015.**
- Structure of Integrated Teaching for II MBBS **vide Resolution No. BM-26(iii)-15, dated 29th December, 2015.**
- Introduction of Bioethical aspects in various chapters of all subjects **vide Resolution No. BM-26(xi)-15, dated 29th December, 2015.**
- Inclusion of certain topics in the Microbiology syllabus of IInd MBBS **vide Resolution No. BM-17(iv)-16, dated 22nd September, 2016.**
- Inclusion of practical classes in Pharmacology Syllabus of IInd MBBS **vide Resolution No. BM-17(v)-16, dated 22nd September, 2016.**
- Change in existing Internship Training Programme in Community Medicine Posting **vide Resolution No. BM-05(i)-17, dated 7th April, 2017.**
- Graduate Attributes, Programme Outcomes (POs), Course Outcomes (Cos) and gap analysis for all courses of UG and PG Programmes for Para-Clinical and Surgical Subjects **vide Resolution No. BM-10(vii)-19 dated, 12th April, 2019.**
- Interdisciplinary subjects of M.B.B.S, M.D./M.S. and Super-specialty (D.M./M.Ch.) Programs under the Faculty of Medicine **vide Resolution No. BM-10(viii) dated 12th April, 2019.**

The **Syllabus for II-M.B.B.S. (Para-Clinical Subjects) – 2014-15"** is **revised upto July 2019** will be useful to all the concerned. This will come into force with immediate effect.

Dr. D.Y. PATIL VIDYAPEETH PIMPRI, PUNE-18. Deemed to be University

(Dr. A. N. Suryakar)
Registrar

Copy to:
1. PS to Chancellor for kind information of Hon'ble Chancellor, Dr. D. Y. Patil Vidyapeeth, Pune.
2. PS to Vice Chancellor for kind information of Hon'ble Vice Chancellor, Dr. D. Y. Patil Vidyapeeth, Pune.
3. The Dean, Dr. D. Y. Patil Medical College Hospital & Research Centre, Pimpri, Pune
4. The Controller of Examinations, Dr. D. Y. Patil Vidyapeeth, Pune.
5. Director (IQAC), Dr. D. Y. Patil Vidyapeeth, Pune.
6. Web Master for uploading on Website.

REGULATIONS AND SYLLABUS FOR M.B.B.S. DEGREE COURSE

1. SHORT TITLE AND COMMENCEMENT

These regulations may be called "The Regulations for the Bachelor of Medicine and Bachelor of Surgery Degree Course of Dr. D. Y. Patil Vidyapeeth, Pune (Deemed to be University)

These regulations shall come into force from the academic year 1997 - 1998 and amendments notified by MCI from time to time.

2. ELIGIBILITY FOR ADMISSION TO M.B.B.S

DEGREE COURSE QUALIFICATION FOR ADMISSION:

No candidate shall be allowed to be admitted to the first year Bachelor of Medicine and Bachelor of Surgery (MBBS) Course until:

He/She has completed the age of 17 years on or before 31st December of the year of admission to the MBBS course.

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 / Bio-technology** and Mathematics or any other elective subjects with English at a level not less than core course of English as prescribed by the National Council of Educational Research and Training after the introduction of the 10+2+3 years educational structure as recommended by the National Committee of 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 colleges;
Or

(b) The intermediate examination in science of an Indian University / Board or other recognised examining body with **Physics, Chemistry and Biology / Bio-technology** 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/Bio-technology, 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 / Bio-technology** 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 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/Bio-technology** including practical test in each of these subjects and English.

3. PROCEDURE FOR SELECTION TO MBBS COURSE

1] There shall be a uniform entrance examination to all medical educational institutions at the undergraduate level namely 'National Eligibility-cum-Entrance Test for admission to MBBS course in each academic year and shall be conducted under overall supervision of the Ministry of Health & Family Welfare, Government of India.

2] The "designated authority" to conduct the 'National Eligibility-Cum-Entrance Test' shall be the Central Board of Secondary Education or any other body/organization so designated by the Ministry of Health & Family Welfare, Government of India, in consultation with the Medical Council of India.

3] The language and manner of conducting the 'National Eligibility-Cum-Entrance Test' shall be determined by the "designated authority" in consultation with the Medical Council of India and the Ministry of Health and Family Welfare, Government of India.

4] In order to be eligible for admission to MBBS Course for a academic year, it shall be necessary for a candidate to obtain minimum of marks at 50th percentile in 'National Eligibility-cum-Entrance Test to MBBS course' held for the said academic year. However, in respect of candidates belonging to Scheduled Castes, Scheduled Tribes, Other Backward Classes, the minimum marks shall be at 40th percentile. In respect of candidates with benchmark disabilities specified under the Rights of Persons with Disabilities Act, 2016, in terms of Clause 4(3) above, the minimum marks shall be at 45th percentile. The percentile shall be determined on the basis of highest marks secured in the All-India common merit list for admission in 'National Eligibility-cum-Entrance Test for admission to MBBS course.

Provided when sufficient number of candidates in the respective categories fail to secure minimum marks as prescribed in National Eligibility-cum-Entrance Test held for any academic year for admission to MBBS Course, the Central Government in consultation with Medical Council of India may at its discretion lower the minimum marks required for admission to MBBS Course for candidates belonging to respective categories and marks so lowered by the Central Government shall be applicable for the said academic year only.

4. REGISTRATION/ Eligibility Certificate

A candidate admitted to the course shall register with this University by remitting the prescribed fees along with the prescribed application form for registration duly filled in, within the stipulated date.

5. DURATION OF THECOURSE

The period of certified study and training for the course of Degree of Bachelor of Medicine and Bachelor of Surgery shall extend over a period of four and half academic years and one year of Compulsory Rotatory Resident Internship before the award of the Degree.

6. CURRICULUM

The curriculum and the syllabus for the course shall be as prescribed from time to time by the appropriate bodies.

