Rajiv Gandhi University of Health Sciences,
Karnataka, Bangalore

The Emblem

The Emblem of the Rajiv Gandhi University of Health Sciences is a symbolic expression of the confluence of both Eastern and Western Health Sciences. A central wand with entwined snakes symbolises Greek and Roman Gods of Health called Hermis and Mercury is adapted as symbol of modern medical science. The pot above depicts Amrutha Kalasham of Dhanvanthri the father of all Health Sciences. The wings above it depicts Human Soul called Hamsa (Swan) in Indian philosophy. The rising Sun at the top symbolises knowledge and enlightenment. The two twigs of leaves in western philosophy symbolises Olive branches, which is an expression of Peace, Love and Harmony. In Hindu Philosophy it depicts the Vanaspathi (also called as Oushadi) held in the hands of Dhanvanthri, which are the source of all Medicines. The lamp at the bottom depicts human energy (kundalini). The script “Devahitham Yadayahu” inside the lamp is taken from Upanishath Shanth i Manthram (Bhadram Karnebh i Shrunuyanadev…), which says “May we live the full span of our lives allotted by God in perfect health” which is the motto of the Rajiv Gandhi University of Health Sciences.

Revised Ordinance Governing Regulations and Curriculum of

**HOMOEOPATHY DEGREE B.H.M.S. COURSE**

**2015**

In conformity with

**Homoeopathy (Degree Course) B.H.M.S. Regulations, 1983**

**(as Amended upto March, 2016)**

of

Central Council of Homoeopathy, New Delhi

**RAJIV GANDHI UNIVERSITY OF HEALTH SCIENCES, KARNATAKA**

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**Section – I: INTRODUCTION**

Basic objectives of education and training in a Homoeopathic institution is to prepare a competent Homoeopathic Physician, who is capable of functioning independently and effectively in Rural and Urban set up.

**a. Sound Foundation**

To function effectively as a Homoeopathic physician, a thorough grasp over the medical concepts is imperative. For this, the educational process shall be perceived as an integrated evolving process and not merely as an acquisition of a large number of disjointed facts.

A student shall have to pass through a training procedure, which encompasses the above, right from I BHMS to IV BHMS and also during the internship period. He / She shall undergo an education process wherein learning of Facts and Concepts right from I Year are in continuity, in an evolutionary and progressive pattern. In I BHMS, students shall study the fundamental principles of Homoeopathy and will also learn more of applied anatomy than a multitude of minor anatomical details.

In II BHMS, a student shall be exposed to very vital concepts of susceptibility and symptomatology with Analysis-Evaluation and details of the Homoeopathic concepts and logic of Homoeopathy. These will attain much deeper significance (if care is taken by teachers of Pathology and Organon-Philosophy) when the current knowledge of Inflammation, Immunity, is correlated well with the concepts of susceptibility.

In III BHMS, there is opportunity to fortify the foundation at the best by correlating between theory of Chronic diseases and the Patho-Physiological facts of Gynecology, Surgery and Medicine. A student shall have to be taught the spectrums of various diseases in correlation with the spectrum of miasmatic manifestations. He will then be able to use a well-concluded evaluation order of Characteristics to derive an Operationally valid Repertorial Totality.

The Knowledge gathered in this pattern will keep him constantly aware of his objectives and his role as a Homoeopathic Physician. The integration will eliminate the state of confusion. The Therapeutic actions then will be right and complete, utilizing the full repertories of the Medicinal and Non-medicinal measures, keeping him up-to-date about all fresh scientific developments and inculcating values of Continuous Medical Education.

**b. Execution**

Maximum emphasis shall be placed on the applied aspects of all the subjects. Thus teachings of Anatomy, Physiology and Biochemistry will demand greater emphasis on applied aspects. Teaching of Pathology will demand sharp focus on General Pathology, while Regional Pathology will come up as an application. It shall require correlation with Medicine, Surgery and Gynecology.

All these need to be studied from Homoeopathic perspectives, with emphasis on applied aspects of Organon Philosophy & Homoeopathic Therapeutics, representing application to all other subjects.

**c. Inter-Departmental Co-ordination**

Essentially, the entire approach becomes integrated. All departments shall develop a cohesive well-defined programme of inter-departmental co-ordination.

It is therefore desirable to have teaching programmes wherein, by rotation each department participates in the teaching, co-ordinating well with the other faculties with constant updating and evaluation. This will ensure fundamental and exceptional clarity.

**d. Deductive-Inductive Teachings**

While teaching, there shall be balance in designing deductive and inductive process in mind. There shall be less emphasis on didactic lectures. Major portion of the time of the students shall be devoted to demonstrations, group discussions, seminars and clinics. Every attempt shall be made to encourage students to participate in all these to develop his personality, character, expressions and to ensure rapid grasp over the concepts.

**e. Patient Oriented Teachings**

In order to impart the integrated medical education, PATIENT has to be the Centre of learning.

Importance of social factors in relation to the problem of health and disease, shall receive proper emphasis throughout the course and to achieve this objective, the educational process shall be community as well as hospital based.

Based on the above concepts, the course of studies as laid down in these Regulations will help to fulfill these needs. While doing so, the need of the hour, past experience in learning and teaching is taken into consideration.

**Section – II: GOALS**

1. The curriculum should enable the students to play the role of a competent Homoeopathic Physician and fulfill the responsibilities of a medical graduate in both rural and urban environment confidently and effectively.

2. Emphasis in the course should be to demonstrate to the students:

Application of Homoeopathic principles.

Scope and limitations of Homoeopathy.

Role of Homoeopathy in the present and future context.

Skills in clinical diagnosis.

Techniques of individualization.

Evolution of constitutional totality.

Miasmatic analysis of the patient.

1. Teaching programme should be an integrated one, avoiding compartmentalization of disciplines. The teaching of clinical subjects, Para-clinical subjects and pre clinical subjects should be done with a Homoeopathic perspective and need. All the departments should jointly develop a teaching programme so that the students are presented with an integrated and cohesive knowledge and skills both vertically and horizontally. A uniform method of clinical approach that blends the tenets of Homoeopathy and contemporary developments in the field of medicine to meet the requirements of effective Homoeopathic practice should be evolved and adopted by all the clinical departments.
2. The educational experience should provide community orientation in addition to mere hospital orientation. The scope of Genus epidemicus should be fully tapped in the field of preventive medicine.
3. Every effort should be made to use learner-oriented methods that encourages cultivation of the values like logical thinking, clarity of expression and action, independence of judgment, scientific habits, problem-solving abilities, self-initiated and self-directed learning, purity of purpose and other necessary values.
4. Reduction of theoretical and class-room lectures and increasing use of the methods of active learning like group discussions, seminars, role modeling, field visits, clinical case-demonstration etc. should be attempted by all departments to develop the inter-personal and communicative skills and to provide an integrated learning.
5. As education without character and discipline is futile, more so in the field of medicine, educational institution should also be a center for character building than a mere center for learning. Examination should be an avenue not merely to assess the student's extent and depth of knowledge and skills but also to assess his dedication, integrity, habits, behavior, values and other essential expressions of affective domain.
6. Regular periodic internal assessment of the student should be done throughout the course. It should not be limited to written tests. Maintenance of records, participation in seminars and group discussions, clinical case study, participation in other projects and assignments should also have a bearing on the internal assessment. These may be evaluated objectively.
7. Teachers shall expand their role from mere imparting of knowledge to that of facilitator, motivator and role model for students learning and practice during the entire course.
8. Every institution shall have a medical education unit (cell) for faculty development, preparation of learning resource materials, evolving standardized techniques in teaching, case-study, methods of prescription, potency selection, repetition procedures, evaluation of teaching methods etc.
9. Students should be taught to appreciate the scope of other systems of medicine and utilize this knowledge for the optimal benefit of human being, sick or well person.
10. The educational experience should result in appreciation of the effects of social, psychological, cultural, economical and environmental factors on health and resolution of these with a human concern.
11. The curriculum should create an interest in the student for continuous learning, updating the knowledge and indulge in research. He/she should be open to all developments in the field of medicine and accept them after critical analysis and adopt them for furthering his/her professional competence.
12. The teaching programme should facilitate the development of personal characteristics and attitude acquired for professional life such as personal integrity, sense of responsibility and dependability and ability to relate to or show concern for other individuals and society.

**Section – III: OBJECTIVES**

The goals of BHMS course have been stated in Section II. In this Section the general objectives are given. It is desired that in consonance with the goals and objectives, each medical college should evolve institutional objectives.

At the end of undergraduate programme, the medical students shall:

1. a. Be competent in diagnosis and management of common health problems of individual and the community.
2. b. Be competent to practice promotive, preventive, curative and rehabilitative medicine in respect to the commonly encountered health problems.
3. c. Be able to appreciate the social-psychological, cultural, economic and environmental factors affecting health and disease.
4. d. Develop humane attitude towards the discharging of one's professional responsibilities.
5. e. Possess the attitude for continued self-learning and to seek further expertise or to pursue research in any chosen area of medicine.
	1. f. Be familiar with the basic factors which are essential for the implementation of the National Health Programmes including practical aspects of the following:
	2. i. Family Welfare and Maternal and Child Health (MCH)
	3. ii. Sanitation and water supply
	4. iii. Prevention and control of communicable and non-communicable diseases
	5. iv. Immunization
	6. v. Health education
	7. vi. National Health Mission.
6. g. Acquire basic management skill in the area of human resources, materials and resources management related to health care delivery.
7. h. Be able to identify community health problems and learn to work to resolve these by designing and instituting corrective steps and evaluating outcome of such measures.
8. i. Be able to work as a leading partner in health care teams and acquire proficiency in communication skills.
9. j. Be competent to work in a variety of health care settings commensurate with his/her position as a member of the health team at the primary, secondary or tertiary levels, using his/her clinical skills.
10. k. Have personal characteristics and attitude for professional life such as personal integrity, sense of responsibility and dependability and ability to relate to or show concern for other individuals.

**Section – IV: REGULATIONS**

1. **Eligibility for Admission:**

1. A candidate must have passed the two year Pre-University examination conducted by Department of Pre-university Education, Karnataka State or any other examination recognized as equivalent thereto with English as one of the languages and Physics, Chemistry and Biology as optional subjects, provided the candidate has passed in Physics, Chemistry and Biology subjects individually to be eligible for admission to I BHMS Course.
2. A candidate who has passed the B.Sc. Part-I degree examination of any University in India or recognized as equivalent thereto with the following science subjects namely Chemistry, Botany & Zoology is eligible for admission to I BHMS Course, provided the candidate has passed the Pre-University or equivalent examination with Physics, Chemistry, Biology as optional subjects and English as one of the languages. Note the candidate should have passed the subjects of Physics, Chemistry, Biology individually in the pre-university or its equivalent examination.
3. A candidate who has passed B.Sc. degree examination of any University in India or recognized as equivalent thereto with the following science subjects namely Chemistry, Botany and Zoology is eligible for admission to I BHMS Course provided the candidate has passed Pre-University or equivalent examination with Physics, Chemistry and Biology as optional subjects and English as one of the languages at the Pre-University or B.Sc. Part-I level. Note the candidate should have passed the subjects of Physics, Chemistry, Biology individually in the pre-university or its equivalent examination.
4. A candidate should have attained the age of 17 years on or before 31st December of the year of his / her admission.
5. A candidate to be eligible to be admitted to BHMS course shall NOT be blind (including colour blind), deaf, dumb and deaf and dumb.
6. **Criteria for selection of students:**
7. The selection of students to the college shall be based solely on merit of the candidate and for the determination of the merit, the following criteria be adopted uniformly throughout the country, namely:-
8. In States, having only one Medical college and one University or examining body conducting the competitive examinations, marks obtained at such qualifying examination shall be taken into consideration.
9. In states, having more than one University or examining body conducting the competitive examination or where there is more than one medical college under the administrative control of one authority, a competitive examination shall be held so as to achieve a uniform evaluation.
10. where there are more than one college in a state and only one University or examining board conducting the competitive examination, then a joint selection Board consisting of the Principals of all the colleges and a representative from the faculty of University or examining Body, as the case may be, shall be constituted by the state Government for all colleges to achieve a uniform method of competitive examination.
11. The central Government itself or any other agency notified by it shall conduct a competitive examination in the case of institutions of an all India character.
12. A candidate shall be eligible for the competitive examination if he has passed any of the Qualifying examinations specified under regulation 1to3.

Provided that a candidate who has appeared in the qualifying examination the result of which has not been declared, he may be provisionally permitted to take up the competitive examination and in case of selection for admission to the BHMS Degree course, he shall not be admitted to that course until he fulfills the eligibility criteria under regulation 1to 3.

**2. Course of Study**

1. The Bachelor of Homoeopathic Medicine and Surgery degree course shall comprise a course of study spread over a period of 5 ½ years including a Compulsory Rotatory Internship of one-year duration after passing the IV BHMS examinations.

I BHMS - 1 year

Note: A candidate shall be permitted to join II BHMS only if he has passed Anatomy and Physiology including Biochemistry (Carry-over facility is provided for the subject of Homoeopathic Pharmacy), for which he/she will be permitted in not more than four chances including original examination.

II BHMS - 1 year

III BHMS - 1 year

IV BHMS - 1 ½ year

INTERNSHIP - 1 year

1. As mentioned above i.e., (i) Every candidate after passing IV BHMS examination shall undergo a Compulsory Internship for a period of twelve (12) months as per the procedure laid down in these regulations.
2. On successful completion of Internship and on the recommendation of the Principalof the Homoeopathic College concerned the University shall issue degree certificates to such candidates.
3. Every candidate shall complete the course including the passing of all the examinations in all the subjects and complete the Compulsory Internship within a period of eleven years from the date of admission to I BHMS Degree Course in the college concerned, failing which his name shall be removed from the rolls of the college and consequently the University.

**3.** **Subjects & Hours of Teaching**

**First Year BHMS (Duration 1Year)**

**Table I: Subjects prescribed and distribution of teaching hours for theory and practical classes**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Sl No** | **Subject** | **Theory** | **Practical/****Tutorial/Seminar** | **Total** |
| 1 | Anatomy | 200 Hrs (including 10 hours each for histology and embryology) | 275 Hrs (including 30 hours for histology and embryology)  | **475 Hrs** |
| 2 | Physiology  | 200 Hrs. (including 50 hours for Bio-chemistry) | 275 Hrs (including 50 hours for Bio-chemistry) | **475 Hrs** |
| 3 | Homoeopathic Pharmacy | 100 Hrs | 70 Hrs | **170 Hrs** |
| 4 | Homoeopathic Materia Medica | 35Hrs | -- | **35 Hrs** |
| 5 | Organon of Medicine with Homooeopathic Philosophy | 35 Hrs( including 10 Hrs of Logic) | -- | **35 Hrs** |
|  | **TOTAL** | **570 Hrs** | **620 Hrs** | **1190Hrs** |

**Second Year BHMS (Duration 1 Year)**

**Table II: Subjects prescribed and distribution of teaching hours for theory and practical classes**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Sl No** | **Subject** | **Theoretical Lectures** **(In Hours)** | **Practical or Clinical or Tutorial or Seminar (In Hours)** | **Total** |
| 1 | Pathology  | 200 | 80 | 280 |
| 2 | Forensic Medicine and Toxicology | 80 | 40 | 120 |
| 3 | Organon of Medicine with Homoeopathic Philisophy | 160 | 60 | 220 |
| 4 | Homoeopathic Materia Medica | 160 | 60 | 220 |
| 5 | Surgery  | 80 | 60 (One term of three months in surgical ward and outpatient department) | 140 |
| 6 | Gynaecology and Obstetrics | 40 +40 = 80 | 60 (One term of three months in surgical ward and outpatient department) | 140 |
|  | **TOTAL** | **760** | **360** | **1120** |

Note: Clinical postings: Monday to Friday of 3 hrs. duration.

**Third Year BHMS (Duration 1 Year)**

**Table III: Subjects prescribed and distribution of teaching hours for theory and practical classes**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Sl No** | **Subject**  | **Theoretical lecture (in Hours)**  | **Practical or clinical or tutorial or seminar (In hours)** | **Total** |
| 1 | Surgery including ENT, Ophthalmology, dentistry & Homoeopathic Therapeutics | 100Hrs50 HrsTotal: 150Hrs | 75 Hrs ( three months clinical postings in ward and OPD | 225Hrs |
| 2 | Obstetrics and Gynaecology, Infant Care and Homoeopathic Therapeutics | 100 Hrs50 HrsTotal:150Hrs | 75 Hrs ( three months clinical postings in ward and OPD | 225Hrs |
| 3 | Homoeopathic Materia Medica | 100Hrs | 75Hrs | 175Hrs |
| 4 | Organon of Medicine | 100Hrs | 75Hrs | 175Hrs |
| 5 | Practice of Medicine and Homoeopathic Therapeutics |  50Hrs 25HrsTotal 75Hrs |  75Hrs | 150Hrs |
| 6 | Repertory  |  50Hrs |  25Hrs | 75Hrs |
| 7 | Community Medicine |  35Hrs |  15Hrs | 50Hrs |
|  | **TOTAL** | **660Hrs** | **415Hrs** | **1075Hrs** |

Note: Clinical postings: Monday to Saturday of 3 hrs duration.