COMMENCEMENT OF THECOURSE

The first year MBBS Course shall begin on or before 1st August of every academic year.

7. TRAINING PERIOD AND TIME DISTRIBUTION

(a) Every student shall undergo a period of certified study extending over four and half academic years divided into 9 semesters, (i.e. of 6 months each) from the date of commencement of study for the subjects comprising the medical curriculum to the date of completion of examination and followed by one year Compulsory Rotatory Residential Internship. Each semester will consist of approximately 120 teaching days of 8 hours duration including one hour for lunch.

(b) The period of four and half years is divided into three phases as follows:

- Phase - I (two semesters) consisting of pre-clinical subjects (Anatomy, Physiology, Biochemistry and introduction to Community Medicine including Humanities). Sixty hours are allocated for introduction to Community Medicine including Humanities, and rest of the time shall be and again divided between Anatomy and Physiology (2/3) plus Biochemistry (1/3)combined.

- Phase - II (three semesters) consisting of para-clinical / clinical subjects.

  During this phase teaching of para-clinical and clinical subjects shall be done concurrently.

  The para-clinical subjects shall consist of Pathology, Pharmacology, Microbiology, Forensic Medicine including Toxicology and part of Community Medicine.

  The clinical subjects shall consist of all those detailed below in Phase III.

  Out of the allotted time for para-clinical teaching, approximately equal time be allotted to Pathology, Pharmacology, Microbiology and Forensic Medicine, Community Medicine combined (1/3 for Forensic Medicine and 2/3 for Community Medicine).

- Phase - III (four semesters) Continuation of study of clinical subjects for seven semesters after passing Phase -I

The clinical subjects to be taught during Phase II and III are Medicine and its allied specialities, Surgery and its allied specialities, Obstetrics and Gynaecology and Community Medicine.

The Medicine and its allied specialities training will include General Medicine, Paediatrics, Tuberculosis and Chest, Skin and Sexually Transmitted Diseases, Psychiatry, Radio-diagnosis, Infectious Diseases etc. The Surgery and its allied specialities training will include General Surgery, Orthopaedic Surgery including Physiotherapy and Rehabilitation, Ophthalmology, Oto-rhino-laryngology, Anaesthesia, Dentistry, Radio-therapy etc. The Obstetrics & Gynaecology training will include family medicine, family welfare planning etc.

(c) The first 2 semesters (approximately 240 teaching days) shall be occupied in the Phase I (Pre-clinical) subjects and introduction to a broader understanding of the perspectives of medical education leading to delivery of health care. No student will be permitted to join the Phase II (Para - clinical) group of subjects until he has passed in all the PhaseI.

(d) After passing pre-clinical subjects, Phase II will be devoted to para-clinical and clinical subjects, along with clinical postings. During clinical phase (Phase III) pre-clinical and para-clinical teaching will be integrated into the teaching of clinical subjects where relevant.

(e) Supplementary examination will be conducted as follows:
Supplementary examination may be conducted within 3 months so that the students who pass can join the main batch and the failed students will have to appear in the subsequent year.

8. PHASE DISTRIBUTION AND TRAINING OFEXAMINATIONS:

6 Months	6 Months	6 Months	
1	2		I[st] Professional examination (during 2[nd]semester)
3	4	5	II[nd] Professional examination (during 5[th] semester)
6	7		III[rd] Professional Part I examination (during 7[th] semester)
8	9		III[rd] Professional Part II (Final Professional) (during 9[th] semester)

(a) Passing in I[st] Professional examination is compulsory before proceeding to Phase II training.

(b) A student who fails in the II[nd] Professional examination, shall not be allowed to appear for III[rd] Professional Part I examination unless he/she passes all subjects of II[nd] Professional examination.

(c) Passing in III[rd] Professional (Part I) is compulsory for being eligible for III[rd] Professional (Part II) examination.

During third to ninth semesters, clinical postings of three hours duration daily as specified is suggested for various departments, after introductory course in Clinical Methods in Medicine and Surgery of two weeks each for the whole class.

9. ACADEMICTERMS

First M.B.B.S
Part-I & Part II - 1[st] August to June 15[th]

10. CUT OFFDATES

As decided by the appropriate bodies from time to time.

11. EXAMINATIONDATE

There shall be two sessions of University examinations in an academic year, viz., June and December.

12. WORKING DAYS IN AN ACADEMICYEAR

Each academic year shall consist of not less than 240 working days.

13. ATTENDANCE REQUIRED FOR ADMISSION TO EXAMINATION

(a) No candidate shall be permitted to any one of the parts of MBBS Examinations unless he/she attended the course in the subject for the prescribed period and produces the necessary certificate of study, attendance and progress from the Head of the Institution.

(b) A candidate is required to put in minimum 75% of attendance in a subject for appearing in the examination, inclusive of attendance in non-lectures teaching, i.e. seminars, group discussions, tutorials, demonstrations, practicals, Hospital (Tertiary, Secondary, Primary) postings and bed side clinics, etc.

(c) A candidate lacking in the prescribed attendance and progress in any one subject in theory and practical / clinical in the first appearance shall not be permitted for admission to the university examination in that subject only.

14. MIGRATION/TRANSFER OF CANDIDATES

The Medical Council of India Regulations relating to Migration will be followed by the University as reproduced below:

(1) Migration of students from one medical college to another medical college may be granted on any genuine ground subject to the availability of vacancy in the college where migration is sought and fulfilling the other requirements laid down in the Regulations. Migration would be restricted to 5% of the sanctioned intake of the college during the year. No migration will be permitted on any ground from one medical college to another located within the same city.

(2) Migration of students from one College to another is permissible only if both the colleges are recognized by the Central Government under section 11(2) of the Indian Medical Council Act,1956 and further subject to the condition that it shall not result in increase in the sanctioned intake capacity for the academic year concerned in respect of the receiving medical college.

(3) The applicant candidate shall be eligible to apply for migration only after qualifying in the first professional MBBS examination. Migration during clinical course of study shall not be allowed on any ground.

(4) For the purpose of migration an applicant candidate shall first obtain "No Objection Certificate" from the college where he is studying for the present and the university to which that college is affiliated and also from the college to which the migration is sought and the university to it that college is affiliated. He / She shall submit his application for migration within a period of 1 month of passing (Declaration of result of the 1st Professional MBBS examination) along with the above cited four "No Objection Certificates" to: (a) the Director of Medical Education of the State, if migration is sought from one college to another within the same State **or** (b) the Medical Council of India, if the migration is sought from one college to another located outside the State.

(5) A student who has joined another college on migration shall be eligible to appear in the IInd professional MBBS examination only after attaining the minimum attendance in that college in the subjects, lectures, seminars etc. required for appearing in the examination prescribed under Regulation 12 (1)

Note-1: The State Governments / Universities / Institutions may frame appropriate guidelines for grant of No Objection Certificate or migration, as the case may be, to the students subject to provisions of these regulations.

Note-2: Any request for migration not covered under the provisions of these Regulations shall be referred to the Medical Council of India for consideration on individual merits by the Director (Medical Education) of the State or the Head of Central Government Institution concerned. The decision taken by the Council on such requests shall be final.

Note-3: The College/Institutions shall send intimation to the Medical Council of India about the number of students admitted by them on migration within one month of their joining. It shall be open to the Council to undertake verification of the compliance of the provisions of the regulations governing migration by the Colleges at any point of time."

15. SUBMISSION OF LABORATORY RECORD NOTEBOOKS

At the time of practical/clinical examination, each candidate shall submit to the Examiners his/her laboratory notebooks duly certified by the Head of the Department as a bonafide record of work done by the candidate. The practical record shall be evaluated by the Head of the Department.

The candidate may be permitted by the Examiners to refer to the practical record book during the practical examination in the subject of Biochemistry only. No other material, handwritten, cyclostyled or printed guides is allowed for reference during the practical examinations.

In respect of failed candidates, the marks awarded for records at previous examinations will be carried over for the subsequent examination or the candidates shall have the option to improve his performance by submission of fresh records.

16. INTERNAL ASSESSMENT

1] A minimum of three written and practical examinations shall be conducted in each subject during an academic year and the average marks of three best performances shall be taken into consideration for the award of sessional marks.

2] Day to day records and logbook (including required skill certifications) should be given importance in internal assessment. Internal assessment should be based on skills and competencies. Students must have completed the required certifiable competencies and completed logbook appropriate for each phase of training to be eligible for appearing at the final university examination of that subject.

3] Learner must secure at least 50% marks of total marks (combined in theory / Practical, not less than 40% in theory and practical separately) assigned for internal assessment in a particular subject in order to be eligible for appearing at the final university examination of the subject. Internal assessment marks will not be added to university examination and reflected as a separate head of passing at the summative examination.

4] The results of Internal Assessment should be displayed on notice board within 1-2 weeks of the test. Formulate remedial measures for students who are either not able to score qualifying marks or have missed some assessment due to any reason by forming committee under the Chairmanship of Dean, Dr. D. Y. Patil Medical College, Hospital and Research Center, Pune and three more members.

There shall be one additional examination after third internal assessment (Prelim) examination as per recommendation by institutional grievance committee before the submission of IA marks sheet to University.

17. CLASSIFICATION OF SUCCESSFULCANDIDATES

A successful candidate

i. Who secures not less than 75% in the aggregate marks shall be declared to have secured, **FIRST CLASS WITH DISTINCTION'** provided he/she passes the whole examination in the FIRSTATTEMPT;

ii. Who secures not less than 65% in the aggregate marks and completes the course within the stipulated course period shall be declared to have passed the examinations in the **'FIRSTCLASS'**;

iii. Who secures above 50% marks and completes the course within the stipulated course period shall be declared to have **PASSED** the examinations

18. EXEMPTION FROM RE-EXAMINATION IN ASUBJECT

Where a candidate obtains pass marks in a subject (or) subjects but fails in other subject (s) he / she shall be exempted from reexamination in the subject (s) he / she has passed.

MAPPING OF PROGRAMME OUTCOMES [POs] AND COURSE OUTCOMES [COs] OF- II - MBBS PROGRAMMES

PROGRAMME OUTCOMES :

Programme Name: MBBS	
Programme Code: MB	
Sr. No.	By the end of the programme, the MBBS Graduate will have /be:
PO 1	Knowledge and Skills
PO 2	Planning and problem-solving abilities
PO 3	Communication
PO 4	Research Aptitude
PO 5	Professionalism and Ethics
PO 6	Leadership
PO 7	Societal Responsibilities
PO 8	Environment and Sustainability
PO 9	Lifelong Learner

Year II	
Course Code	**Course Title**
MB201	Pathology
MB202	Pharmacology and Therapeutics
MB203	Microbiology
MB204	Forensic Medicine and Toxicology

Pharmacology and Therapeutics : (MB202)		
CO No.	**At the end of the course, the learner should be able to:**	**Mapped Programme Outcomes**
202.1	Describe the pharmacokinetics and pharmacodynamics of essential and commonly used drugs	PO1,PO2,PO3, PO4,PO5,PO9
202.2	Explain indications and contraindications, drug interactions, adverse drug reactions, efficacy and safety of essential & commonly used drugs and their use in special situations such as pregnancy, lactation, infancy and old age	PO1,PO2,PO3, PO4,PO5,PO6, PO7,PO9
202.3	State the principles underlying the concept of 'essential drugs' i.e. selection of essential drugs from adequate data based on safety and efficacy as determined by clinical studies	PO1,PO2,PO3, PO4,PO5,PO6, PO7,PO9
202.4	Rational prescription writing	PO1,PO2,PO3, PO4,PO5,PO6, PO7,PO9
202.5	Identify ADR & Drug interactions	PO1,PO2,PO3, PO4,PO5,PO6, PO7,PO9
202.6	Interpret the data of experiments designed for study of effects of drugs	PO1,PO2, PO3,PO5,PO6, PO7,PO9
202.7	Critically evaluate the drug formulations	PO1,PO2,PO3, PO4,PO5,PO6, PO7,PO9

PHARMACOLOGY

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1. GOAL

The broad goal of teaching pharmacology to undergraduate students is to inculcate in them a rational and scientific basis of therapeutics for use at Primary Health Centre level and in general practice.