**Fourth Year BHMS (Duration 1.1/2 Year)**

**Table IV: Subjects prescribed and distribution of teaching hours for theory and practical classes**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Sl No** | **Subject** | **Theoretical Lectures (in Hrs)** | **Practical or clinical or tutorial or seminar (In hours)** | **Total** |
| 1 | Practice of Medicine and Homoeopathic Therapeutics | 120Hrs60HrsTotal: 180 | 300 Hrs | 480Hrs |
| 2 | Homoeopathic Materia Medica | 180 Hrs | 110 Hrs | 290 Hrs |
| 3 | Organon Of Medicine | 180 Hrs | 110 Hrs | 290Hrs |
| 4 | Repertory | 100 Hrs | 200 Hrs | 325Hrs |
| 5 | Community Medicine | 100 Hrs | 100Hrs | 200Hrs |
|  | **Total** | **740 Hrs** | **820 Hrs** | **1560 hrs** |

Note:

1. Clinical classes in the subjects of Homoeopathic Materia Medica, Organon of Medicine, Principles of Homoeopathic Philosophy, Case taking and Repertory have to be accommodated within Surgery, Obstetrics and Gynaecology and Medical OPD /IPD postings during 2nd to 4th BHMS courses.

2. One term of three months each in outpatient department and in patient department respectively for case taking analysis, evaluation and provisional prescription just for case presentation on 10 cases per month.

**4. Attendance**

Every candidate shall have attendance of not less than 75% of the total classes conducted in theory and practicals separately in each academic year calculated from the date of commencement of the term to the last working day as notified by the university in each of the subjects prescribed to be eligible to appear for the university examination.

The Principal should notify at the college, the attendance details of all the students at the end of each term without fail under intimation to the university.

A candidate lacking in attendance and satisfactory progress in any of the subject(s) in theory or practicals / clinical in the first appearance shall not be permitted to appear for the examination in that subject(s).

Special classes, seminars, demonstrations, practicals, tutorials etc shall be arranged for the repeaters in the subject in which they have failed before they are allowed to appear in the next examination, in which attendance is compulsory.

**5. Scheme of Examination**

**Internal Assessment:**

It shall be based on evaluation of assignment, presentation of seminar, clinical presentation etc. There shall be periodical tests and internal (theory & practical) examinations in each academic year. Although the question of number of examinations is left to the institution, there should be a minimum of three Internal assessment examinations during the I, II, III and IV BHMS course and average of best of two examination marks for each year should be taken into consideration while calculating the marks of the internal assessment. Day-to-day records should be given importance in the internal assessment. Proper record of the work should be maintained, which will be the basis of internal assessment of all students and should be available for scrutiny. Assistant Professor and above or lecturer with 3 years of teaching experience in the concerned subject can conduct internal assessment examination.

Proportion of marks for Internal Assessment shall be 20% of maximum marks prescribed for university examination for each subject in theory and practical. Please see Tables V to VIII.

A student must secure at least 50% of total marks fixed for internal assessment in a particular subject in order to be eligible to appear in University Examination in that subject.

Each student appearing for I, II, III & IV BHMS shall maintain practical record/ journal comprising of 20 cases (10 short & 10 long cases) with complete processing of the case material for each examination, which shall be evaluated by the head of the department.

There shall be provision for improvement of the internal assessment of all these examinations and journal work in I, II, III & IV BHMS examinations respectively.

**Subjects:**

Subjects for study and examination for the BHMS Degree Course shall be as under namely:-

|  |  |  |  |
| --- | --- | --- | --- |
| **Sl. No** | **Name of the subject** | **Subject taught during** | **Holding of Examination** |
| 1 | Anatomy | First BHMS | At the end of first BHMS |
| 2 | Physiology | First BHMS | At the end of first BHMS |
| 3 | Homoeopathic Pharmacy | First BHMS | At the end of first BHMS |
| 4 | Organon of Medicine with Homoeopathc Philosophy | First BHMS, Second BHMS, Third BHMS, Fourth BHMS | At the end of Second, Third and Fourth BHMS. |
| 5 | Homoeopathic Materia Medica | First BHMS, Second BHMS, Third BHMS, Fourth BHMS | At the end of Second, Third and Fourth BHMS. |
| 6 | Pathology | Second BHMS, | At the end of Second BHMS. |
| 7 | Forensic Medicine and Toxicology | Second BHMS, | At the end of Second BHMS. |
| 8 | Practice of Medicine | Third BHMS, and Fourth BHMS | At the end of Fourth BHMS. |
| 9 | Surgery | Second BHMS, Third BHMS. | At the end of Third BHMS. |
| 10 | Gynecology and Obstetrics | Second BHMS, Third BHMS. | At the end of Third BHMS. |
| 11 | Community Medicine | Third BHMS and Fourth BHMS | At the end of Fourth BHMS |
| 12 | Repertory | Third BHMS and Fourth BHMS | At the end of Fourth BHMS |

**6. University Examination:**

The university shall conduct two examinations annually with an interval of not less than four to six months between the two examinations.

1. **Schedule of Examination**

I BHMS -The first year BHMS examination shall be at the end of 12 months (ONE year) after admission.

II BHMS - The second year BHMS examination shall follow ONE year of course of study after the I BHMS examination

III BHMS - The third year BHMS examination shall follow ONE year of course of study after the II BHMS examination

IV BHMS - The fourth year BHMS examination shall follow ONE AND HAILF year of course of study after the III BHMS examination

All examinations shall be held as per notification issued in the calendar of events by the university from time to time.

1. **Particulars of subjects for university examination:**

The subjects, the number of theory papers, practical and viva-voce examination shall be as follows.

**I BHMS:**

1. **Anatomy including Histology and Embryology**. There shall be two theory papers. One Practical and one viva-voce examination.
2. **Physiology including Biochemistry**. There shall be two theory papers, one practical and one viva-voce examination.
3. **Homoeopathic Pharmacy**. There shall be one theory, one practical & one viva-voce examination.

**II BHMS:**

1. **Pathology and Microbiology.** There shall be two theory papers, one practical and one viva-voce examination.
2. **Forensic Medicine and Toxicology.** There shall be one theory paper, one practical and one viva-voce examination.
3. **Organon of Medicine with Homoeopathic Philosophy**. There shall be one theory paper, one practical and one viva-voce examination.
4. **Homoeopatic Materia Medica**. There shall be one theory paper, one practical and one viva-voce examination.

**III BHMS:**

1. **Organon Medicine, Principles of Homoeopathic Philosophy and Psychology**. Thereshall be one theory paper, one practical and one viva-voce examination.
2. **Surgery**. There shall be two theory papers, one practical and one vica-voce examination. The practical Examination shall consist of clinical examination and oral. In the clinical examination the students shall be **examined on his skill on the surgical instruments, bandages and general measures related to surgery, scope of** Homoeopathic therapeutics and examination and diagnosis of surgical disease through clinical examination X-ray and other common diagnostic techniques. The case studies reports of the students carried out during the course shall also be considered for the oral examination.
3. **Obstetrics & Gynaecology including infant care.** There shall be two theory papers, one practical and one viva-voce examination. The practical examination shall consist of clinical examination and oral. In the clinical examination the students shall be examined on his skill one the specimens, models, instruments and general appliances related to Obstetrics, scope of Homoeopathic therapeutics and examination and diagnosis of Gynaecological disease through clinical examination, X-ray and other common diagnostic techniques. The case studies reports of the students carried out during the course shall also be considered for the oral examination.
4. **Homoeopathic Materia Medica**. There shall be one theory paper, one bedside practical and oneviva-voce examination. The bedside examination shall be on two acute cases with special reference to their nosological diagnosis & therapeutic diagnosis from Homoeopathic point of view.

**IV BHMS:**

1. **Practice of Medicine** including Paediatrics, Psychiatry and Dermatology. There shall be two theory papers one bedside practical and one viva-voce examination. The practical examination shall consist of clinical examination and oral. In the clinical examination the students shall be examined on his skill on the nosological and therapeutic diagnosis, through clinical examination, X-ray and other common diagnostic techniques and detailed case takings on long and short cases. The case reports of the students carried out during the course shall also be considered for the oral examination.
2. **Repertory.** There shall be one theory paper, one practical and one viva-voce examination. The practical examination shall consist of the Homoeopathic principles on case taking of one long case and one short case and the methods of arriving the repotorial totality, through case analysis and actual repertorisation. The skill of finding rubries from Kent and Bonninghausam Repertories, the case reports of the students carried out during the course shall be considered for the oral examination.
3. **Homoeopathic Materia Medica.** There shall be two theory papers, one bedside practical and one viva-voce examination. The bedside examination shall be one long case and one short case with special reference to their nosological diagnosis and therapeutic diagnosis from Homoeopathic point of view. The case reports of the students carried out during the course shall be considered for the oral examination.
4. **Organon of Medicine with Homoeopathic Philosophy:-**There shall be two theory papers one practical and one viva-voce examination. The practical examination consist of two theory papers and one practical examination. The practical examination shall be on the Homoeopathic orientation of cases in relation to miasmatic diagnosis, general management, posology, second prescription etc.
5. **Community Medicine**. There shall be one theory paper, one practical and one viva-voce examination. The practical examination shall be on spotting and identification of specimen and matters related to the community oriented problems.

**7. Distribution of Marks**

a. Distribution of Marks for internal assessment is given in Tables V to VIII. Particulars of subjects, number of papers, duration and distribution of marks for the University examinations are given in Tables IX to XII.

b. Topic wise distribution of marks is theory is given in concerned subjects. These are suggestive. Some validations may occur.

**7.1. Internal Assessment:**

**Table V: - Distribution of Marks for Internal Assessment for I BHMS**

|  |  |  |  |
| --- | --- | --- | --- |
|  | **Anatomy** | **Physiology including Biochemistry** | **Homoeopathic Pharmacy** |
| **Theory Max. Marks** | **200** | **200** | **100** |
| Internal assessment | 40 | 40 | 20 |
| **Practical Max Marks** | **100** | **100** | **50** |
| Internal assessment | 20 | 20 | 10 |
| **Viva Voce Max Marks** | **100** | **100** | **50** |
| Internal assessment | 20 | 20 | 10 |

**Table VI : - Distribution of Marks for Internal Assessment for II BHMS**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **Pathology** | **Forensic Medicine and Toxicology** | **Homoeopathic Materia Medica** | **Organon with Philosophy** |
| **Theory Max. Marks** | **200** | **100** | **100** | **100** |
| Internal assessment | 40 | 20 | 20 | 20 |
| **Practical Max Marks** | **100** | **50** | **50** | **50** |
| Internal assessment | 20 | 10 | 10 | 10 |
| **Viva Voce Max Marks** | **100** | **50** | **50** | **50** |
| Internal assessment | 20 | 10 | 10 | 10 |

**Table VII : - Distribution of Marks for Internal Assessment for III BHMS**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **Surgery** | **Gynaecology and Obstetrics** | **Homoeopathic Materia Medica** | **Organon with Philosophy** |
| **Theory Max. Marks** | **200** | **200** | **100** | **100** |
| Internal assessment | 40 | 40 | 20 | 20 |
| **Practical Max Marks** | **100** | **100** | **50** | **50** |
| Internal assessment | 20 | 20 | 10 | 10 |
| **Viva Voce Max Marks** | **100** | **100** | **50** | **50** |
| Internal assessment | 20 | 20 | 10 | 10 |

**Table VIII : - Distribution of Marks for Internal Assessment for IV BHMS**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | **Practice of Medicine** | **Homoeopathic Materia Medica** | **Organon of Medicine with Philosophy** | **Repertory** | **Community Medicine** |
| **Theory Max. Marks** | **200** | **200** | **200** | **100** | **100** |
| Internal assessment | 40 | 40 | 40 | 20 | 20 |
| **Practical Max Marks** | **100** | **100** | **100** | **50** | **50** |
| Internal assessment | 20 | 20 | 20 | 10 | 10 |
| **Viva Voce Max Marks** | **100** | **100** | **100** | **50** | **50** |
| Internal assessment | 20 | 20 | 20 | 10 | 10 |

**7.2. Particulars of subjects for University examinations, number of papers, duration and distribution of marks**

**Table: IX - I BHMS Examination**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Subject** | **Written** | **Practical** | **Viva Voce** | **Total** |
|  | Full marks | Pass marks | Full marks | Pass marks | Full marks | Pass marks | Full marks | Pass marks |
| **Homoeopathic Pharmacy** | 100 | 50 | 50 | 25 | 50 | 25 | 200 | 100 |
| **Anatomy** | 200 | 100 | 100 | 50 | 100 | 50 | 400 | 200 |
| **Physiology** | 200 | 100 | 100 | 50 | 100 | 50 | 400 | 200 |

**Table: X - II BHMS Examination**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Subject** | **Written** | **Practical** | **Viva Voce** | **Total** |
|  | Full marks | Pass marks | Full marks | Pass marks | Full marks | Pass marks | Full marks | Pass marks |
| **Pathology**  | 200 | 100 | 100 | 50 | 100 | 50 | 300 | 150 |
| **Forensic Medicine and Toxicology**  | 100 | 50 | 50 | 25 | 50 | 25 | 200 | 100 |
| **Homoeopathic Materia Medica** | 100 | 50 | 50 | 25 | 50 | 25 | 200 | 100 |
| **Organon of Medicine with Homoeopathic Philosophy** | 100 | 50 | 50 | 25 | 50 | 25 | 200 | 100 |

**Table: XI - III B.H.M.S. Examination**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Subject** | **Written** | **Practical** | **Viva Voce** | **Total** |
|  | Full marks | Pass marks | Full marks | Pass marks | Full marks | Pass marks | Full marks | Pass marks |
| **Surgery**  | 200 | 100 | 100 | 50 | 100 | 50 | 400 | 200 |
| **Gynaecology and Obstetrics**  | 200 | 100 | 100 | 50 | 100 | 50 | 400 | 200 |
| **Homoeopathic Materia Medica** | 100 | 50 | 50 | 25 | 50 | 25 | 200 | 100 |
| **Organon of Medicine with Homoeopathic Philosophy** | 100 | 50 | 50 | 25 | 50 | 25 | 200 | 100 |

**Table: XII - IV BHMS examination**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Subject** | **Written** | **Practical** | **Viva Voce** | **Total** |
|  | Full marks | Pass marks | Full marks | Pass marks | Full marks | Pass marks | Full marks | Pass marks |
| **Practice of Medicine** | 200 | 100 | 100 | 50 | 100 | 50 | 400 | 200 |
| **Homoeopathic Materia Medica** | 200 | 100 | 100 | 50 | 100 | 50 | 400 | 200 |
| **Organon of Medicine with Homoeopathic Philosophy** | 200 | 100 | 50 | 25 | 50 | 25 | 300 | 150 |
| **Repertory** | 100 | 50 | 50 | 25 | 50 | 25 | 200 | 100 |
| **Community Medicine** | 100 | 50 | 50 | 25 | 50 | 25 | 200 | 100 |

**8. Eligibility for University Examination**

I BHMS - A student shall be eligible to appear for I BHMS examination provided he/she has pursued the course satisfactorily and has requisite attendance as per regulation.

II BHMS - No candidate shall be eligible to appear in II BHMS examination unless he/she has passed in the first BHMS examination in the subjects of Anatomy and Physiology including Biochemistry one year before second year examination and pass in Homoeopathic Pharmacy atleast 6 months before appearing IInd year BHMS examination and has required attendance as per regulation.

III BHMS - No candidate shall be eligible to appear in III BHMS examination unless he/she has passed in the second BHMS examination and has required attendance as per regulation.

Note:- to consider as pass in second BHMS examination, a candidate has to pass in all the subjects prescribed for the University examination. In case a candidate has failed in one or more subjects in II BHMS examination he/she shall have to pass in these failed subject(s) atleast one term (6 months) before he/she is allowed to appear in the III BHMS examination.

IV BHMS - No candidate shall be eligible to appear in IV BHMS examination unless he/she has passed in the third examination and he/she has requisite attendance as per regulation. Note:- to consider as pass in third BHMS examination, a candidate shall have to pass in all the subjects prescribed for the university examination. In case a candidate has failed in one or more subjects in third BHMS examination, he/she shall have to pass in the failed subject(s) at least one term (6 months) before he/she is allowed to appear in the IV BHMS examination.

**9.1. Criteria for pass in a subject**

A candidate to be declared as pass in any subject, shall secure separately, in Theory and Practicals / Clinicals including Viva-voce examination, not less than 50% of maximum marks prescribed for the University examination.

A candidate who has passed in a subject or subjects need not appear in that subject(s) in the subsequent examination if he/she has failed in other subject or subjects.

**9.2. Criteria for pass in I year, II year, III year and IV year BHMS examination**

To consider as pass in BHMS examination, a candidate has to pass in all the prescribed subjects of the University examination for the concerned year.

**10. Facility to keep term:**

Not withstanding with forgoing regulations, the student shall be allowed to keep term on the following conditions:

1. The candidate must pass First BHMS examination in all the subjects at least one term (6Months) before he is allowed to appear in Second year Examination provided that he has passed in the subjects of Anatomy and Physiology (including Biochemistry) examinations two terms (12 Months) before he is allowed to appear in the Second BHMS Examination.
2. The candidate must pass the second year BHMS Examination at least one term (6months) before he is allowed to appear Third year BHMS examination.
3. The candidate must pass The Third year BHMS Examination at least one term (6months) before he is allowed to appear Fourth year BHMS Examination.

**11. Number of Attempts**

If a candidate fails to pass in all the subjects within four chances I or II or III BHMS examination, he/she shall be required to prosecute a further course of study of all the subjects and in all parts for one year to the satisfaction of the head of the college and appear for examination in all the subjects.

Provided that if a student appearing for the Fourth BHMS examination, has only one subject to pass at the end of prescribed chances, he shall be allowed to appear at the next examination in that particular subject and shall complete the examination with this special chance.

**12. Declaration of Class:**

1. A candidate having appeared in all the subjects in the same examination and passed that examination in the first attempt and secures 75% of marks or more of grand total marks prescribed will be declared to have passed the examination with distinction.
2. A candidate having appeared in all the subjects in the same examination and passed that examination in the first attempt and secures 65% of marks or more but less than 75% of grand total marks prescribed will be declared to have passed the examination in First Class.
3. A candidate having appeared in all the subjects in the same examination and passed that examination in the first attempt and secures 50% of marks or more but less than 65% of grand total marks prescribed will be declared to have passed the examination in Second Class.
4. A candidate passing a university examination in more than one attempt shall be placed in Pass class irrespective of the percentage of marks secured by him/her in the examination.

[Please note fraction of marks should not be rounded off for clauses (a), (b) and (c)]

**13. Results and Re-Admission to Examination**

 (i) The examination body shall ensure that the results of the examination are published at the maximum within one month of the last date of examination so that students can complete the course in 5 ½ yrs after admission.

 (ii) Candidates who have passed in one or more subjects need not appear in that subject or those subjects again in the subsequent examinations if the candidate passes the whole examination within four chances including the original examination.

 (iii A candidate who appears at First B.H.M.S. examination, Second B.H.M.S. examination, Third B.H.M.S. examination or Fourth B.H.M.S. examination but fails to pass in the subject or subjects shall be re-admitted to the examination in the subject or subjects (theory and practical or clinical including oral or practical or clinical wherein he has failed).

 (iv) Special classes, seminars, demonstration, practical, tutorials etc, shall be arranged for the repeaters in the subject in which they have failed before they are allowed to appear at the next examinations, in which attendance shall be compulsory.

 (v) If a candidate fails to pass in all the subjects within four chances in examinations, he shall be required to prosecute a further course of studying al the subjects and in all parts for one year to the satisfaction of the head of the college and appearing for examination in all the subjects.

Provided that if a student appearing for the Fourth BHMS examination has only one subject to pass at the end of prescribed chances, he shall be allowed to appear at the next examination in that particular subject and shall complete the examination with this special chance.

 (vi) The University may under exceptional circumstances, partially or wholly cancel any examination conducted by it under intimation to the Central Council of Homoeopathy and arrange for conducting re- examination in those subjects within a period of thirty days from the date of such cancellation.

 (vii) The University shall have the discretion to award grace marks at the maximum to ten (10) marks in total and not more than five (5) marks for an individual subject, if a student fails in one or more subjects.

**14. Examiners** –

i) No person other than the holder of qualification prescribed for the teaching staff in the Homoeopathy Central Council (Minimum Standards Requirement of Homoeopathic Colleges and attached Hospitals) Regulations, 2013 (as amended from to time) shall be appointed as an Internal or External examiner or paper-setter or moderator for the B.H.M.S. Degree Course:

Provided that:-

 (a) No such person shall be appointed as an examiner unless he has at least three years continuous regular teaching experience in the subject concerned, gained in a degree level Homoeopathic Medical College.

 (b) Internal examiners shall be appointed from amongst the teaching staff of the Homoeopathic Medical College to which the candidate or student belongs.

(ii) The criteria for appointing the Chairman or paper-setter or moderator shall be as follows.

 Namely:-

1. Chairperson: Senior most person from amongst the examiners or paper-setters appointed for theory and oral or practical or clinical examinations shall be appointed as Chairman and the eligibility qualification for the Chairman shall be the same as for appointment of a Professor.
2. Moderator : A Professor or Associate Professor or Reader shall be eligible to be appointed as moderator.

Provided that an Assistant Professor or Lecturer with five years experience as an Examiner Shall be eligible to be appointed as moderator.

1. Paper- setter : A Professor or Associate Professor or Reader shall be appointed as a paper-setter:

Provided that an Assistant Professor or Lecturer with three years experience as an examiner shall be eligible to be appointed as Paper-setter.

**15. General Guidelines for Admission to Examination and Scheme of Examination**

 (i) The University shall ensure that the minimum number of hours for lecture/demonstration/practical/seminar etc. in the subjects in each BHMS examination as specified in respective regulations are followed before allowing any Homoeopathic Medical College to send the students for University examination :

 (ii) The University shall ensure that the students of the Homoeopathic Medical Colleges, who do not fulfill the Homoeopathy (MSR) Regulations, are not sent for the University Examination.

 (iii) 75% (Seventy five percent) attendance at the minimum in each of the subjects (in theory and practical including clinical) for appearing in the University examinations shall be compulsory.

 (iv) Each theory paper shall be of three hours duration.

 (v) The Practical / Viva Voce examination shall be completed immediately after the theory examination.

 (vi) That the examining body shall hold examinations on such date and time as the examining body may determine. The theory and practical examination shall be held in the premises of the Homeopathic Medical College concerned.

 (vii) There shall be a regular examination and a supplementary examinations in a year and the supplementary examination shall be conducted within two months of declaration of result (including issue of mark sheets);

(viii) For non-appearance in an examination for any reason, a candidate shall not have any liberty for availing additional chance to appear in that examination.

**16. Migration or transfer of students from on college of another:**

(a) Migration from one college to other is not a right of a student.

(b) Migration of students from the Homoeopathic College to another Homoeopathic college in India shall be considered by the Central Council of Homoeopathy only in exceptional cases on extreme compassionate grounds, provided following criterias are fulfilled. Routine migration on other grounds shall not be allowed;

(c) Both the colleges, i.e. one at which the student is studying at present and one to which migration is sought are recognised as per provisions of Homoeopathy Central Council Act.

(d) The applicant shall have passed First B.H.M.S. examination.

(e) The applicant shall submit his/her application in the prescribed format for migration, complete in all respect, to the principal of his college within a period of one month of passing (declaration of result) the I BHMS examinations.

(f) The applicant shall submit an affidavit stating that he shall pursue twelve months of prescribed study before appearing at II B.H.M.S examination at the transferee college, which he is seeking transfer and the transfer shall be effective only after receipt of the affidavit.

(g) Migration during internship training shall be allowed on extreme compassionate grounds, provided that such migration shall be allowed only with the mutual consent of the concerned Colleges, where both the college, i.e. one at which the student is studying at present and one to which migration is sought are recognized as per provisions of Homoeopathy Central Council Act.

Note 1:

1. All applications for migration shall be referred to Central Council of Homoeopathy by college authorities. No Institution or University shall allow migrations directly without the approval of the Central Council.
2. The Central Council of Homoeopathy reserves the right not to entertain any application except under the following compassionate grounds, namely :-
3. death of a supporting guardian:
4. illness of candidate causing disability supported by medical grounds certified by a recognized hospital;
5. disturbed conditions as declared by concerned Government in the area where the college is situated.

 c) A student applying for transfer on compassionate ground shall apply in relevant format and in complete manner with requisite documents.

**17. INTERNSHIP TRAINING**

1. (i) Each candidate shall be required to undergo Compulsory Rotating Internship of one year, after passing the final BHMS Examinations, to the satisfaction of the Principal of the Homoeopathic College. Thereafter only, the candidate shall be eligible for the award of Degree of Bachelor of Homoeopathic Medicine and Surgery (B.H.M.S) by the University.

(ii) All parts of the internship training shall be undertaken at the hospital attached to the College, and in cases where such hospital cannot accommodate all of its students for Internship then candidates/Students shall be informed in writing by the college and it shall be the responsibility of the College to ensure that each of such students is put on internship training in a Homoeopathic Hospital or dispensary run by Government or local bodies.

(iii) To enable the State Board /Council of Homeopathy to grant provisional registration of minimum of one year to each candidate to undertake the internship, the University concerned shall issue a Provisional Passed Certificate on passing the final BHMS examination to each successful candidate.

Provided that in the event of shortage or unsatisfactory work, the period of compulsory internship and the provisional registration shall be accordingly extended by the State Board/Council.

(iv) Full registration shall only be given by the State Board if the BHMS degree awarded by the University concerned is a recognized medical qualification as per Section 13(1) of the HCC Act, and the Board shall award registration to such candidates who produce certificate of completion or compulsory rotating internship of not less than one year duration from the Principal of College, where one has been a bonafide student which shall also declare that the candidate is eligible for it.

(v) The internee students shall not prescribe the treatment including medicines, and, each of them shall work under the direct supervision of Head of Department concerned and /or a resident Medical Officer. No intern student shall issue any medico-legal document under his/her signatures.

1. The internship training shall be regulated by the Principal in consultation with concerned Heads of Departments and the R.M.O. as under :-
2. Each internee student shall be asked to maintain a record of work which is to be constantly monitored by the Head of concerned Department and/or Resident Medical Officer under whom the internee is posted. The scrutiny of record shall be done in an objective way to update the knowledge, skill and aptitude of internee.
3. (a) The stress during the internship training shall be on case taking, analysis and evaluation of symptoms, nosological and miasmatic diagnosis. Totality of symptoms, repertorisation and management of sick people based on principles of Homoeopathy:

(b) The Principal or Head of the College in consultation with heads of concerned clinical departments (including Organon of Medicine, Materia Medica and Repertory) shall make, medical units having integration of teaching faculty of concerned departments to regulate internship training to be given to each student.

(c) Weekly seminars shall be conducted wherein interns in rotation be given a chance to present their cases for discussion an concerned teachers in conduct of weekly seminars.

1. Rotation of intern students shall be as under:

(a) Practice of Medicine - 8 Months, wherein, internee will be rotated in each Psychology, Respiratory, Gastro–intestinal, Endocrinology, Skin and V.D., Loco-motor, Cardiology, Pediatrics sections.

(b)Surgery – 1month.

(c) Obstetrics & gynecology – 2 Months [1month each (including reproductive & child health care)].

(d) Community Medicine (including PHC/CHC) - 1month.

1. Each internee shall be exposed to clinic pathology work to acquire skill in taking samples and doing routine blood-examination. Student shall be trained to correlate laboratory findings with diagnosis and management of sick people.
2. Each internee shall be given opportunities to learn the diagnostic techniques like x-rays, Ultrasonography, E.C.G., Spirometer and other forthcoming techniques and co-relate their findings with diagnosis and management of cases.
3. Each internee student shall be given adequate knowledge about issuing of medico-legal certificates including medical and fitness certificates, death certificates, birth certificates, court producers and all of such legislation`s be discussed which were taught n curriculum of Forensic Medicine.
4. Each internee shall maintain record of 40 acute and 25 chronic cases complete in all manner including follow up in Practice of Medicine, record of 5 antenatal check – up and 3 delivery cases attended by him/her in department of Obstetrics and 3cases of Gynecology; records of 5 surgical cases assisted by him (and demonstration of knowledge of dressings) in Surgery department, and records of knowledge gained in Primary Health Centres, Community Health Centres and various health programmes.
5. Each interne shall be given a liberty to choose an elective assignment on any subject, and complete out-put shall b furnished in writing by the internee in respect of elective assignment to the Principal of the College within internship duration.
6. Each intern shall be posted on duty in such manner that each of them attend at least 15 days in O.P.D. and 15days in I.P.D. in each month (except for duty in Community Medicine) and attend the other parts of duty including self-preparation in Library.
7. Each intern shall be posted be made to learn importance of maintaining statistics and records, intern-student shall also be familiarized with research methodology.

3. (i). Each internee shall have not less than 80% of attendance during the internship training.

(ii). Each internee shall be on duty of at least 6 hours per day during the Compulsory Internship Training.

(iii). Each internee shall not avail more than ten days of leave during each posting.

**18. EDUCATIONAL TOUR**

**Components**

 Number of Students.

Name of teacher accompanying students.

 What the tour is about - an overview.

 Prerequisites – What knowledge the students must know before going for tour

 How it will be organized;

 Approaches to teaching or learning and assessment;

**Aim and Objectives:**

 1. To provide the basic knowledge of practical aspects of Pharmacy /FMT/Community Medicine by exposure of students to Pharmaceutical Labs and HPL/district courts/hospitals / PC/I.D. Hospitals units/sewage treatment plants/water purification plants / milk dairies, as the case may be.

 2. To inspire students for their involvement in study during the said visits to learn the related procedures.

 3. To provide the platform for evaluation of their skill and knowledge by interactive methodology.

 4. To infuse confidence amongst students about homoeopathy, its future and their career.

 5. To provide interaction between students, induce decision making skills and to motivate them for better vision about their future.

 6. To improve cognitive skills (thinking and analysis)

 7. To improve communication skills (personal and academic).

**Learning outcomes**

1. To be more than a wish list objectives, need to be realistic, pragmatic, understandable and achievable.
2. The focus should be on what students will be able to do or how will show that they know, and how this will help in their career and individual growth.
3. Knowledge - we want the students to have by the end of the course.
4. Skills - we want the students to master by the end of the course.
5. Attitude - we want students to demonstrate at the ends of the course.

Note: It shall be an essential part of the journal on the subject a viva-voice can be put in respect of it.

**Resources:**

 1. Essential and recommended text books.

 2. Journals and other readings.

 3. Equipment and apparatus.

**Visit record:**

 1. Places visited with photograph

 2. Programmes organized during visit.

 3. Summary

**Assignment or project report.**

 1. Description of assignment.

 2. Due dates of assignments.

 3. Preparation method for the project report

 (i) Purpose

 (ii) Schedule

 (iii) Places visited.

 (iv) Details of visit

1. Summary of achievements or leanings.

**Section – V: COURSE DESCRIPTION**

**1) ANATOMY:**

**Introduction**

I (a) Instructions in Anatomy be so planned as to present a general working knowledge of the structure of the human body;

(b) The amount of detail which a student is required to memorize should be reduced to the minimum;

(c) Major emphasis should be laid on functional anatomy of the living subject rather than on the static structures of the cadaver, and on general anatomical positions and broad relationship of the viscera, muscles, blood vessels, nerves and lymphatics and study of the cadaver is only the means to achieve this;

(d) Students should not be burdened with minute anatomical details which have no clinical significance.

II Though dissection of the entire body is essential for the preparation of the student of his clinical studies, the burden of dissection can be reduced and much saving of time can be effected, if considerable reduction of the amount of topographical details is made and the following points,

(1) Only such details as have professional or general educational value for the medical students.

(2) The purpose of dissection is to give the student an understanding of the body in relation to its function, and the dissection should be designed to achieve this goal.

(3) Normal radiological anatomy may also form part of practical or clinical training and the structure of the body should be presented linking functional aspects.

(4) Dissection should be preceded by a course of lectures on the general structure of the organ or the system under discussion and then its function. In this way anatomical and physiological knowledge can be presented to students in an integrated form and the instruction of the whole course of anatomy and physiology made more interesting, lively and practical or clinical.

(5) A good part of the theoretical lectures on anatomy can be transferred to tutorial classes with demonstrations.

(6) Student should be able to identify anatomical specimen & structures displayed in the dissections.

(7) Lectures or demonstrations on the clinical and applied anatomy should be arranged in the later part of the course and it should aim at demonstrating the anatomical basis of physical signs and the value of anatomical knowledge to the students.

(8) Seminars and group discussions to be arranged periodically with a view of presenting the subject in an integrated manner.

(9) More stress on demonstrations and tutorials should be given. Emphasis should be laid down on rhe general anatomical position and broad relations of the viscera, muscles, blood vessels, nerves and lymphatics.

(10) There should be joint seminars with the departments of Physiology and Biochemistry which should be organized once a month.

(11) There should be a close correlation in the teaching of gross Anatomy, Histology, Embryology and Genetics and the teaching of Anatomy, Physiology including Biochemistry shall be integrated.

**Course goal**

Human Anatomy is the study of the normal structures of the human body. It is broadly divided into gross anatomy and histology. Gross anatomy deals with the macroscopic study of the normal structures of the human body which includes general anatomy and regional anatomy. Histology deals with the microscopic study of tissues.