2. EDUCATIONAL OBJECTIVES

2.1 KNOWLEDGE

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

2.1.1 Describe the pharmacokinetics and pharmacodynamics of essential and commonly used drugs

2.1.2 List the indications, contraindications, interactions and adverse reactions of essential drugs.

2.1.3 Indicate the use of appropriate drug in a particular disease with consideration of its cost, efficacy and safety for –

- Individual needs, and
- Mass therapy under national health programmes.

2.1.4 Explain pharmacological basis of prescribing drugs in special situations such as pregnancy, lactation, infancy and old age.

2.1.5 State the principles underlying the concept of Essential Drugs'

The criteria for selection of essential drugs are:

i. Adequate data on its efficacy and safety should be available from clinical studies.

ii. It should be available in a form in which quality including, bio-availability, and stability on storage can be assured.

iii. Its choice should depend upon patter of prevalent disease; availability of facility and trained personnel; financial resources; genetic, demographic and environmental factors.

iv. In case of two or more similar drugs, choice should be made on the basis of relative efficacy, safety, quality, price and availability. Cost benefit ratio should be a major consideration.

v. Choice may also be influenced by comparative pharmacokinetic properties and local facilities for manufacture and storage.

vi. Most essential drugs should be single compounds. Fix ratio combination product should be included only when dosage of each ingredient meets the requirements of defined population group, and when combination has a proven advantage.

vii. Selection of essential drug should be a continuous process, which should take into account the changing priorities for public health action, epidemiological conditions as well as availability of better drugs/ formulation and progress in pharmacological knowledge.

2.2 SKILLS

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

2.2.1 Prescribe drugs for common ailments.

2.2.2 Identify adverse reactions and interactions of essential drugs.

2.2.3 Interpret the data of experiments designed for the study of effects of drugs.

2.2.4 Scan information on common pharmaceutical preparations and critically evaluate the drug formulations.

2.2.5 Be well conversant with the principles of pharmacy and pharmaceutical preparations.

2.3 INTEGRATION

Practical knowledge of rational use of drugs in clinical practice will be acquired through integrated teaching vertically with pre-clinical & clinical subjects and horizontally with other para-clinical subjects.

3. DURATION OF PARA-CLINICAL TEACHING

3.1 Semesters : III, IV, V

3.2 Teaching days : 360 per batch

3.3 Teaching hours : 300 per batch

4. SYLLABUS :

4.1 LEARNING METHODS

Lectures, tutorials, practicals, case studies, group discussions, seminars, integrated Teaching.

Distribution of Teaching Hours:

4.1.1 **Theory**

- Lectures - 108 ± 7
- Case studies, group discussions & seminars - 12 ± 5

Total - 120 ± 12

4.1.2 **PRACTICALS & TUTORIALS - 120 ± 5**

4.1.3 **REVISION & EVALUATION (Internal Assessment) - 60**

4.2 SEQUENTIAL ORGANISATION OF CONTENTS

The students are expected to study the drugs as given below:

(a) Essential Drugs that must be known	(b) Other Drugs that must be known	(c) Drugs that may be mainly required to be known for solving MCQs
• Pharmacokinetics • Dosage schedule • Pharmacodynamics • Indications (Uses) • Contraindications • Drug interactions • Adverse effects	• Mechanism of action • Therapeutic Uses • Important Adverse Effects (without dosage schedule, contraindications, drug interactions)	• Classification of drugs

A) INTRODUCTION:

PHARMACOLOGY – (N=3)

- **A FOUNDATION TO CLINICAL PRACTICE** (n=1)
    - Development of the branch of pharmacology; Scope of the subject; role of drugs as one of the modalities to treat diseases,
    - Definition of drug;
    - Nature and sources of drugs;
    - Subdivisions of pharmacology
    - Rational pharmacotherapy
- **DRUG DEVELOPMENT** (n=1)
- **DRUG ASSAYS** (n=1)

B) GENERAL PHARMACOLOGY: (N=11 ± 2)

- Pharmacokinetics: Absorption, Distribution, Biotransformation, and Elimination (n=5) Pharmacodynamics: Principles of drug action, Mechanisms of drug action.
- Receptors (Nature, Types, Theories, Regulation) (n=1)
- Application to pharmacotherapeutics: Relevance of Pharmacokinetics & dynamics in clinical practice, Sequelae of repeated administration of drug (n=2)
- Factors modifying drug action (n=1)
- Adverse Drug Reactions (n=2)

C) AUTONOMIC PHARMACOLOGY: (N= 9 ± 2)

- General Considerations (n=1)
- Adrenergic agonists (n=2)

Adrenaline, Isoprenaline, Ephedrine, Dopamine Phenylephrine, Xylometazoline, Isoxsuprine	Dobutamine, Mephenteramine, Ritodrine.	Noradrenaline, Oxymetazoline, Amphetamine, Fenfluramine, Methoxamine.

- Adrenergic antagonists (n=2)

Prazosin, Propranolol, Timolol, Atenolol	Metoprolol	Phentolamine, Acebutalol, Labetalol

- Cholinergic agonists & Anticholinesterases (n=2)

Pilocarpine, Neostigmine, Physostigmine, Pyridostigmine, Pralidoxime.	Acetylcholine, Bethanechol, Edrophonium.	Methacholine, Carbachol, DFP, Tik 20, Soman, Propoxur, Echothiophate, Tabun, Sarin, Parathion, Malathion.