The general purpose of a course in anatomy for the undergraduate students of Homeopathy is to provide a comprehensive knowledge of the gross and microscopic structure and development of human body, so as to present a basis for understanding the clinical correlation of organs or structures involved and the anatomical basis for the disease presentations. This course provides *the students with the fundamental knowledge of human body structure and its correlation with the functions. This knowledge is aimed at application for clinical practice. The students will be able to* recall, identify, recognize and correlate basic knowledge of structural and functional anatomy acquired through lectures/ tutorials/ dissection of the cadaver or virtual dissection/ demonstration of prepared dissected specimens before the pillars of sound clinical knowledge are laid upon to complement homeopathic principles and practices.

Dissection is limited to main anatomical structures which have clinical value and significance so as to give students a clear understanding of their normal structures, positions and relations in normal human body. Demonstration of prepared dissected specimens is used to aid lectures and tutorials.

**Course objectives**

At the end of this module, the student will be able to:

* Illustrate the normal disposition, clinically relevant interrelationship and functional anatomy of various structures in the body
* identify and locate structures of the body and mark topography of living anatomy
* recognize basic and systemic microscopic structures of the human body
* Identify, recognize and describe the normal morphology of various organ systems
* Correlate the knowledge of general anatomy with regional anatomy
* Correlate structures of the human body with functional Radiological anatomy
* Identify anatomical basis of physical signs in clinical and applied anatomy
* Establish close co-relation in the knowledge of Gross Anatomy, Histology, Embryology& Genetics
* To integrate the knowledge of Anatomy with Physiology including Biochemistry.
1. **THEORY - 200 HOURS**

A complete course of human anatomy with general working knowledge of different anatomical parts of the body.

The curriculum includes the following, namely:-

1. **General Anatomy- 15 Hours**

|  |  |  |  |
| --- | --- | --- | --- |
| **Sl. No.** | **Topics** | **Component** | **Hours Allotted** |
| **Must Know** | **Desirable To Know** | **Nice To Know** |
| **1** | **Cell** |
|  | Modern concept of cell | Cell components | Cell division types with significance | Applied anatomy | 1 |
| **2** | **Tissues** |
| (i) | Basic tissues | Definition & Types  | Functional correlation | Applied anatomy | 1 |
| (ii) | Descriptive terms in anatomy | Anatomical planes, Anatomical terms of position & movement | Terms used in Embryology |  | 1 |
| (iii) | General Osteology | Classification of bones,Terms used in osteology,Ossification: Definition, centers & laws of ossification | Functions of bone, Parts of growing long bone, Blood supply of long bone & Applied aspect | Types of ossification & Epiphysis | 2 |
| (iv) | General Arthrology | Joint: Definition, Classification,Synovial joint: Parts of Typical synovial joint & types | Fibrous & Cartilaginous joints, Blood & nerve supply of joint | Kinesiology | 2 |
| (v) | General Myology | Muscle tissue: Definition, types & Parts of the Skeletal muscle | Classification of Skeletal muscle  | Actions of Skeletal muscles | 1 |
| (vi) | General Angiology | Types of blood vessels: Arteries, Capillaries, Veins & Sinusoids | Anastomosis, End artery& Applied aspect | Nerve supply of blood vessels | 1 |
| (vii) | General Neurology | Parts of the nervous system,Neuron, Neuroglia, Nerve: Definition & types- Cranial & Spinal | Classification of neurons,Nuclei, Ganglia & Synapse  | Autonomic nervous system: Parts & functions | 2 |
| (viii) | Skin &its derivatives & Fasciae | Skin: Structure, appendages, Fasciae: Superficial & deep, modifications & functions | Functions of Skin & Dermatomes | Applied aspect of Skin & Appendages | 2 |
| **3** | **Genetics** |
|  | Introduction, terminology,DNA & RNA  | Mendelian laws of inheritance, Structure & function of Chromosomes | Protein biosynthesis, Genetic disorders & Karyotyping | Genetic code, Inheritance-Homoeopathic perspective | 2 |

1. **Developmental Anatomy (Embryology) - 15 Hours**

|  |  |  |  |
| --- | --- | --- | --- |
| **Sl. No.** | **Topics** | **Component** | **Hours Allotted** |
| **Must Know** | **Desirable To Know** | **Nice To Know** |
| **1** | Gametogenesis: Spermatogenesis & Oogenesis | Formation & maturation of Gametes | Structure of Spermatozoon & Ovarian follicle | Abnormalities in Gamete formation | 1 |
| **2** | Formation of germ layers | Fertilization, Implantation, Cleavage, Morula & Blastocyst,Formation of bilaminar germ disc, Prochordal plate, Primitive streak, Intra-embryonic mesoderm & Formation of trilaminar germ disc | Decidua: Parts,Trophoblastic stages of differentiation,Fetal membranes: Amnion, Chorion & Connecting stalk | In vitro fertilization, Types of Implantation & Abnormal implantation | 2 |
| **3** | Development of embryonic disc | Formation of Notochord, Neural tube & Neural crest,Primitive gut: Formation, parts & derivatives | Intra-embryonic mesoderm & its subdivisions,Derivatives of Ectoderm, Endoderm & Mesoderm | Allantoic diverticulum & Urachus | 2 |
| **4** | Placenta | Placenta: Formation, functions &features  | Placental circulation &Placental barrier | Placenta previa, Amniocentesis | 1 |
| **5** | Development of Abdominal organs, Respiratory system & body cavities | Formation of Gastrointestinal tract, Development of Liver, Gall bladder, Pancreas & Spleen | Tracheobronchial diverticulum &Lung bud | Intraembryoniccoelom& cavities derived from it | 3 |
| **6** | Development of Urogenital system | Development of Kidneys, Testis & Ovary |  | Development of Uterus, vagina & Fallopian tubes | 2 |
| **7** | Development of Cardiovascular system | Development of Heart | Congenital anomalies of Heart | Development of main blood vessels | 2 |
| **8** | Development of Nervous system | Development of Brain & Spinal cord | Neural crest & its derivatives  |  | 2 |

1. **Regional Anatomy:**
	1. **Head, Neck, Face & Brain- 50 Hours**

|  |  |  |  |
| --- | --- | --- | --- |
| **Sl. No.** | **Topics** | **Component** | **Hours Allotted** |
| **Must Know** | **Desirable To Know** | **Nice To Know** |
| **(a)** | **Osteology** |
| (i) | Skull | Anatomical position, Exterior of views of skull, major foramina & structures passing through them, Interior of skull & cranial fossae | Fontenellae: Significance, age estimation & Sex differences of Skull & Muscle attachments | Ossification of Skull & Fractures of skull | 3 |
| (ii) | Mandible | Identification & Anatomical position | Dental formula &Ossification | Sex & age estimation | 1 |
| (iii) | Hyoid bone |  | Parts &muscle attachments | Applied anatomy | 1 |
| (iv) | Cervical vertebrae | Identification & parts of Typical cervical vertebrae | Atypical cervical vertebrae | Applied anatomy | 1 |
| **(b)** | **Syndesmology** |
|  | Temporo-mandibular joint | Articulation, ligaments, blood, nerve supply & lymphatic drainage | Movements & muscles responsible | Factors influencing the stability | 1 |
| **(c)** | **Myology** |
| (i) | Fasciae of the neck | Layers and attachments | Spaces & derivatives |  | 1 |
| (ii) | Triangles of the Neck | Anterior & Posterior Triangles Boundaries, divisions & contents |  | Muscles of back of Neck | 1 |
| (iii) | Muscles of face | Names, nerve supply & actions | Applied anatomy |  | 1 |
| (iv) | Muscles of the Head &Neck  | Origin, insertion, nerve supply & action of Muscles of mastication &Extra-ocular muscles | Origin, insertion, nerve supply & action of Sternocleidomastoid | Muscles of the Larynx, Pharynx & Soft palate | 1 |
| **(d)** | **Angiology** |
|  | Blood vessels of the Head, Neck & Brain | Origin, parts, course, relations, branches/ tributaries of Subclavian, Common, Internal & External carotid arteries andExternal & internal Jugular vein,Venous drainage of Scalp & FaceNames & Classification of Dural venous sinuses &Blood supply of the brain | Origin, parts, course, relations, branches/ tributaries of Facial, Lingual, Middle meningeal, Maxillary, Vertebral artery, Pterygoid plexus of veins,Emissary veins | Superior thyroid, & Occipital arteries, Retro mandibular vein,Lymphatic drainage of Head and Neck | 4 |
| **(e)** | **Neurology** |
|  | Cranial nerves | Origin, nuclei, course, branches, distribution & applied anatomy of Occulomotor, Trochlear, Abducent, Trigeminal, Facial, Glossopharyngeal, Vagus & Hypoglossal nerves | Origin, nuclei, course, branches, distribution & applied anatomy of, Lingual, Chorda tympani, Recurrent laryngeal nerve, Phrenic nerve | Spinal accessory nerve,Cervical plexus &Parasympathetic Ganglia | 4 |
| **(f)** | **Splanchnology** |
| (i) | Scalp | Extent and layers | Blood, nerve supply & lymphatic drainage | Clinical correlation | 1 |
| (ii) | Lachrymal apparatus | Structures forming the lachrymal apparatus | Blood, nerve supply & lymphatic drainage  | Development | 1 |
| (iii) | Pituitary gland | Location, features, relations & connections with Hypothalamus | Blood, nerve supply & lymphatic drainage | Development | 1 |
| (iv) | Thyroid gland  | Location, features & relations | Blood, nerve supply & lymphatic drainage | Functions & Development | 1 |
| (v) | Parathyroid gland | Location & features | Blood, nerve supply & lymphatic drainage | Functions & Development | 1 |
| (vi) | Parotid gland | Location, External features & relations,Parotid duct | Structures present within, blood, nerve supply and lymphatic drainage | Parotid sheath & Development | 1 |
| (vii) | Submandibular gland | Parts their features, relations & Submandibular duct | Blood, nerve supply & lymphatic drainage | Development | 1 |
| (viii) | Sublingual gland | Location & external features | Blood, nerve supply & lymphatic drainage | Development | 1 |
| (ix) | Nose | External features, Cavity & Nasal septum | Blood, nerve supply & lymphatic drainage | Development | 1 |
| (x) | Para nasal air sinuses | Names, classification & features | Blood, nerve supply & lymphatic drainage | Development | 1 |
| (xi) | Tooth | Deciduous & permanent teeth, Parts and structure | Blood, nerve supply & lymphatic drainage | Functions | 1 |
| (xii) | Tongue | External features & muscles | Blood, nerve supply & lymphatic drainage | Functions,Development | 1 |
| (xiii) | Soft Palate | Morphology & muscles | Blood, nerve supply & lymphatic drainage | Development | 1 |
| (xiv) | Tonsil | Location &features,Tonsilar fossa & Tonsilar bed | Blood, nerve supply & lymphatic drainage | Development | 1 |
| (xv) | Pharynx | Location, relations & subdivisions  | Blood, nerve supply & lymphatic drainage | Important features of subdivisions | 1 |
| (xvi) | Larynx | Location, extent, cartilages & cavity | Blood, nerve supply & lymphatic drainage | Rima glottis,Phonation | 1 |
| (xvii) | Trachea (cervical part) | Extent, structure & relations | Blood, nerve supply & lymphatic drainage | Applied anatomy | 1 |
| (xviii) | Central Nervous System | Introduction, Parts of the brain & Meninges of the brain | Ventricles of the brain and circulation of Cerebro spinal fluid | Base of the brain & Applied anatomy | 1 |
| (xix) | Spinal cord | External features & Internal Structure | Arterial supply &venous drainage | Applied anatomy | 1 |
| (xx) | Medulla oblongata | External features & internal structure | Blood supply | Applied anatomy | 1 |
| (xxi) | Pons | External features & internal structure | Blood supply | Applied anatomy | 1 |
| (xxii) | Mid brain | External features & internal structure | Blood supply | Applied anatomy | 1 |
| (xxiii) | Cerebellum | External features,Subdivisions: anatomical, functional & Intracerebellar nuclei | Structure of cerebellar cortex & Cerebellar peduncles | Blood supply & Applied anatomy | 1 |
| (xxiv) | Fourth Ventricle | Boundaries of the fourth ventricle | Floor of the fourth ventricle | Choroid plexus | 1 |
| (xxv) | Diencephalon: Thalamus | Parts of diencephalon & External features of thalamus | Parts & nuclei | Functions | 1 |
| (xxvi) | Hypothalamus | Boundaries & subdivisions | Connections  | Functions | 1 |
| (xxvii) | Third Ventricle | Boundaries | Recesses | Choroid plexus | 1 |
| (xxviii) | Cerebrum | External features & lobes | Functional areas of cerebral cortex | Limbic system | 1 |
| (xxix) | Cerebrum: White matter | Types of nerve fibers | Corpus callosum & Internal capsule | Fornix | 1 |
| (xxx) | Lateral ventricle | Parts & boundaries | Choroid plexus & Choroid fissure |  | 1 |
| **(g)** | **Radiographic anatomy**: Introduction to the study of X-Ray, CT & MRI of the Head, Neck & Brain region | 1 |
| **(h)** | **Surface anatomy** and **Applied anatomy** (Clinical significance) of each of the topic shall be covered without undue importance to minute & less significant anatomical details. |

* 1. **Thorax- 20 Hours**

|  |  |  |  |
| --- | --- | --- | --- |
| **Sl. No.** | **Topics** | **Component** | **Hours Allotted** |
| **Must Know** | **Desirable To Know** | **Nice To Know** |
| **(a)** | **Osteology** |
|  | Bones of thorax | General features of Sternum,Typical ribs & Typical thoracic vertebrae | General features ofAtypical ribs & Atypical thoracic vertebrae | Applied anatomy, Ossification & muscle attachments | 3 |
| **(b)** | **Syndesmology** |
|  | Joints of the thorax | Names & articulation | Clinical importance |  | 1 |
| **(c)** | **Myology** |
|  | Muscles of thorax | Origin, insertion, nerve supply & action of Intercostal muscles | Origin, insertion, nerve supply & action of Diaphragm | Applied anatomy | 1 |
| **(d)** | **Angiology** |
|  | Blood vessels of thorax | Origin, parts, course, relations, branches/ tributaries of Ascending, arch & descending thoracic aorta, Superior venacava& Azygos venous system | Origin, parts, course, branches of Internal thoracic artery & Thoracic duct | Applied anatomy & Lymphatic drainage of thorax | 3 |
| **(e)** | **Neurology** |
|  | Nerves in thorax | Formation of Phrenic nerve | Applied anatomy of Phrenic nerve | Thoracic part of sympathetic nervous system | 1 |
| **(f)** | **Splanchnology** |
| (i) | Trachea (thoracic part) | Extent & relations | Blood, nerve supply & lymphatic drainage | Applied anatomy | 1 |
| (ii) | Lungs | External features, relations, Bronchial tree & Broncho-pulmonary segments | Blood, nerve supply & lymphatic drainage | Applied anatomy | 2 |
| (iii) | Pleura | Definition, parts & recess | Blood & nerve supply | Applied anatomy | 1 |
| (iv) | Mediastinum | Definition, Subdivisions, boundaries & contents | Applied anatomy |  | 1 |
| (v) | Heart | Chambers of the heart: External, internal features & blood supply | Valves of the heart & Applied anatomy | Conducting system | 3 |
| (vi) | Pericardium | Definition, parts & sinuses of pericardium | Blood & nerve supply | Applied anatomy | 1 |
| (vii) | Oesophagus | External features, course & blood supply | Constriction & Nerve supply | Applied anatomy | 1 |
| **(g)** | **Radiographic anatomy**: Introduction to the study of X-Ray, CT& MRI of the Thoracic region | 1 |
| **(h)** | **Surface anatomy** and **Applied anatomy** (Clinical significance) of each of the topic shall be covered without undue importance to minute & less significant anatomical details. |

* 1. **Abdomen & Pelvis- 40 Hours**

|  |  |  |  |
| --- | --- | --- | --- |
| **Sl. No.** | **Topics** | **Component** | **Hours Allotted** |
| **Must Know** | **Desirable To Know** | **Nice To Know** |
| **(a)** | **Osteology** |
|  | Bones of the Abdomen &Pelvis | General features of Lumbar vertebrae, Sacrum,Male & Female pelvis | Applied anatomy,Pelvis- Sex differences | Ossification, Types of Pelvis & pelvimetry | 4 |
| **(b)** | **Syndesmology** |
|  | Joints of the back | Lumbosacral joint- Articulation | Applied anatomy | Sacroiliac joint | 1 |
| **(c)** | **Myology** |
| (i) | Abdomen & Pelvis | Origin, insertion, nerve supply & action of the muscles of Anterior abdominal wall & Psoas major | Rectus sheath & Inguinal canal  | Applied anatomy | 2 |
| (ii) | Perineum | Definition, divisions,Ischiorectal fossa | Superficial, deep perineal pouches & Pelvic Diaphragm | Muscles & nerves | 2 |
| **(d)** | **Angiology** |
|  | Blood vessels of the Abdomen & Pelvis | Origin, parts, course, relations, branches/ tributaries of Abdominal aorta,Portal vein & Inferior venacava | Origin, parts, course, relations, branches ofCoeliac trunk, Superior, Inferior mesenteric &Internal iliac arteries | Applied anatomy, Lymphatic drainage of Abdomen & pelvis | 4 |
| **(e)** | **Neurology** |
|  | Study of the main nerves in abdomen & pelvis |  |  | Autonomic nerve plexuses  | 1 |
| **(f)** | **Splanchnology** |
| (i) | Abdominal cavity | Quadrants & contents |  |  | 1 |
| (ii) | Peritoneum | Definition, parts & reflection, Greater & lesser omentum | Omental bursa, Mesentery, Peritoneal pouches in pelvis | Functions & applied anatomy | 2 |
| (iii) | ScrotumTestis & Penis | Gross anatomy, Layers/ Coverings | Blood, nerve supply & lymphatic drainage | Applied anatomy, Development | 2 |
| (iv) | Stomach | Parts, important relations and interior | Blood, nerve supply & lymphatic drainage | Applied anatomy | 2 |
| (v) | Small intestine | Parts, main features of Duodenum | Differences between Jejunum &Ileum  | Applied anatomy | 2 |
| (vi) | Large intestine | Parts, main features of Caecum, appendix & Applied anatomy | Blood, nerve supply & lymphatic drainage | Marginal artery | 1 |
| (vii) | Spleen | Location, external features,ligaments & relations | Blood, nerve supply & lymphatic drainage | Applied anatomy | 1 |
| (viii) | Liver & Gall bladder | External features, Lobes/ Parts,Ligaments & Bile duct | Blood, nerve supply & lymphatic drainage | Cystic duct | 1 |
| (ix) | Pancreas | Parts and their relations | Blood, nerve supply & lymphatic drainage | Duct system,Development | 1 |
| (x) | Kidney | Morphology, structure on coronal section & Blood supply | Nerve supply, Lymphatic drainage & Applied anatomy | Horse shoe kidney, Polycystic kidney | 2 |
| (xi) | Ureter | Extent | Course & constrictions  | Blood supply | 1 |
| (xii) | Suprarenal glands | Location &morphology | Relations & Applied anatomy | Blood, nerve supply & lymphatic drainage | 1 |
| (xiii) | Urinary bladder | Morphology, Trigone of the urinary bladder & blood supply | Relations & Applied anatomy | Micturition reflex | 1 |
| (xiv) | Male & female urethrae | Extent & courseparts of the male urethra | Relations & Applied anatomy |  | 1 |
| (xv) | Prostate | Location, morphology | Relations & Applied anatomy | Blood, nerve supply & lymphatic drainage | 1 |
| (xvi) | Ductus deferens, Seminal vesicle |  | Relations | Applied anatomy | 1 |
| (xvii) | Rectum & anal canal | Morphology, blood, nerve supply & applied anatomy | Applied anatomy |  | 2 |
| (xviii) | Vaginal & Ovary, Uterus & Uterine tube | Morphology, blood, nerve supply & Applied anatomy | Relations, ligaments &Supports of uterus |  | 2 |
| **(g)** | **Radiographic anatomy**: Introduction to the study of X-Ray, CT & MRI of the Abdomen & Pelvis | 1 |
| **(h)** | **Surface anatomy** and **Applied anatomy** (Clinical significance) of each of the topic shall be covered without undue importance to minute & less significant anatomical details. |

* 1. **Upper Extremity- 20 Hours**

|  |  |  |  |
| --- | --- | --- | --- |
| **Sl. No.** | **Topics** | **Component** | **Hours Allotted** |
| **Must Know** | **Desirable To Know** | **Nice To Know** |
| **(a)** | **Osteology** |
|  | Bones of the upper extremity | General features of Clavicle, Scapula, Humerus, Radius & Ulna | Articulated hand & Applied anatomy | Ossification & muscle attachments | 5 |
| **(b)** | **Syndesmology** |
|  | Shoulder, Elbow &Wrist joint | Articulation, ligaments & muscles responsible for movements | Applied anatomy | First Carpo-metacarpal joint,MP & IP joints | 3 |
| **(c)** | **Myology** |
| (i) | Muscles of upper extremity | Origin, insertion, nerve supply & action of Pectoralis major, Trapezius, Lattismus dorsi, Deltoid, Biceps, Brachialis, Triceps, Flexor digitorum superficialis &profundus, Extensor digitorum | Origin, insertion, nerve supply & action of Brachioradialis, Intrinsic muscles of the hand, Formation & applied anatomy of Rotator cuff | Thenar & Hypothenar muscles | 2 |
| (ii) | Axilla & Cubital fossa | Definition, boundaries & contents | Applied anatomy |  | 1 |
| (iii) | Hand | Flexor retinaculum, Palmar aponeurosis | Other flexors & extensor muscles |  | 1 |
| **(d)** | **Angiology** |
|  | Blood vessels of the upper extremity | Origin, parts, course, relations, branches/ tributaries & applied anatomy of Axillary, Brachial, Radial & Ulnar artery,Cephalic & Median Cubital vein | Origin, parts, course, relations, branches/ tributaries & applied anatomy of Profunda brachii artery,Superficial, deep palmar arch & Basilic vein | Anastomosis around the elbow, shoulder &Lymphatic drainage of upper limb | 2 |
| **(e)** | **Neurology** |
|  | Brachial plexus | Formation & branches | Relations & applied anatomy | Variations | 4 |
| Nerves of the upper extremity | Origin, root value, course, branches, distribution, applied anatomy of Median, Ulnar & Radial nerve | Origin, root value, course, branches, distribution, applied anatomy of Axillary & musculocutaneous nerve |  |
| **(f)** | **Splanchnology** |
|  | Mammary gland | Gross anatomy, structure blood supply & lymphatic drainage | Applied anatomy |  | 1 |
| **(g)** | **Radiographic anatomy**: Introduction to the study of X-Ray, CT & MRI of the Upper Extremity | 1 |
| **(h)** | **Surface anatomy** and **Applied anatomy** (Clinical significance) of each of the topic shall be covered without undue importance to minute & less significant anatomical details. |

* 1. **Lower Extremity- 20 Hours**

|  |  |  |  |
| --- | --- | --- | --- |
| **Sl. No.** | **Topics** | **Component** | **Hours Allotted** |
| **Must Know** | **Desirable To Know** | **Nice To Know** |
| **(a)** | **Osteology** |
|  | Bones of the lower extremity | General features of Hip bone, Femur, Patella, Tibia & Fibula | Articulated foot& Applied anatomy | Ossification & muscle attachments | 5 |
| **(b)** | **Syndesmology** |
|  | Hip, Knee & Ankle joint | Articulation, ligaments & muscles responsible for movement | Applied anatomy | Subtalar joint | 3 |
| Arches of the foot | Types & formation | Applied anatomy |  |
| **(c)** | **Myology** |
| (i) | Muscles of lower extremity | Origin, insertion, nerve supply & action of Gluteus maximus, Quadriceps femoris, Sartorius, Adductor magnus, Hamstring muscles, Tibialis anterior & Calf muscles | Origin, insertion, nerve supply & action of Gluteus medius, minimus& Tensor fascia latae | Adductor, Peroneal muscles & Muscles of the sole of the foot | 2 |
| (ii) | Femoral triangle, Adductor canal & Popliteal fossa | Definition, boundaries &contents | Applied anatomy |  | 1 |
| (iii) | Thigh,Ankle & foot | Fascia lata & modificationsPlantar aponeurosis | Applied anatomyExtensor, perineal & flexor retinacula |  | 1 |
| **(d)** | **Angiology** |
|  | Blood vessels of the lower extremity | Origin, parts, course, relations, branches/ tributaries &applied anatomy of Femoral, Popliteal, Posterior Tibial & Dorsalis pedis artery, Great saphenous, short saphenous vein & Popliteal vein | Origin, parts, course, relations, branches/ tributaries & applied anatomy of Profunda femoris, Anterior Tibial, Obturator artery & Plantar arch | Lymphatic drainage of lower limb | 2 |
| **(e)** | **Neurology** |
| (i) | Lumbar & Sacral plexus | Formation & branches | Relations & applied anatomy |  | 2 |
| (ii) | Nerves of the lower extremity | Origin, root value, course, branches, distribution & applied anatomy of Femoral, Sciatic & Common peroneal nerve | Origin, root value, course, branches, distribution & applied anatomy of Obturator & Tibial nerve |  | 3 |
| **(f)** | **Radiographic anatomy**: Introduction to the study of X-Ray, CT & MRI of the Lower Extremity | 1 |
| **(g)** | **Surface anatomy** and **Applied anatomy** (Clinical significance) of each of the topic shall be covered without undue importance to minute & less significant anatomical details. |

1. **Special Senses- 5 Hours**

|  |  |  |  |
| --- | --- | --- | --- |
| **Sl. No.** | **Topics** | **Component** | **Hours Allotted** |
| **Must Know** | **Desirable To Know** | **Nice To Know** |
| (a) | Ear | Parts of the ear & ear ossicles | Mastoid antrum,Eustachian tube &Applied anatomy |  | 3 |
| (b) | Eye | Coats of the eye & chambers of the eye | Optic pathway &Applied anatomy |  | 2 |

1. **Histology (Microanatomy) - 15 Hours**

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| --- | --- | --- | --- |
| **Sl. No.** | **Topics** | **Component** | **Hours Allotted** |
| **Must Know** | **Desirable To Know** | **Nice To Know** |
| (a) | Epithelial tissue | Definition & Classification | Area of distribution | Urothelium | 1 |
| (b) | Connective tissue | Types of Connective tissue,Bone & Cartilage | General Connective tissue & Adipose tissue |  | 1 |
| (c) | Muscle tissue | Skeletal & Cardiac muscle | Smooth muscle |  | 1 |
| (d) | Blood vessels | Artery and vein |  |  | 1 |
| (e) | Glands  | Serous, Mucous & Mixed |  |  | 1 |
| (f) | Lymphoid tissue  | Lymph node & Spleen | Thymus & Tonsil |  | 1 |
| (g) | Skin  | Thin & thick Skin |  |  | 1 |
| (h) | Respiratory system  | Trachea & Lung |  |  | 1 |
| (i) | Digestive system | Basic structure of GIT, Liver & Gall bladder |  |  | 1 |
| (j) | Urinary system  | Kidney |  |  | 1 |
| (k) | Male reproductive system  | Testis & Prostate |  |  | 1 |
| (l) | Female reproductive system | Ovary & Uterus |  |  | 1 |
| (m) | Endocrine glands  | Thyroid, Pancreas & Suprarenal gland |  |  | 1 |
| (n) | Central Nervous System | Cerebrum & Cerebellum |  |  | 1 |
| (o) | Embryonic tissue | Placenta & Umbilical cord |  |  | 1 |

1. **PRACTICAL- 275 HOURS**

Dissection of whole body, demonstration of dissected parts. Identification of histological slides related to tissues and organs. Students shall maintain practical or clinical journal and dissection cards.

1. **Upper Extremity- 38 Hours**

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| --- | --- | --- | --- |
| **Sl. No.** | **Topics** | **Component** | **Hours Allotted** |
| **Must Know** | **Desirable To Know** | **Nice To Know** |
| **(a)** | Introduction | Parts & muscular compartments | Dermatomes |  | 2 |
| **(b)** | **Osteology** |
|  | Demonstration of the bones of the upper limb | Anatomical position,Parts & features | Joints formed |  | 8 |
| **(c)** | **Surface anatomy** |
|  | Demonstration & palpation | Surface land marks in upper extremity & back | Anatomical snuffbox (boundaries) | Triangle of auscultation & Lumbar triangleof Petit | 2 |
| Surface marking of the main blood vessels & nerves | Axillary, Brachial, Radial & Ulnar arteries,Median, Ulnar, Radial & Axillary nerves |  |  |
| Palpation of blood Vessels | Axillary, Brachial & Radial arteries |  | Palpation of Axillary group of lymph nodes |
| **(d)** | **Dissection including Syndesmology** |
|  | Dissection, demonstration of functional compartments in Arm, Fore arm, Hand & Back | Skin, superficial fascia, deep fascia, muscles, blood vessels & nerves of the compartment | Inter-muscular spaces & modifications of deep fascia: Palmar aponeurosis, Retinacula & Spaces of hand |  | 24 |
| Dissection, demonstration of articulating surfaces & movements of joints | Shoulder joint, Elbow joint, Radioulnar joints & Wrist joint |  | 1st Carpo-metacarpal joint, MP & IP joints |
| **(e)** | **Radiographic anatomy:** Demonstration of X-Ray, CT & MRI of the Upper Extremity. | 2 |

1. **Lower Extremity- 40 Hours**

|  |  |  |  |
| --- | --- | --- | --- |
| **Sl. No.** | **Topics** | **Component** | **Hours Allotted** |
| **Must Know** | **Desirable To Know** | **Nice To Know** |
| **(a)** | Introduction | Parts & muscular compartments | Dermatomes |  | 2 |
| **(b)** | **Osteology** |
|  | Demonstration of the bones of the lower limb | Anatomical position,Parts & features | Joints formed |  | 8 |
| **(c)** | **Surface anatomy** |
|  | Demonstration & palpation | Surface land marks in lower extremity |  |  | 2 |
| Surface marking of the main blood vessels & nerves | Femoral, Popliteal, Anterior & Posterior Tibial & Dorsalis pedis arteries,Sciatic, Tibial & Common peroneal nerves |  |  |
| Palpation of blood Vessels | Femoral, Popliteal, Posterior Tibial & Dorsalis pedis arteries |  | Palpation of Inguinal & Popliteal group of lymph nodes |
| **(d)** | **Dissection including Syndesmology** |
|  | Dissection, demonstration of functional compartments in Thigh, Gluteal region, Leg & Foot | Skin, superficial fascia, deep fascia, muscles, blood vessels & nerves of the compartment | Modifications of deep fascia: Plantar aponeurosis, Retinacula & Layers of Sole  |  | 26 |
| Demonstration of articulating surfaces & movements of joints | Hip, Knee, Ankle & joints of Foot |  |  |
| **(e)** | **Radiographic anatomy:** Demonstration of X-Ray, CT & MRI of the Lower Extremity. | 2 |

1. **Thorax- 35 Hours**

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| --- | --- | --- | --- |
| **Sl. No.** | **Topics** | **Component** | **Hours Allotted** |
| **Must Know** | **Desirable To Know** | **Nice To Know** |
| **(a)** | Introduction | Walls, mediastinum & viscera | Dermatomes |  | 2 |
| **(b)** | **Osteology** |
|  | Demonstration of the bones of the thorax | Anatomical position,Parts & features | Joints formed |  | 4 |
| **(c)** | **Surface anatomy** |
|  | Demonstration & palpation | Surface land marks in thorax |  |  | 4 |
| Surface marking of the main viscera | Pleura, Lungs & Heart | Arch of aorta & Superior venacava | Thoracic duct |
| **(d)** | **Dissection including Syndesmology** |
|  | Dissection, demonstration | Thoracic cavity, Pleura, Lungs, Mediastinum, Heart & Pericardium, | Wall of the thorax,Structures in superior & posterior Mediastina |  | 22 |
| **(e)** | **Radiographic anatomy:** Demonstration of X-Ray, CT & MRI of the Thorax. | 3 |

1. **Abdomen & Pelvis- 54 Hours**

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| --- | --- | --- | --- |
| **Sl. No.** | **Topics** | **Component** | **Hours Allotted** |
| **Must Know** | **Desirable To Know** | **Nice To Know** |
| (a) | Introduction | Anterior abdominal wall, abdominal & pelvic cavity & containing viscera | Dermatomes |  | 2 |
| (b) | **Osteology** |
|  | Demonstration of the bones of the abdomen & pelvis | Anatomical position,Parts & features | Joints formed |  | 4 |
| (c) | **Surface anatomy** |
|  | Demonstration & palpation | Quadrants of the abdominal cavity, surface land marks in Abdomen & Pelvis |  |  | 4 |
| Surface marking of the main viscera | Stomach, Spleen, Liver & Gall bladder, Caecum, Appendix & Kidney | Pancreas & Duodenum | Abdominal aorta & Inferior venacava |
| (d) | **Dissection including Syndesmology** |
|  | Dissection, demonstration | Walls of abdomen, Male & female external genitalia, Peritoneum, Liver, Stomach, Spleen, Pancreas, Duodenum,Small intestine, Large intestine,Kidney, Urinary bladder, Prostate gland, Uterus, Uterine tube & Ovary | Suprarenal glands &Perineum | Lumbosacral joint, Sacroiliac joint &Sacro-coccygeal joint | 42 |
| (e) | **Radiographic anatomy:** Demonstration of X-Ray, CT & MRI of the Abdomen & Pelvis. | 2 |