- Antimuscarinic drugs (n=1)

Atropine, Hyoscine butyl bromide, Homatropine, Ipratropium bromide, Tropicamide, Dicyclomine, Biperidine.	Glycopyrrolate, Pirenzepine, Benzhexol, Benztropine.	Cyclopentolate, Propantheline.

- Skeletal muscle relaxants (n=1)

Succinylcholine, Vecuronium, Alcuronium, Pancuronium, Atracurium,	d-Tubocurarine	Dantrolene, Baclofen

D) CARDIOVASCULAR SYSTEM INCLUDING DRUGS AFFECTING

COAGULATION AND THOSE ACTING ON KIDNEYS: (N=13 ± 2)

- General Considerations & overview of antihypertensive therapy (n=1)
- Diuretics (n=2)

Frusemide, Hydrochlorothiazide, Acetazolamide, Mannitol Spironolactone,	Chlorthalidone,	Triamterene Amiloride.

- Angiotensin Converting Enzyme (ACE) inhibitor & A II antagonists (n=1)

Enalapril	Captopril	Ramipril, Lisinopril, Losartan

- Sympatholytics & vasodilators (n=1)

Methyldopa, Hydralazine, Sodium Nitroprusside.	Clonidine	Reserpine, Minoxidil

- Antianginal Drugs (n=1)

Glyceryl Trinitrate, Isosorbide-5-Mononitrate, Isosorbide dinitrate		Nicorandil

- Drugs affecting coagulation / thrombosis / bleeding (n=2) Coagulants

Vit. K (Phytomenadione), Factor VIII conc.& Factor IX complex		

- Anticoagulants, Thrombolytics & Antiplatelet Agents

Heparin, Warfarin, Acenocumarol, Streptokinase.	Urokinase	Alteplase, Ticlopidine, Dipyridamol.

- Drugs for CCF: Digitalis glycosides & Other agents (n=1)

Digoxin		Amrinone, Milrinone.

- Antiarrhythmic Agents (n=1)

Quinidine, Procainamide, Mexiletin, Amiodarone		

- Agents used for the management of shock (n=1)
- Plasma expanders, water and electrolyte balance (I.V Fluids)

Albumin, Dextran-70, polygelene, Glucose, Glucose + NaCl, Ringer Lactate, NaCl, KCL, Intraperitoneal Dialysis soln.	P.V.P.	

- Hypolipidaemic drugs (n=1)

Lovastatin	Cholestyramine, Clofibrate, Probucol, Nicotinic Acid	

E) HAEMATINICS AND HAEMATOPOIETIC FACTORS: (N=1)

Agents used in the therapy of iron deficiency and megaloblastic anaemia

Ferrous salt, Folic acid Ferrous salt + Folic acid, Folinic Acid, Iron Dextran	Iron Sorbitol Citric Acid	

F) DRUGS AFFECTING C.N.S. (N=15 ± 2)

- Sedative-Hypnotics (n=1)

Diazepam, Clonazepam, Phenobarbitone, Chloral hydrate.	Alprazolam	Lorazepam

- Psychopharmacology: (n=3)
- Antianxiety & Antimanic

Lithium		Buspirone

- Antipsychotics:

Chlorpromazine, Flufenazine, Haloperidol.		

- Antidepressants:

Amitriptyline, Imipramine, Clomipramine, Fluoxetine,		Citalopram, Sertraline

- Antiepileptics (n=2)

Carbamazepine, Sodium Valproate, Phenytoin Sodium		Ethosuximide,

- Anti-Parkinsonian agents (n=1)

Levodopa-Carbidopa, Trihexiphenidyl	Selegiline	Bromocriptine, Amantadine

- Local anaesthetics (n=1)

Lignocaine, Bupivacaine, Lignocaine + Adrenaline, Tetracaine.	Procaine	

- General anaesthetics (n=1)

Thiopental Sodium, Ether, Halothane, Ketamine, Nitrous Oxide	Isoflurane, Fentanyl	Lorazepam, Propofol

- Analgesics: (n=3)
  Opioids & NSAIDs:

Morphine, Pethidine, Codeine, Naloxone, Pentazocine		Methadone, Naltrexone
Acetyl Salicylic Acid, Ibuprofen, Paracetamol, Diclofenac,	Piroxicam, Ketorolac, Nimesulide	Flurbiprofen, Celecoxib

- Pharmacotherapy of rheumatoid arthritis and gout (n=1)

Allopurinol, Colchicine,	Probenecid	d-penicillamine

- Substance abuse:Management of opioid, alcohol& to bacco addictions n=1
- Alcohol (n=1)

Ethyl Alcohol (70 %)		Disulfiram

G) MISCELLANEOUS TOPICS - I: (N=7 ± 2)
Autacoids (to be covered before pain lectures)

- Drug treatment of migraine (n=1)
- Ergot, serotonin. (n=1)

Ergotamine, Dihydroegotamine, Methyl ergometrine	Ondansetron, Sumatriptan	Cyproheptadine

- Antihistaminics (n=1)

Chlorpheniramine, Promethazine, Pheniramine	Loratadine, Cetirizine, Diphenhydramine	Meclizine, Cyclizine, Cinnarizine.