1. **Head, Neck, Brain &Bulbus oculi- 78 Hours**

|  |  |  |  |
| --- | --- | --- | --- |
| **Sl. No.** | **Topics** | **Component** | **Hours Allotted** |
| **Must Know** | **Desirable To Know** | **Nice To Know** |
| (a) | Introduction | Parts | Dermatomes |  | 2 |
| (b) | **Osteology** |
|  | Demonstration of the different views of the skull | Identification of the bones, foramina & features | Sutures | Fontenellae | 16 |
| Mandible, Hyoid bone & Cervical vertebrae | Parts & features | Attachments |  |
| (c) | **Surface anatomy** |
|  | Demonstration & palpation | Surface land marks in head & neck | External jugular vein |  | 6 |
| Surface marking of the main blood vessels & glands | Common carotid artery, External carotid artery &Thyroid gland |  | Palpation of Cervical group of lymph nodes |
| (d) | **Dissection including Syndesmology** |
|  | Dissection, demonstration | Scalp, temple & faceSide of neck: Anterior & posterior triangles,Deep dissection of neck: Thyroid gland, Contents of carotid sheath,Demonstration of sagittal section of mouth, tongue pharynx, larynx,Nose: Nasal septum & lateral wall,Ear & Eye ball,Brain & Spinal cord:Parts of the brain, sulci &gyri of the cerebral cortex | Cranial cavity: Dural folds & venous sinuses,Orbit: contents of the orbit,Deep dissection of face: Facial nerve, facial artery &Lacrimal apparatus, Parotid region,Temporal & infra temporal fossa: Muscles of Mastication & Maxillary artery,Submandibular region &Temporo-mandibular joint |  | 50 |
| (e) | **Radiographic anatomy:** Demonstration of X-Ray, CT & MRI of the Head, Neck, Brain. | 4 |

1. **Histology & Embryology-30 Hours**

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| --- | --- | --- | --- |
| **Sl. No.** | **Topics** | **Component** | **Hours Allotted** |
| **Must Know** | **Desirable To Know** | **Nice To Know** |
| (a) | Epithelial tissue | Definition & Classification | Area of distribution | Urothelium | 2 |
| (b) | Connective tissue | Types of Connective tissue,Bone & Cartilage | General Connective tissue & Adipose tissue |  | 2 |
| (c) | Muscle tissue | Skeletal & Cardiac muscle | Smooth muscle |  | 2 |
| (d) | Blood vessels | Artery and vein |  |  | 2 |
| (e) | Glands | Serous, Mucous & Mixed |  |  | 2 |
| (f) | Lymphoid organs | Lymph node & Spleen | Thymus & Tonsil |  | 2 |
| (g) | Skin | Thin & thick Skin |  |  | 2 |
| (h) | Respiratory system | Trachea & Lung |  |  | 2 |
| (i) | Digestive system | Basic structure of GIT, Liver & Gall bladder |  |  | 2 |
| (j) | Urinary system | Kidney |  |  | 2 |
| (k) | Male Reproductive system | Testis & Prostate |  |  | 2 |
| (l) | Female Reproductive system | Ovary & Uterus |  |  | 2 |
| (m) | Endocrine glands | Thyroid, Pancreas & Suprarenal gland |  |  | 2 |
| (n) | Nervous tissue | Cerebrum & Cerebellum |  |  | 2 |
| (o) | Embryonic tissue | Placenta & Umbilical cord |  |  | 2 |

1. **EXAMINATION:**
2. **Theory:** The written papers in Anatomy shall be two papers,

**TYPES OF QUESTIONS WITH MARKS-**

|  |  |  |  |
| --- | --- | --- | --- |
| Type of Questions | Marks per Question | No. of Questions | Total |
| Long Essays (**LE**) | 10 | 02 | 20 |
| Short Essays (**SE**) | 05 | 10 | 50 |
| Short Answers (**SA**) | 03 | 10 | 30 |
| Total | 22 | MAXIMUM MARKS- **100** |

**The distribution of chapter wise marks in written paper may be as follows\*:**

1.1**Paper-I (**Max. Marks- 100)

|  |
| --- |
| **Blue Print of Question Paper- I** |
| **Sl. No.** | **Topic** | **Hours Allotted** | **Long Essay****10 Marks** | **Short Essay****5 Marks** | **Short Answer****3 Marks** | **Weightage of Marks** |
| 1 | General Anatomy | 15 | - | 3 | 2 | **21** |
| 2 | Head, Neck & Face  | 35 | 1 | 3 | 2 | **31** |
| 3 | Brain & Special senses | 20 | - | 1 | 3 | **14** |
| 4 | Upper Extremity | 20 | 1 | 2 | 1 | **23** |
| 5 | Embryology | 15 | - | 1 | 2 | **11** |

1.2 **Paper- II (**Max. Marks- 100)

|  |
| --- |
| **Blue Print of Question Paper- II** |
| **Sl. No.** | **Topic** | **Hours Allotted** | **Long Essay****10 Marks** | **Short Essay****5 Marks** | **Short Answer****3 Marks** | **Weightage of Marks** |
| 1 | Thorax | 20 | 1 | 1 | 2 | **21** |
| 2 | Abdomen | 23 | 1 | 3 | 2 | **31** |
| 3 | Pelvis | 17 | - | 2 | 2 | **16** |
| 4 | Lower Extremity | 20 | - | 3 | 2 | **21** |
| 5 | Histology | 15 | - | 1 | 2 | **11** |

\*- 80 % of the questions shall be from the Must Know area and 20 % shall be from the Desirable to Know area of the Curriculum.

**LAYOUT OF ANATOMY QUESTION PAPER - I**

|  |  |  |
| --- | --- | --- |
| **Type of Question** | **Question No.** | **Topics** |
| Long Essay10 Marks | 1 | Head, Neck & Face |
| 2 | Upper Extremity |
| Short Essay5 Marks | 3 | Gen. Anatomy |
| 4 |
| 5 |
| 6 | Brain & Special senses |
| 7 | Embryology |
| 8 | Head, Neck & Face |
| 9 |
| 10 |
| 11 | Upper Extremity |
| 12 |
| Short Answer3 Marks | 13 | Gen. Anatomy |
| 14 |
| 15 | Brain & Special senses |
| 16 |
| 17 |
| 18 | Embryology |
| 19 |
| 20 | Head, Neck & Face |
| 21 |
| 22 | Upper Extremity |

**LAYOUT OF ANATOMY QUESTION PAPER - II**

|  |  |  |
| --- | --- | --- |
| **Type of Question** | **Question No.** | **Topics** |
| Long Essay10 Marks | 1 | Thorax |
| 2 | Abdomen |
| Short Essay5 Marks | 3 | Pelvis |
| 4 |
| 5 | Lower Extremity |
| 6 |
| 7 |
| 8 | Histology |
| 9 | Thorax |
| 10 | Abdomen |
| 11 |
| 12 |
| Short Answer3 Marks | 13 | Pelvis |
| 14 |
| 15 | Lower Extremity |
| 16 |
| 17 | Histology |
| 18 |
| 19 | Thorax |
| 20 |
| 21 | Abdomen |
| 22 |

1. **Practical including Viva voce or oral examination includes the following:**

Distribution of marks Maximum marks: **200 Marks**

1. Knowledge of dissected parts- 20 marks

 2 Specimens (1 above & 1 below Diaphragm) as mentioned in the Annexure- I

Draw & label- 2 X 5 Marks = 10 Marks

Discussion on any one- 10 Marks

2. Viscera- 20 marks

2 Specimens (1 above & 1 below Diaphragm) as mentioned in the Annexure- I

Draw & label- 2 X 5 Marks = 10 Marks

Discussion on any one- 10 Marks

3. Bones- 20 marks

2 Specimens (1 above & 1 below Diaphragm) as mentioned in the Annexure-I

Draw & label- 2 X 5 Marks = 10 Marks

Discussion on any one- 10 Marks

4. Surface Anatomy (Procedural skill & Discussion) 10 marks

5. Spotting 20 marks

1 X-Ray, 2 Histology slides & 1 Embryology model or chart as mentioned in the Annexure- I

Identification- 1 Mark

Anatomical significance- 4 Marks

6. Maintenance of Practical record (Journal) &Dissection card 10 marks

7. Viva voce (Oral) (100 marks)

General Anatomy, Embryology, Histology, Radiographic Anatomy 20 marks

Head, Neck, Face, Brain & Special senses 20 marks

Thorax 20 marks

Abdomen & Pelvis 20 marks

Upper & Lower Extremity 20 marks

**MARKS DISTRIBUTION-**

|  |  |  |  |
| --- | --- | --- | --- |
| **Subject** | **Theory** | **Practical & Oral** | **Grand Total** |
| **Max. Marks** | **Pass Marks** | **Max. Practical Marks** | **Max. Oral Marks** | **Total Practical & Oral** | **Pass Marks** | **Max. Marks** | **Pass Marks** |
| Anatomy | 200 | 100 | 100 | 100 | 200 | 100 | 400 | 200 |

**List of recommended books –**

**Basic Books**

* Garg K, (2013). *B.D. Chaurasia’s Human Anatomy Regional & Applied, Dissection & Clinical. Upper limb & Thorax*. Ed. 6. CBS Publishers & Distributors Pvt Ltd, New Delhi.
* Garg K, (2013). *B.D. Chaurasia’s Human Anatomy Regional & Applied, Dissection & Clinical. Lower limb & Abdomen*. Ed. 6. CBS Publishers & Distributors Pvt Ltd, New Delhi
* Garg K, (2013). *B.D. Chaurasia’s Human Anatomy Regional & Applied, Dissection & Clinical. Head, Neck & Brain.* Ed. 6. CBS Publishers & Distributors Pvt Ltd, New Delhi
* Singh V. (2008). *General Anatomy*. Ed. 2. Elsevier; New Delhi
* Garg K, Indira Bahl, MohiniKaul. (2014) *Textbook of Histology*. Ed. 5. CBS Publishers & Distributors Pvt Ltd, New Delhi
* Halim A. (2011) *Surface and Radiological Anatomy*. Ed. 3. CBS Publishers & Distributors Pvt Ltd, New Delhi
* Khurana A, Khurana I, Garg K (2014). *B.D. Chaurasia’s Dream Human Embryology*, Ed. 2 (Reprint). CBS Publishers & Distributors Pvt Ltd, New Delhi
* Loukas M, Benninger B, Tubbs R S. (2013) *Gray’s Clinical Photographic Dissector of Human Body.* Elsevier; Philadelphia
* Romanes G J. (1986) *Cunningham’s Manual of Practical Anatomy. Upper & Lower limb*. Ed. 15. Oxford Medical Publisher; Oxford
* Romanes G J. (1986) *Cunningham’s Manual of Practical Anatomy. Abdomen & Pelvis*. Ed. 15. Oxford Medical Publisher; Oxford
* Romanes G J. (1986) *Cunningham’s Manual of Practical Anatomy. Head & Neck*. Ed. 15. Oxford Medical Publisher; Oxford

**Reference books**

* Eroschenko VP. (2014) *Di’fiore’s Atlas of Histology with functional correlation*. Ed. 12 (Reprint). Lippincot, William, Wilkins; London
* Gunasegaran JP. (2014) *Text book of Histology & Practical Guide*. Ed. 2(Reprint). Elsevier; New Delhi.
* Hansen JT. (2015) *Netter’s Atlas of Human Anatomy*. South Asian Ed. Elsevier; New Delhi
* Mescher AL. (2013) *Junqueria’s Basic Histology Text & Atlas*. Ed. 13. Lange; New York
* Mortan DA, Peterson KD, Albretine K. (2007) H. *Gray’s Dissection Guide for Human Anatomy.* Ed. 2. Elsevier; London
* Romanes GJ. (1981) *Cunningham’s Textbook of Anatomy*. Ed. 12. Oxford Medical Publisher; Oxford
* Ross & Wilson. (2014) *Anatomy and Physiology in Health and Illness*. Ed. 12. Elsevier; London
* Singh, Inderbir. (2014) *Human Embryology*. Ed. 10. Jaypee; New Delhi
* Singh V. (2014) *Anatomy of Head, Neck & Brain*. Ed. 2. Elsevier; New Delhi.
* Singh V. (2014) *Anatomy of Upper limb & Thorax*. Ed. 2. Elsevier; New Delhi
* Singh V. (2014) *Anatomy of Abdomen & Lower limb*. Ed. 2. Elsevier; New Delhi
* Sinnathamby CS. (2014) *Snell’s Clinical Anatomy for Medical Students*. Ed. 12 (Reprint). Lippincot, William, Wilkins; London
* Standring Susan. (2015) *Gray’s Anatomy The Anatomical Basis of Clinical Practice*. Ed. 41. Elsevier; London
* Tortora GJ &Derrickson B. (2014) *Anatomy & Physiology*. New Delhi: Wiley; New Delhi.

**Annexure- I**

**List of structures topic wise to be kept for Practical Examination-**

**1. Knowledge of dissected parts-**

|  |  |
| --- | --- |
| **Above Diaphragm** | **Below Diaphragm** |
| **Upper Extremity-**Axilla & Cubital fossa | **Lower Extremity-**Femoral triangle, Adductor canal & Popliteal fossa |
| **Thorax-**Para sagittal section of Heart & Mediastinum |
| **Head, Neck, Brain & Bulbus oculi-**Cranial fossae, Anterior & posterior Triangle of Neck & Sagittal section of Brain | **Abdomen & Pelvis-**Sagittal section of Male & Female Pelvis |

**2. Viscera-**

|  |  |
| --- | --- |
| **Above Diaphragm** | **Below Diaphragm** |
| **Thorax-**Lungs, Heart, Trachea & Oesophagus | **Abdomen & Pelvis-**Stomach, Small intestine, Large intestine with vermiform Appendix, Spleen, Liver, Gall bladder, Pancreas, Kidney, Urinary bladder, Prostate, Uterus & Ovary |
| **Head, Neck, Brain & Bulbus oculi-** Brain, Thyroid gland, Parotid gland & Tongue |

**3. Bones-**

|  |  |
| --- | --- |
| **Above Diaphragm** | **Below Diaphragm** |
| **Upper Extremity-**Clavicle, Scapula, Humerus, Radius & Ulna | **Lower Extremity-**Hip bone, Femur, Patella, Tibia & Fibula |
| **Thorax-**Sternum, Typical ribs &Typical thoracic vertebrae | **Abdomen & Pelvis-**Lumbar vertebrae, Sacrum, Male & Female pelvis |
| **Head, Neck, Brain & Bulbus oculi-**Skull, Mandible & Typical Cervical vertebrae | - |

**4. Surface Anatomy-**

|  |  |
| --- | --- |
| **Above Diaphragm** | **Below Diaphragm** |
| **Upper Extremity-**Surface land marks, Axillary, Brachial, Radial & Ulnar arteries, Median, Ulnar, Radial & Axillary nerves | **Lower Extremity-**Surface land marks, Femoral, Popliteal, Anterior &Posterior Tibial & Dorsalis pedis arteries, Sciatic, Tibial & Common peroneal nerves |
| **Thorax-**Surface land marks, Pleura, Lungs & Heart | **Abdomen & Pelvis-**Surface land marks in Abdomen & Pelvis, Quadrants of the abdominal cavity, Stomach, Spleen, Liver, Caecum, Appendix & Kidney |
| **Head, Neck, Brain & Bulbus oculi-**Surface land marks, Common carotid artery, External carotid artery & Thyroid gland |

**5. Spotting-**

|  |  |  |
| --- | --- | --- |
| **Radiographic Anatomy** | **Histology** | **Embryology** |
| **Upper Extremity-** X-Ray of Shoulder region including Clavicle & Humerus- AP view, Elbow including Radius & Ulna- AP view, Wrist & Hand- AP view.**Thorax-** X-Ray of Chest- PA, AP, Lateral & Oblique view,Thoracic spine- AP & Lateral view.**Head, Neck, Brain & Bulbus oculi-** X-Ray of Skull- AP, Lateral & PA view, Cervical spine- AP & Lateral view.**Lower Extremity-**X-Ray of Hip with Femur- AP view, Knee- AP & lateral view,Ankle with Tibia & Fibula- AP & lateral view.**Abdomen & Pelvis-**X-Ray of Plain Abdomen- AP view, Pelvis- AP view,Lumbosacral spine- AP & Lateral view. | Simple & stratified Epithelium, Bone, Cartilage, Skeletal muscle, Cardiac muscle, Artery, Vein, Serous gland, Mucous gland, Mixed gland, Lymph node, Spleen, Thin skin, Thick skin, Trachea, Lung, Oesophagus, Stomach, Small Intestine, Large Intestine, Liver, Gall bladder, Kidney, Testis, Prostate, Ovary, Uterus, Thyroid gland, Pancreas, Suprarenal gland, Cerebrum, Cerebellum, Placenta, Umbilical cord. | **Models/ Charts of** Development of Ovarian follicle, Fertilized Ovum, Spermatogenesis, Cell to Embryo (Blastula, Gastrula, Morula, Blastocyst), Formation of Notochord, Amnion, Chorion & Chromosomes. |

**2) PHYSIOLOGY INCLUDING BIOCHEMISTRY**

**Introduction**

The purpose of a course in physiology is to teach the functions, processes and inter-relationship of the different organs and systems of the normal disturbance in disease and equip the student with normal standards of reference for use while diagnosing and treating deviations from the normal.

To a homoeopath the human organism is an integrated whole of body life and mind and though life includes all the chemico-physical processes it transcends them. There can be no symptoms of disease without vital force animating the human organism and it is primarily the vital force which is deranged in disease.

Physiology shall be taught from the stand point of describing physical processes underlying them in health. There should be close cooperation between the various departments while teaching different systems. There should be joint courses between the two departments of anatomy and physiology so that there is maximum coordination in the teaching of these subjects.

Seminars should be arranged periodically and lecturers of anatomy, physiology and biochemistry should bring home the point to the students that the integrated approach is more meaningful.

**Objectives -**

**Knowledge**

*At the end of the course the student will be able to:*

* Explain the normal functioning of all the organ systems of the body and their interactions.
* Narrate the contribution of each organ system to the maintenance of homeostasis.
* Elucidate the physiological aspects of normal growth and development.
* Describe the physiological response and adaptations to environmental stresses.
* List the physiological principles underlying pathogenesis and treatment of disease.
* Describe the basic and clinical aspects of enzymology and regulation of enzymatic activity;
* Explain the process of digestion and assimilation of nutrients and consequences of malnutrition;
* Discuss the integration of various aspects of metabolism, and their regulatory pathways;

.

**Skills**

*At the end of the course the student will be able to:*

* Perform experiments designed either primarily for the study of physiological phenomena or for assessment of function.
* Analyse and interpret experimental/investigative data critically.
* Distinguish between normal and abnormal data derived as a result of tests which he/she has performed and observed in the laboratory.
* Make use of conventional techniques/ instruments to perform biochemical analysis relevant to clinical screening and diagnosis, analyse and interpret investigative data

**Distribution of teaching – learning hours**

**Theory:**

Physiology : 150 hrs.

Biochemistry : 50 hrs

Total : 200hrs

**Practical:**

Physiology : 150 hrs.

Biochemistry : 50 hrs

Total : 200 hrs.