- Drugs acting on the uterus (n=1)

Oxytocin		Ethacridine, Magnesium

DRUGS ACTING ON IMMUNE SYSTEM:

- Immunostimulants, immunosuppressants; pharmacology of vaccines & sera (n=1)

Cyclosporine Tuberculin purified protein derivative **Vaccines-** Typhoid (TAB), Pertussis, Meningococcal, Influenza, B.C.G., A.R.V. (Semple), Hepatitis B, O.P.V., Mumps, Measles, Rubella, Tetanus toxoid, D.P.T. **Immunoglobulin** Anti tetanus Ig, Rabies Ig, Anti-D-Ig, Ig Human Normal, Anti Snake Venom, Diphtheria Anti toxin,	P.C.E.V. H.D.C.V.	M.M.R. P.V.R.V I.P.V (Salk's Vaccine) Hepatitis A Typhoid-Ty 21a Anti Gas Gangrene Serum

RESPIRATORY SYSTEM

- Drugs used for bronchial asthma (n=1)

Salbutamol, Terbutaline, Aminophylline, Theophylline, Sodium Cromoglycate, Beclomethasone		Leukotriene Inhibitors (Zafirlukast, Montelukast), Salmeterol, Budesonide

- Pharmacotherapy of cough (n=1)

Dextromethorphan,	Ammonium Salts, Bromhexine	Ambroxol, Acetylcystine, Codeine

- Therapeutic Gases
  Oxygen

H) CHEMOTHERAPY INCLUDING CANCER CHEMOTHERAPY: (N=21 ± 2)

- General considerations (n=2)
- Antimicrobial agents (n=8)
- Sulphonamides & Cotrimoxazole

Sulfadiazine, Sulfacetamide, Silver Sulfadiazine, Trimethoprim, Cotrimoxazole	Sulfamethoxazole	Sufadoxine

- Quinolone derivatives

Nalidixic Acid, Ciprofloxacin, Ofloxacin, Norfloxacin, Levofloxacin		Pefloxacin, Gatifloxacin, Sparfloxacin

- Lactams Penicillins

Benzyl penicillin, Benzathine penicillin G, Phenoxy methyl penicillin, Procaine penicillin G, Cloxacillin, Ampicillin Amoxycillin, Amoxycillin + Clavulanic Acid.	Carbenicillin, Methicillin, Sulbactum	Mecillinam, Ticarcillin, Piperacillin, Mezlocillin.

- Cephalosporins

Ceftazidime, Ceftriaxone, Cephalexin	Cefotaxime, Cefadroxil.	Cefepime. Other □- Lactams (Imipenem + Cilastatin),

- Aminoglycosides

Streptomycin, Gentamicin, Kanamycin, Amikacin, Neomycin, Framycetin Neomycin + Bacitracin		

- Macrolides

Erythromycin	Roxithromycin, Azithromycin, Clarithromycin	Miscellaneous Antibiotics Clindamycin, Vancomycin

- Tetracyclines & Chloramphenicol

Tetracycline, Doxycycline, Chloramphenicol		Minocycline, Demeclocycline.

Urinary antiseptics		Nitrofurantoin, Methanamine

- Anti-Tuberculosis agents; Anti-leprotic agents (n=3)

Isoniazid (H), Rifampicin (R), Pyrazinamide (Z), Ethambutol (E), H+ E, H+ R, H + R + Z, H + R + Z + E		Rifabutin, Thiacetazone + Isoniazid Ethionamide
Dapsone, Clofazimine		Minocycline

- Antiprotozoal agents: (n=3)
  Antiamoebic & Other antiprotozoal

Metronidazole, Diloxanide furoate, Tinidazole, Furazolidone,	Sodium Stibogluconate, Pentamidine	Secnidazole

- Antimalarials

Chloroquine, Mefloquine, Quinine, Primaquine, Pyrimethamine+Sufadoxine	Artemether, Artesunate, Artesunate + Lumifantrine	Proguanil, Halofantrine.

- Anthelmintics (n=1)

Mebendazole, Albendazole, Pyrantel pamoate, Diethylcarbamazine, Niclosamide, Praziquantel		Thiabendazole, Ivermectin, Levamisole, Piperazine.

- Antifungal agents (n=1)

Amphotericin-B, Nystatin, Griseofulvin, Ketoconazole, Miconazole, Fluconazole, Flucytosine		Tolnaftate

- Antiviral agents including antiretroviral agents (n=1)

Acyclovir, Zidovudine, Idoxuridine	Didanosine	Lamuvidine, Abacavir, Nevirapine, Ritonavir, Indanavir, Saquinavir, Nelfinavir, Efavirenz, Lopinavir + ritonavir, Interferon

- Pharmacotherapy of STDs (n=1)
- Principles of cancer chemotherapy and their adverse drug reactions (n=1) (individual agents and regimes need not be taught)

	Cyclophosphamide, Methotrexate, Vincristine, Vinblastine, Actinomycin D	Mechlorethamine, Chlorambucil, Melphalan, Dacarbazine, 6-Mercaptopurine, Azathioprine, Flurouracil, Cytosine arabinocide, Etoposide, Doxorubicin, Daunorubicin, Bleomycin, Procarbazine, Mitomycin C, Cisplatin, L- Asparginase.

I) ENDOCRINOLOGY: (N=11 ± 2)

- Corticosteroids (n=2)

Hydrocortisone, Hydrocortisone sodium succinate, Prednisolone, Methyl-prednisolone, Dexamethasone, Betamethasone, Fludrocortisone.		

- Oestrogens & its antagonists (n=1)

Ethinyl-estradiol, Centchroman, Tamoxifen.	Stilbestrol	

- Progestins & their antagonists (n=1)

Medroxyprogesterone acetate, Norethisterone enanthate, Norethisterone, Levonorgestrel		Norgestrel

- Contraceptives & Ovulation inducing agents (n=1)

Ethinyl-estradiol +Levonorgestrel, Ethinyl-estradiol+Norethisterone, Ethinyl-estradiol + Norgestrel, I.U.C.D with Copper		Clomiphene Citrate

- Testosterone & anabolic steroids (n=1)

Testosterone propionate, Danazol		Nandrolone, Finasteride

Thyroid

- Thyroxine and antithyroid agents (n=2)

Levothyoxine, Propylthiouracil, Carbamezole, Potassium iodide, Iodine,		Methimazole, Radioactive iodine

- Agents affecting calcium balance (n=1)

D_3 (Ergocalciferol), Calcium Salt,		Calcitonin

ANTIDIABETIC AGENTS:

- Insulin; Oral antidiabetic drugs (n=2)

Insulin Injection, Lente/NPH Insulin, Gliben-clamide, Met-formin		New Preparations (Insulin), Chlorpropamide, Acarbose, Ripaglinide, Roglitazone

J) AGENTS USED IN GASTROINTESTINAL DISORDERS:(N=5 ± 1)

- Pharmacotherapy of nausea & vomiting (n=1)

Metoclopramide, Domperidone, Prochlorperazine,		Ondansetron, Cisapride, Ipecacuanha

- Pharmacotherapy of peptic ulcer (n=2)

Cimetidine, Ranitidine, Aluminum hydroxide + Magnesium hydroxide	Omeprazole, Sucralfate, Misoprostol	Colloidal Bismuth, Carbenoxolone Sodium

Anti-haemorrhoidal agents- (Local anaesthetic, Astringent & Anti-inflammatory)

Management of Diarrhea and Constipation (n=2)

- Antidiarrheal

O.R.S, Sodium hydrogen carbonate, Sulfasalazine, 5-Amino Salicylic acid, Loperamide	Diphenoxylate	

- Laxatives

Senna, Magnesium hydroxide, Bisacodyl, Ispaghula, Liquid paraffin, Castor oil		Magnesium Trisilicate, Cascara sagrada, Lactulose, DOSS

K) MISCELLANEOUS TOPICS – II (N=8 ± 1)

- Drug-Drug Interactions (n=1)
- Drug use at extremes of age, in pregnancy & in organ dysfunction (n=2)
- Use of chelating agents in heavy metal poisonings (n=1)

Dimercaprol (B.A.L.), Calcium disodium edetate, Desferrioxamine, Activated charcoal	d-Penicillamine, N- acetylcysteine.	Deferiprone

- Ocular pharmacology (n=1)
- Dermato-pharmacology (n=1)

Glycerin, Calamine, Silver nitrate, Podophyllum resin, Benzoin compound, Selenium sulfide, Coal tar, Benzoyl peroxide, Benzyl benzoate, Permethrin, Gamma benzene hexachloride		

- Diagnostic Agents

Fluorescein		

- Vitamins (n=1)

Retinol, Conc. Vit A sol., Thiamine, Riboflavin, Nicotinamide, Pyridoxine, B_{12}, Ascorbic Acid, Hydroxo-cobalamine, Vitamin B complex & Multi vitamins as per Schedule V	Vitamin E	

- Antiseptics and disinfectants (n=1)

Povidone iodine, Cetrimide, Potassium permanganate, Bleaching powder, Chlorhexidine, Glutaraldehyde, Formaldehyde, Chloroxylenol, Hydrogen Peroxide, Gentian Violet, Acriflavin +Glycerine		

L) RATIONAL PHARMACOTHERAPY: (N=4)
Prescription writing and P-drug concept
Rational Drug Use; Essential Drug List (EDL)

CRITICISM WITH REFERENCE TO FIXED DRUG COMBINATIONS (FDCS)

4.3 TERM-WISE DISTRIBUTION

I TERM

- Introduction
- General pharmacology
- Autonomic pharmacology
- Endocrinology
- **Research methodology (10 sessions in II MBBS)**
- **Communication skill (5 sessions in II MBBS)**
- **Language sessions (5 sessions in II MBBS)**

II TERM

Chemotherapy
Central Nervous System

III TERM

Agents used in gastro-intestinal disorders
Drugs acting on cardiovascular system including drugs affecting coagulation and those acting on the kidneys
MISCELLANEOUS (including RS.)

BIO-ETHICS IN UNDERGRADUATE MEDICAL CURRICULUM (4 +10)

Sr. No.	Theory Topic	Department	Hours
1	Informed consent and assent	Pharmacology	02 Hours
2	Research Ethics	Pharmacology	02 Hours

HORIZONTAL INTEGRATED TEACHING

Sr. No.	Semester of MBBS	Topics to be covered
1	III rd Semester	1. Pyelonephritis 2. Pneumonia 3. Enteric Fever
2	IV th Semester	4. TB 5. HIV
3	Vth Semester	6. Myocardial infraction 7. Malaria

4.4 PRACTICALS & TUTORIALS: TOTAL HOURS, NUMBER AND CONTENTS

Total hours : 120
Number : 60
Contents :

I TERM PRACTICALS (N=10)

Introduction to Practical Pharmacology, animal study and drug development, Assay (Computer simulated), Effect of drug on blood pressure and respiration (Computer simulated), Neuromuscular signal transmission (Computer simulated), Mydriatic and miotics (Computer simulated), Effect of drug on ciliary motility of frogs oesophagus (Computer simulated), Study of drug antagonism (Computer simulated), Case studies: Diabetes Mellitus and Organophosphorus poisoning. Dissolution and disintegration, Introduction to Pharmacopoeia. Printed material.

- **ROUTES OF DRUG ADMINISTRATION:**
  Demonstration using mannequin-
  - Intravenous
  - Intramuscular
  - Subcutaneous
  - Intradermal
  - Inhalation
- **DIABETES MELLITUS**-
  Estimation of blood glucose level by glucometer Use of insulin pen
  Taking out insulin from a syringe into a vial

II TERM PRACTICALS (N=30)

Pharmacy: Prescription Writing, Clinical Prescription Writing, Evaluation of analgesics (Computer simulated), Clinical evaluation, Visit to pharmaceutical compony, Clinical trials, Study of drug utilisation pattern in hospitals, Case studies: Methanol poisoning, with standard prescription, Printed material

III TERM PRACTICALS (N=20)

Effect of nitrate on volunteers, Problem solving, Adverse Drug Reactions, Comments on the FDCs, Case studies: - Bronchial Asthma, Hypertension, Diarrhoea, Anaemia, Skin, Drug interaction - book information, Printed material. The journal should be scrutinized by the teacher concerned and presented during university examination.

4.5 BOOKS RECOMMENDED

4.5.1. Pharmacology & Pharmacotherapeutics. Satoskar R.S., Bhandarkar SD (Ed), Publisher: Popular Prakashan, Bombay.

4.5.2 Essentials of Medical Pharmacology. Tripathi K.D. (Ed), Jaypee Brothers, publisher: Medical Publishers (P) Ltd.

4.5.3 Clinical Pharmacology. Laurence DR, Bennet PN, Brown MJ (Ed). Publisher: Churchill Livingstone

4.6 REFERENCE BOOKS :

4.6.1 Basic & Clinical Pharmacology. Katzung BG (Ed), Publisher: Prentice Hall International Ltd., London

4.6.2 Goodman & Gilman's The Pharmacological Basis of Therapeutics. Hardman JG & Limbird LE (Ed), Publisher: McGraw-Hill, New York

4.6.3 Pharmacology: H. P. Rang, M. M. Dale, J.M. Ritter publisher: Churchill Livingstone.

EVALUATION

5.1 METHODS

THEORY, PRACTICAL AND VIVA

No	Head	Total Marks
1	Theory (2 papers – 40 marks each)	80
2	Oral (Viva)	14
3	Practical	26
4	Internal Assessment (Theory-15,Practicals - 15)	30
	Total	**150**

Passing : A candidate must obtain 50% in aggregate with a minimum of 50% in theory + orals, 50 % in practicals.

5.2 UNIVERSITY PATTERN OF EXAMINATION(Theory Examination)

Time Allowed: - 2.00 Hours For Each Paper

				Marks	**Total**
Paper I	SECTION A	Question 1	One Sentence Answer Questions(8 out of 10)	8x1=08	22
		Question 2	Long Answer Questions (2out of 3)	7x2=14	
	SECTION B	Question 3	Short Answer Questions (6 out of 8)	6x3=18	18
				Total=	**40**
	SECTION A	Question 1	One Sentence Answer Questions (8 out of 10)	8x1=08	22
		Question 2	Long Answer Questions (2 out of 3)	7x2=14	
Paper II	SECTION B	Question 3	Short Answer Questions (6 out of 8)	6x3=18	18
				Total =	**40**

5.3 TOPIC DISTRIBUTION

PHARMACOLOGY PAPER I - includes General Pharmacology including drug-drug interactions; Autonomic Nervous System, Cardiovascular System including drugs affecting Coagulation and those acting on the Kidneys; Haematinics; Agents used in Gastro-Intestinal Disorders; Ocular pharmacology; Drug use at extremes of age, in pregnancy & in organ dysfunction; Diagnostic & Chelating agents; Environmental & Occupational Pollutants; Vitamins.

PHARMACOLOGY PAPER II - includes Neuro-Psychiatric Pharmacology including Anti-inflammatory - Analgesics and Addiction & its management; Pharmacology in Surgery (particularly peri-operative management); Chemotherapy including Cancer Chemotherapy; Endocrinology; Dermatology; Miscellaneous Topics I (Lipid-derived autacoids; Nitric Oxide; Allergy - Histaminics & Anti-histaminics including anti-vertigo; Anti Asthmatics; Anti-tussive agents; Immunomodulators; Vaccines & sera; Drugs acting on the uterus)

5.4 MARKING SCHEME

Each paper of 40 marks as shown in the above table.

5.5 NATURE OF PRACTICALS AND DURATION

Practical Heads	**26 Marks**
i) Prescription writing One Long (5) One Short (2)	7 Marks
ii) Criticism Prescription & rewriting the wrong prescription (3) Fixed dose formulation (3)	6 Marks
iii) Clinical Pharmacy	5 Marks
iv) Spots (8 nos.)	8 Marks

5.6 VIVA: DURATION AND TOPIC DISTRIBUTION

Pharmacology Viva Total Marks - 14, distributed as follows:

Viva I- 7 Marks. Two examiners will examine each candidate covering topics of **t**he theory paper I.

Viva II- 7 Marks. Two examiners will examine each candidate covering topics of **t**he theory paper II.

5.7 PLAN FOR INTERNAL ASSESSMENT

Marks for Internal Assessment:

Theory: 15

Practical: 15

Pattern for computation of 'Internal Assessment' in the subject of Pharmacology. (Applicable to the batch joining in June 2004)

THEORY:

Internal Assessment shall be computed on the basis of three term ending examinations (Two terminal & one preliminary examination before the university examination).

Examination	No. of papers	Pattern	Duration of each paper	Total marks
1ST TERMINAL	One-50 Marks	MCQs – 28 (14 Marks) SAQs–10/12 (20 Marks) LAQs-2/3 (16 Marks)	2 Hours 30 Minutes	50
2ND TERMINAL	One-50 Marks	MCQs – 28 (14 Marks) SAQs–10/12 (20 Marks) LAQs-2/3 (16 Marks)	2 Hours 30 Minutes	50
PRELIMINARY (As per final University pattern)	Two- 40 Marks each	MCQs – 28 (14 Marks) SAQs–6/7 (12 Marks) LAQs-2/3 (14 Marks) (Total–40 Marks paper)	2 Hours each paper	80
			Total	**180**

Final internal assessment in THEORY shall be computed on the basis of actual marks obtained out of 180, reduced to marks out of 15.

PRACTICAL:

Internal assessment of PRACTICALS shall be computed on the basis of three term ending examination and marks allotted to practical Journal.

Examination	Pattern	Marks	Total
1ST TERMINAL	Viva Spots	30 10	40
2ND TERMINAL	Viva Spots Clinical Pharmacy Prescription writing	20 10 5 5	40
PRELIMINARY EXAM (As per University pattern)	Viva Prescription writing Criticism Clinical Pharmacy Spots	14 7 6 5 8	40
		Total	**120**

Actual marks obtained out of 120 shall be reduced to out of 12. Add marks obtained out of 3 for Practical Journal.

Total internal assessment marks for Practical shall be out of (12+3) 15.

Total Internal Assessment:

Theory 15
Practical 15
Total 30