Tutorial including Group discussion, Seminar : 75 hrs

**TOTAL : 475 hrs.**

**Distribution of Contents:**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Sl.No | Topic | Timing | Must Know | Desirable to Know | Nice to Know |
| 1 | General Physiology and Biophysical science | 5 HRS | Cell membrane composition, structure and its functions. Constituents of cytoplasm | The cell and its differentiation. Tissues and organs of the body  | RNA and DNA with its significance |
| Types of transport across cell membrane.Transport mechanisms as passive and active and difference between them. List and description of the passive transport processes.Simple diffusion of respiratory gases through lipid film.Proton pumps , Secondary active transport: sodium-glucose co-transport (SGLT), sodium amino acid co-transport, sodium-hydrogen exchangers (NHE), sodium-calcium exchangers (NCX), Na/2Cl/K symport (NKCC)Endocytosis- its types & mechanism  | Primary active transport sodium-potassium pump, calcium pumps - plasma membrane calcium pumps (PMCA) and Sarco/endoplasmic reticulum calcium pumps (SERCA) and its significance | Diffusion of ions through ion channels. Sodium, potassium, calcium and chloride channels.Regulation of protein channels - Non-gated channels, voltage-gated channels, ligand-gated channels and mechanogated channels Facilitated diffusion - Glucose transporters (GluTs)Differences between channel and carrier-mediated transport processes, State Fick’s law of diffusion |
| Homoeostasis - concept and maintenance of internal environmentRegulation of Acid base balance by buffer system ( in kidneys & lungs)Maintenance of acid base balance in Blood‘Anion gap’ and its physiological significance | Volatile & Non volatile acids, metabolic acidosis & alkalosis |  |
| Different body fluid compartments, composition, tissue fluids, measurements of different body fluids, measurement of water balance, ECF & ICF volume & values  | Dehydration and replacement of body fluid loss Describe edema and its causes in terms of Starling's forces\* | Difference between tonicity and osmolarity\*\*Starling's forces that govern fluid exchange across the membranes separating the various compartments\*\* |
|  | Biophysical processes –filtration, adsorption, osmosis, osmotic pressure, hydrotropy, colloid,  | Donnan equilibrium, surface tension, absorption and assimilation, |
| 2 | Blood | 1. HRS
 | Composition, and functions of bloodPlasma proteins – classification, properties and function, values, methods of separationPlasmapharesis & its clinical significance | Significance of Albumin to Globulin ratioDifference between plasma & serum | Acute Phase ProteinsSerum Albumin levels with specific examples of disease conditions, Causes of oedema in Kwashiorkor, Liver failure, glomerulonephritis and filariasis in relation to albumin |
| RBC – morhplogy, variations, functions, erythropoeisis- definition, site, stem cells, stages with diagram and factors influencing, life span and fate of RBC’sConditions where RBC increase & decreaseRole of Erythropoeitin  | physiological variations of the normal RBC countDifference between reticulocyte & erythrocyteReticulocyte count and its significance\*Erythrocyte sedimentation rate-its values , variations & significance 4. PolycythemiaDefine Polycythemia rubra vera, Types of Polycythemia , relative polycythemia | sites of erythropoiesis with ageRBC in MalariaExtrinsic & Intrinsic factors in formation of RBCPacked cell volume(Haematocrit value)(RBC indices)\* - MCV, MCH, MCHC, Color index\*Effects of polycythemia |
| Hemoglobin – synthesis, types, derivatives, fate and iron metabolism | 3 Reduced hemoglobin\* and carbon monoxide poisoning\*, Methaemoglobin\*Applied physiology - cyanosis\*. Abnormal hemoglobins. role of Hb in gas transport Haemolysis and Fragility of Red blood cells | sickle cell anemia & Thalassemiairon overloadrole of phototherapy in treating infants with jaundice due to hemolysiscyanosis.jaundice |
| 4.Anaemia Define anemiaClassify anemia based on etiology and morphology, major symptoms and signs  |  |  |
| WBC – classification and morphology and functions of neutrophils, eosinophils, basophils, mast cells; Lymphocytes ,monocytesLeucopoiesis | Differential countConditions in which total leucocyte counts is increased or decreased,each type of WBC are increased or decreased | Arneth count & its significanceDiapedesis and opsonisation |
| RES | ClassificationFunctions | Tissue macrophages |
| Immunity –definition, classification, mechanismImmunization & its types | T and B cells –its types immunoglobulins & their mechanism and state their functionshumoral immunityAntigens and its mechanism in maintenance of immunity | Cytokines & typesDefine Allergy |
| Platelets – structure, life span, values | Properties, functions & formation of platelets | causes and effects of thrombocytopenia. Dengue FeverRole of platelets in hemostasis |
| Hemostasis- definition and stages and coagulation of blood – clotting factors, intrinsic and extrinsic mechanism and anticoagulants, procoagulants | Anti coagulantsanticlotting and fibrinolytic mechanisms in the bodyProthrombin TimeBleeding timeClotting timeBleeding disordersRole of calcium in coagulation | Clot and its retractionThrombosis and EmbolismVitamin-kVon willebrand’s diseasePlasmin |
| Blood volumeMeasurement Regulation | Variations | Hyper and hypovolemia  |
| Blood groupsBlood transfusion – indication, types, modes and hazardsRh system of blood grouping, Rh incompatibility | Erythroblastosis Fetalis, state preventive measure and treatment for the same.Blood banking | minor blood group systems  |
| Spleen | functions | Splenomegaly |
| Lymphatic system and lymphLymphatic circulation | formation and composition of lymph functions of lymph and lymph nodes | pathophysiology of lymphedema |
| 3 | Cardiovascular system | 20 HRS | 1. Physiological anatomy with respect to its chambers, valves, input and output vessels, AV ring and electrical discontinuity, Conducting system, Coronary supply  | Difference between systemic and pulmonary circulation | Junctional tissuesPacemakerFunctions of syncitium of heart |
| 2.Properties of cardiac muscle including conductive system of heart | Starling’s law & its importance | Action potential of cardiac muscleRefractory period Difference between cardiac and skeletal muscles |
| Cardiac cycle – definition, time duration, phases, volume and pressure changes in atria, ventricles, aorta, pulmonary artery and jugular vein. and | End diastolic volume, end systolic volume, ejection fraction. | 3 Arrythmias – typesFibrillation and flutterCurrent of injuryEffects of changes in electrolyte concentration on heart |
| Heart sounds-types | Normal character, causes | . Abnormal heart sounds -Cardiac Murmur  |
| 4. ECG – definition, recording, leads, waves, segments, intervals and significance and vector analysis | Clinical uses of ECG | Calculate rate from a normal ECG tracing |
| 5. cardiac output – definition, values determination of COP, factors influencing, variations, Fick’s principle | Heart Block-types | Cardiac cathetherisation |
| 6.Arterial blood pressure-def, variations, factors,the short-term (neural and hormonal) and long term (renal) mechanisms regulating blood pressure | Measurement of blood pressureHypertensionhypotension | venous and capillary pressureRole of reninKorotkoff’s sounds |
| 8. Heart rate - Regulation Reflexes(Marey’s, Bain-Bridge reflex) | Tachycardiabradycardia |  |
| Pulse-types | Abnormal pulse |  |
| 9.Regional circulation | CoronaryCerebralRenal circulationPulmonary SplanchnicCutaneous circulation Fetal circulation | Cushing reflex |
| Cardiovascular adjustment during exercise | the effects of exercise on the cardiovascular system, mild to moderate and high intensity exercise on the blood pressure and heart rate in a normal subjecthaemorrhage-types & shock – Stages, Manifestations, | Definition of Angina, Ischemia and Myocardial infarction or heart attack. The major ECG changes in: Myocardial ischemia; Myocardial infarction\*\* |
| Hemodynamics  | Types of blood flowFactors maintaining volume of blood flowWind kessel effect | Velocity of blood flow-def, factors maintainingCirculation time- def and condition altering itTheories of autoregulation |
| 4 | Respiratory system | 16 HRS |  | Functional Anatomy and functions of respiratory system.\*- the parts of the respiratory tract, the functions of nose and Para-nasal sinusesDifference between conducting zone and respiratory zone The structure of alveolus & alveolar capillary membrane Non-Respiratory functions of lung\* physiological mechanism of protective reflexes -cough, sneeze and gag reflexes\*The Normal Respiratory Rate  |  |
| Pulmonary circulation:Characteristic features, measurement and regulation of pulmonary blood flow |  | Normal rate of pulmonary blood flow & normal range of pulmonary blood pressures, special features of pulmonary circulation, pulmonary veins,pulmonary vascular resistance, its response to hypoxia (hypoxic vasoconstriction in pulmonary circulation) |
| Mechanics of Respiration:Recoil Of Lungs And Chest WallThe Changes In Alveolar And Intra Pleural Pressures During RespirationLung Compliance And its Relation To Clinical Conditions In Which It Is Altered Work of breathing – utilization of energy | Define Inspiration & Expiration\* The Movements Of Chest Wall And The Changes In Chest Wall dimensions produced By Respiratory Muscles\*The Values Of Intra Alveolar Pressure, Intra Pleural Pressure\* | The Muscles Of Inspiration, Expiration & Accessory Muscles Of RespirationClinical Conditions In Which Work Of Breathing Is increased\*\*Respiratory distress syndrome\*\*Respiratory cycle and transpulmonary pressure |
| Pulmonary Function Tests:Lung volumes and capacities: the normal values and their physiological variations | Recording of the Spirogram with a diagram \* the lung volumes and capacities of a normal subject using a spirometer Discuss the physiological significance of the Residual volume & functional residual capacity with its methods of measurementPeak expiratory flow & state its normal value\* | The Sites Of Air Way Resistance In Obstructive Lung Diseases\*\*.The forced expiratory spirogram and FEV1, FVC and the FEV1/FVC ratio and its variations in obstructive and restrictive lung diseases.\*\*Interpretion of altered values of absolute lung volumes, peak expiratory flow and FEV1/FVC ratio in restrictive and obstructive lung diseases\*\* |
| Ventilation – types, measurement | Define minute ventilation, Dead space- types & its measurement \*Regional differences in perfusion, ventilation & V/Q ratio in the lungs\* | effect of breathing through a tube\*\* (increased anatomical dead space)Alveolar air, inspired air, Expired air. |
|  | Gas Exchange\*- normal composition of atmospheric, tracheal and alveolar air\*, the normal partial pressures of gases in blood entering and leaving lung oxygen uptake and carbon‐dioxide elimination by lungs and the normal rates , respiratory exchange ratio and state its normal value, State the physiological causes for normal alveolar-arterial oxygen difference, Discuss gas exchange during exercise\*. Fick’s law of diffusion | Respiratory quotient\*\* |
| Transport of oxygen - forms of oxygen transport in bloodhemoglobin’s affinity for oxygenoxygen-hemoglobin dissociation curve and the factors affecting it and the physiological advantages of the curve oxygen carrying capacity of blood oxygen content of blood & % oxygen saturation of hemoglobin hypoxemia and hypoxiaTransport of Carbon dioxide: forms of carbon dioxide transport in blood Explain the role of chloride shift and Haldane effect  | Bohr effect\* | oxygen diffusion affection in cases of respiratory membrane thickening\*\*. |
| Control of Respiration: location and functions of the respiratory centres in brain; chemical control of respiration; the role of peripheral and central chemoreceptors; the feedback control of ventilation to regulate gas exchange & maintain normal levels of arterial blood gases and pH. |  |  |
| Disturbances of respiration: hypercapnoea and hypocapnoea , asphyxia  | The physiological basis of types of hypoxia with examples\*cyanosis and conditions in which it occurs and may not occur\*physiological basis of oxygen therapy as treatment for the different types of hypoxias\*Cheyne-stokes breathing, its causes\*.the effect of apnoea & hyperventilation on respiration; and the effect of speech & cough on respiration\*.  | Biot’s breathing\*\*Kussmauls breathing\*\*Oxygen toxicity\*\* |
| Effects Of Exercise - effects of exercise on the respiratory system and the physiological basis of these effectsoxygen debt  |  |  |
|  |  |  | Physiological adaptations in special environments - physiological effects of zero gravity , the physiological basis of Caisson's disease & Nitrogen narcosis , ,physiological adaptations occurring at high altitude  |  | Artificial respiration-types \*\* |
| 5 | Digestive system | 12 HRS |  | Physiological anatomy of GI tract and Accessory organs of Digestive system \*Neural control of G.I function. **\*** Location and components of the enteric nervous system.The functions of the Myenteric plexus and Meissner's plexusEffect of the autonomic nervous system on the enteric nervous system  |  |
| Saliva: Composition, Functions, control of secretion. |  | Xerostomia\*\*Conditioned salivary secretion\*\* |
| Gastric juice: Composition, mechanism of secretion, functions, regulation of secretion, different phases of gastric secretion, Role of chief cells and parietal cells, experimental evidences | mucosal barrier\*, peptic ulcer\*,Gastric glands and their cells | .Gastrectomy\*\*, Dumping Syndrome\*\*, gastric function tests (to be taught in Biochemistry) pernicious anemia and give the reason for the same\*\*. Zollinger Ellison SyndromePepsin, GastrinIntrinsic factorChyme |
|  | Small intestine\*: Properties, Composition & regulation of secretion and functions of intestinal juice. | Brunners glands |
|  | Large intestine\*: Functions and formation of faeces State the importance of dietary fiber | MegacolonDifference between constipation and diarrhea |
|  | Movements of GI tract: Mastication\*, deglutition\*, gastric motility and emptying\*- The process of mixing of food in the stomach, The factors influencing gastric motility and gastric emptying, intestinal peristalsis\*- state the stimuli and factors which influence peristalsis ‘segmentation contractions’ and ‘propulsive contractions’ and their functions, mechanism of vomitingparalytic ileus, defecation | Pathophysiology of diarrheal disease\*\*Gastro-esophageal reflux disorder(GERD)\*\* , Achalasia\*\*Act of belching\*\*Gastro-colic reflex\*\* |
| Pancreatic juice: Composition, properties, functions, regulation, applied physiology-pancreatitis |  | CCK-PZ, Secretin\*\*Pancreatic function tests\*\*Steatorrhea\*\* |
| Liver & Gall Bladder: functions of liver The composition and functions of BileFactors regulating bile secretionnFunction of Gall BladderThe process of Entero-hepatic circulation  |  |  |
|  |  |  | G.I. Hormone - source; functions and regulation of secretion of Gastrin, Cholecystokinin and Secretin  |  |  |
|  |  |  | Digestion & Absorption: Carbohydrates, Proteins And Lipids  |  |  |
| 6 | Renal physiology and skin | 12 HRS | Functional anatomy of kidney and urinary tract, nephron-structure, parts, function, types, diagram, Juxtaglomerular apparatus-cells,Functions of kidney(Excretory & non-excretory) |  | Surface area of Glomerular Capillaries\*\*.Renin\*\* |
| Glomerular filtration and renal blood flow -Describe the following factors affecting glomerular filtration, Pressures determining GFR the factors determining and regulating renal blood flow the mechanisms of autoregulation of renal blood flow and Glomerular filtration rate.the role of the Juxtaglomerular apparatus in the autoregulation of GFR and RBF (TG feedback) and the regulation of blood pressure via the Renin-AT-Aldosterone axis.(Functions of juxta glomerular apparatus) |  | Tm values\*\*Splay\*\* |
| Formation of Urine -.Tubular functions: reabsorption, secretion, PCT: The reabsorption of sodium, chloride and water in the proximal tubule The important sodium transporters in PCT – sodium-glucose cotransporter (SGLT), sodiumaminoacid co-transporter and sodium‐hydrogen exchanger (NHE) in the luminal border, sodium-potassium pump in the basolateral border. The mechanism of glomerulotubular balance The renal handling of glucose, bicarbonate and amino acids in the PCT  The role of Carbonic anhydrase, the sodium‐hydrogen exchanger in luminal border, and the bicarbonate transporter in basolateral border in bicarbonate reabsorption in the PCTFunctioning of the Loop of Henle (LOH) Permeability characteristics of the two limbs of loop of Henle.The role of the Na/2Cl/K transporter and the sodium potassium pump in the thick ascending limb (TAL) The function of the Function of LOH in the creation of hyperosmolar medullary interstitium (MI) by the following two mechanisms:i. Active transport of salt in TAL segmentii. Counter current multiplication of the active transportThe role of the vasa recta in maintaining the hyperosmolarity of the medullary interstitium by counter-current exchange Functioning of the Distal Convoluted tubules (DCT): The regulated reabsorption of sodium (aldosterone-dependent) via Epithelial sodium channels (ENaC) and Na/Cl symporter in luminal borderThe regulated secretion of potassium (aldosterone-dependent) via potassium channels in Luminal border The generation of bicarbonate in the distal tubule,Phosphate and ammonia as urinary buffers Functioning of the Collecting duct (CD): The role of aquaporins in water absorption in the collecing duct.The role of ADH in regulated water absorption.The role of the hyperosmolarity of the medullary interstitium (created by the Loop of Henle) in producing a gradient for water reabsorption in the collecting duct. The role of ADH in urea absorption from the collecing duct, enhancing the hyperosmolarity of Medullary Interstitium. | Types of thresholds\* | The mechanism of action of Loop diuretics (Furosemide) as due to blockade of Na/2Cl/K transporter\*\*The mechanism of diuretics action of thiazide and amiloride\*\* |
| Acidification of urine in Acid base balance - the different buffer systems in the bodyThe role of the kidney in regulation of acid base balance Concentration of urine by different mechanisms |  | Discuss the features of hyperaldosteronism and the occurrence of metabolic alkalosis in the same\*\* |
| 5.Renal function test, Abnormal Constituents Of Urine |  |  |
| 6.Micturition – its nervous control | Cystometrogram\*-recording of intravesical pressure | Higher center regulation of micturition\*\*Abnormalities of micturition\*\* |
|  | Dialysis- Types\*Mechanism of artificial kidney\* |  |
|  | Renal failure- Types & abnormalities |  |
| Skin- Structure, diagram and functions | Glands of skin\*Sebum & its composition\* | Triple response\*\*Piloerection\*\* |
| 8.Body temperature and regulation of body temperature – its mechanism,factors |  | Types of sweating\*\*Fever- its classification,signs & symptoms\*\*Heat stroke\*\* |
| 7 | Endocrinology | 16 HRS |  | General organization of endocrine glands & control systemDefine a hormoneClassification and list the hormones based on chemical nature the target organs for each hormoneThe General mechanism of negative and positive feedback regulation of hormone release The General mechanism of action of hormones including their receptors and second messengers  |  |
| Hypothalamus : the relationship between hypothalamus and pituitary including the hypothalamohypophyseal tract and the hypothalamohypophyseal portal circulationList the various releasing and inhibiting hormones released by the hypothalamus  |  |  |
| Pituitary Gland - List the various hormones secreted by the anterior and posterior pituitary. Growth hormone: List the important actions of growth hormone, its effects on growth and metabolism  the regulation of growth hormone secretion List the important stimuli that can increase or decrease growth hormone secretion Abnormalities of growth hormone secretion: the physiological basis and important features of conditions resulting from abnormal secretion of growth hormone, like gigantism, acromegaly and pituitary dwarfism Prolactin: the actions of prolactin and regulation of prolactin secretion, List the features of excess Prolactin secretion Antidiuretic hormone (ADH) : List the important actions of ADH and Facultative water reabsorption List the physiological stimuli that regulate ADH secretionList the important factors that increase or decrease ADH secretion features of Diabetes Insipidus Oxytocin -List the important actions of oxytocinList the stimuli for its secretion , regulation of secretion of Oxytocin FSH& LH – Functions & regulation of secretion |  | List the causes and describe features of panhypopituitarism and syndrome of inappropriate hypersecretion of antidiuretic hormone (SIADH) \*\* |
| Thyroid Gland -List the important steps involved in the synthesis of thyroid hormones, the transport of thyroid hormones The mechanism of action of thyroid hormones The important actions of thyroid hormones  The regulation of thyroid hormone secretionList the causes for and the features of Hyposecretion and hypersecretion of thyroid hormones, The physiological basis for Simple Goitre, List the differences between dwarfism and cretinism the important thyroid function tests and its clinical use Calcitonin - Mention the gland and cells secreting Calcitonin List the actions of calcitonin on calcium metabolism  |  |  |
| Parathyroid Gland - Mention the target cells of parathyroid hormoneList the major actions of parathyroid hormone the regulation of secretion of parathyroid hormone List the causes of and features of hypoparathyroidism/tetany Differentiate between Tetanus and TetanyList the features of primary hyperparathyroidismList the causes for secondary hyperparathyroidism Vitamin D- the sources of Vitamin D.the important actions of vitamin D. role as an immunomodulator. the regulation of vitamin D synthesis.List the features of vitamin D deficiency in children and in adults – Rickets and Osteomalacia Calcium Homeostasis - The normal level of serum calciumThe role of bones and its cells in calcium homeostasis The organs and hormones involved in calcium homeostasis and their roles  |  |  |
| Adrenal Gland Adrenal Cortex: List the hormones secreted by the different layers of the adrenal cortex Glucocorticoids: List the important glucocorticoids The mechanism of action of glucocorticoidsList the major actions of glucocorticoids The regulation of glucocorticoid secretionList the causes of and the features of excess Glucocorticoid secretion Minearalocorticoids: List the important mineralocorticoidsThe mechanism of action of mineralocorticoids on its target cells The important actions of mineralocorticoidsList the physiological stimuli that regulate mineralocorticoid secretionThe regulation of mineralocorticoid secretionList the features of primary hyperaldosteronism or Conn’s syndromeAdrenal insufficiency: List the causes of and describe features of Addison’s disease Adrenal medulla: List the physiological effects of epinephrine and nor‐epinephrine on various systems of the body List the factors that regulate the secretion of adrenal medullary hormones List the features of Phaeochromocytoma  |  | Adrenaline effects on CNS & Blood pressureAdrenal sex hormones - Exogenous steroids \*\* |
|  |  |  | Endocrine Pancreas: List the cells of the Islets of Langerhans and mention the hormone secreted by each Insulin: The steps in biosynthesis of Insulin and the origin of the C‐peptide (Connecting peptide) The physiological stimulus for Insulin secretionThe activation of islets by its physiological stimulus resulting in Insulin secretionList the target cells of Insulin and the cells that do not require insulin action for glucose uptake The mechanism of action of Insulin on its receptorList the important actions of insulinList the various factors that regulate insulin secretion Features of hypersecretion of Insulin and Hypoglycemia Glucagon : List the important actions of glucagon |  | Diabetes Mellitus: Insulin deficiency leading to high blood sugar level the pathophysiological effects of high blood sugar and insulin deficiency\*\* Type I and Type II Diabetes Mellitus and their complications \*\*Hypoglycemia : List the feature of hypoglycemia and the counter regulatory hormones List the hormones that raise blood sugar level |
|  |  |  | Atrial natriuretic peptide (ANP) List the important actions of ANPList the physiological stimuli for ANP secretion Mention the role of hypothalamus and melatonin on circadian rhythm  | Pineal gland \* Thymus gland\* |  |
| 8 | Reproductive system | 8 HRS | 1.Male reproductive system – testis and its hormones,  | cryptorchidism\*, male hypogonadism and hypergonadism\*, Stages of spermatogenesis and its factors regulating them\*Source, synthesis, metabolism and functions of androgen & testosteroneprostrate gland and its functions\*seminal vesicles and its functions \*, semen-qualities, composition and ejection mechanism in fertilization\* | Serotoli cells\*Infertility\*\* |
| Female reproductive system: ovary, oogenesis, ovulation, corpus luteum, ovarian hormones – oestrogen, progesterone, relaxin,its functions, control of ovarian functions by hypothalamic and pituitary hormones. | Menopause and changes\*.  | Fertility control-by different methods\*\* |
| Menstrual cycle: ovarian cycle, uterine cycle, hormonal basis | Pregnancy-changes, maintenance of pregnancy by hormones\*: Fertilization, implantation, Placenta, placental hormones, parturition- role of hormones.\* | Abnormalities of menstruation\*\*Fetoplacental unit\*\*HCG\*\*Pregnancy tests\*\* |
|  | Lactation\*Mechanism, hormonal regulation and the development of mammary glands | Composition and advantages of breast milk\*\* |
|  | Fetal circulation\* |  |
| 9 | Central nervous system | 25 HRS | Organization of nervous system, Classification of nervous system and the components of the following divisions: CNS, PNS Somatic NS,Autonomic NSMorphology of different types of neurons with structure, diagram , the process of myelination and its significance . Define the terms ‘nuclei’ and ‘ganglia’. |  |  |
| Properties of Nerve fibres- Resting membrane potential (RMP) of a nerve cell. ‘receptor or generator potential’ in a sensory receptor‘Action potential’ and the currents responsible for the different phases of the action potential in the neuron.Process of transmission of action potential in unmyelinated and myelinated neurons. Factors affecting conduction velocity in a nerve.  |  | Nerve fibres:ClassificationEhrlanger & Gasser’s classification of peripheral nerve fibres\*\*Node of ranvier\*\*Salutatry conduction\*\* |
| Nerve Injury, Degeneration And Regeneration Of Injured Fibres |  |  |
| Neuroglia-definition, classification and Properties | Basal ganglia: components, connections, functions, applied Physiology\*. |   |
| Synapse –Definition,types,structure and functions. Define the terms electrical & chemical synapseDescription of the morphological features of a chemical synapse – pre and post synaptic neurons ‘excitatory or inhibitory post-synaptic potentials (EPSP and IPSP)’ in a synapse List the morphological types of chemical synapse – axosomatic, axodendritic and axoaxonic and its properties | Properties of synapse\*:One-way conductionSynaptic delayConvergence and Divergence of synapsesSpatial summationTemporal summationDefine the term synaptic spasticityDescribe the differences between Pre-synaptic and post-synaptic inhibition.Define the term Pre-synaptic facilitation. | Bell-Magendie law\*\*Synaptic fatigue\*\* |
| Receptors: classification,List the properties,Define generator potential or receptor potential,mechanism of sensory transduction | Neurotransmitters\*–Definition, criteria for nuero transmission, Classification, Transport and release ,Important Nuero transmittors-o GABAo Glycineo Dopamineo Serotonin or 5-HTo Acetylcholineo Noradrenalin, | Nueromodulators\*\* |
| Reflex action: definition, reflex arc,Classification,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. Polysynaptic reflexes: withdrawal reflex.  |  | Babinski sign\*\*Clonus-types\*\* |
| Sensory system: touch, pain, temperature, vibration, sensory cortex |  | Gate control theory\*\*Dermatome\*\*Leminnsci\*\* |
| Physiology of Pain: types, visceral pain, pain inhibiting mechanism, gating of pain, opioids, analgesia, hyperalgesia, thalamic syndrome  |  | Referred pain\*\*, Phantom limb pain\*\* |
| Tracts- Ascending and descending tracts – pyramidal & extrapyramidal tracts,details of each tracts – (situation & extent in spinal cord, origin, course & termination, collaterals, somatotopic arrangement, functions, applied aspect, tests)Define the term ‘Sensory and Motor homunculus’. Sensation, pathway from head, face region.Description of the features and physiological basis of upper motor neuron lesion and lower motor neuron lesion, differences between UMN & LMN lesions.  | Spinal cord- white matter and grey matter with nuclei , Tabis dorsalis\*, syringomyelia\*, section of anterior root & posterior root. | Definiton –paralysis and describe the types (hemiplegia, paraplegia, monoplegia ,Hemiparesis, quadriparesis & paraparesis)\*\*Brown- Sequerd syndrome\*\*Multiple sclerosis\*\*Disc prolapsed\*\* |
| Cerebral cortex Identify the major somatic and special sensory, motor & association areas in the cortex.Recognize the somatotopy of the motor and somatic sensory areas (homunculi) Recognize the phenomena of hemispheric specialization (dominance), handedness. Define the role of corpus callosum – inter-hemispheric transfer of information.  |  | Hominuculus\*\*Kaluvrbucy syndrome\*\* |
| Muscle tone, posture, equilibrium, regulation of muscle tone & posture, vestibular apparatusProprioceptors |  | Golgi tendon reflex |
|  | Cerebellum: structure, parts, connections, functions,.cerebellar function tests. | Features of cerebellar lesion\*\*(NystagmusDysarthriaDysmetriaAtaxiaAdiadochokinesia) |
| Limbic system- the components of Limbic system, the Functions of the limbic system. The central role of amygdala |  | Papez circuit\*\* |
| Autonomic nervous system: organization and functions |  | EEG\*\*Blocks & Rythms\*\* |
| Hypothalamus: structure & functions |  | Narcolepsy,catalepsy,circadian rhythmReward and punishment centres |
| Thalamus, List the groups of thalamic nuclei. outline of connections of thalamus, function |  | Thalamic syndrome |
| Physiology of sleep and wakefulnessSleep-types,theories and its mechanism. |  | Disorders of Sleep\*\* |
| Higher functions of the brain: learning & memory, speech-typesDefine the role of Wernicke’s & Broca’s areas in language & speech Define aphasia and state the site of lesion in motor and sensory aphasia |  | Alzheimers disease\*\*Dementia\*\*Retrograde amnesia\*\*Aphasia\*\* |
| Define brain stem and its parts |  | Red nucleus |
| Define reticular formation, functions, ascending reticular activating system |  |  |
| 20.  Cerebrospinal fluid-Definition, formation, properties, composition, circulation, absorption and functionsBBB and significance |  |  |
| 10 | Special senses | 10 HRS | Vision : List Of The Structures Within The Eyeball.The Extraocular Muscles And their Functions. The Functions Of Iris, Ciliary Body, Intra-Ocular Muscles, Lens, Aqueous Humor, Vitreous Body And Optic Nerve. The Formation And Drainage Of Aqueous Humor. | Functions of lacrimal gland\*, rhodopsin\*The Normal Range Of Intraocular Pressure\* , Glaucoma and its types\*, Cataract and its symptoms\* | Theories of colour vision & hearing \*\*List the extraocular muscles and describe their actions\*\*Nyctalopia\*\*Blind spot\*\* |
| Optics of eye: List the structures through which light passes before falling on the retina the important refracting surfaces of the eye and the extent of contribution of each to image formation.State that the image formed on the retina is inverted and diminished in size. the role of crystalline lens in focusing the light rays and the changes that happen while focusing a near object – accommodation reflexList the common refractive errors – Myopia, hypermetropia, presbyopia and astigmatismDescribe the cause for the refractive errors and their correction |  |  |
| Retina: List the retinal cells contributing to the visual pathway. (photoreceptors, bipolar cells and ganglion cells)optic disc, macula lutea and fovea as important structural features in the retina Classification of photoreceptors – Rods and cones major structural and functional differences between rods and cones .Describe the distribution of rods and cones in the retina. Snellen’s chartLight & Dark adaptation - changes that happen during dark and light adaptation.  |  |  |
| Colour vision: Name the types of photoreceptors responsible for colour vision, Classification of cones based on their spectral sensitivityList the types of colour blindnessThe use of Ishihara’s chart to check for colour blindness  |  |  |
|  |  |  | Optic pathway: The optic pathway from the photoreceptors to the visual cortex and the visual field defects produced by lesions at various levels of the pathway  |  |  |
|  |  |  | Pupillary reflexes: the pupillary light reflex pathwayDifference between direct and consensual pupillary light reflexes, the accommodation reflex pathwayList the features of Horner’s syndromeArgyll-Robertson pupil  |  |  |
|  |  |  | Eye movements: Name of the cranial nerves innervating the extraocular muscles , Assessment of normal eye-movements |  |  |
|  |  |  | Hearing : Functional anatomy of the ear, List different parts of the ear.Mention functions of outer earStructure of middle ear & the role of middle ear in impedance matchingList structures within the inner ear and specify their functions the importance of attenuation reflex  | Sound Localization\*, Pitch Discrimination\*, Deafness\*. |  |
|  |  |  | Structure and Functions of cochlea: the ‘travelling wave theory’ of hearing the function of basilar membrane in frequency discrimination - 'Place principle' of hearing Processing of auditory signals |  |  |
|  |  |  | Describe the auditory pathway |  |  |
|  |  |  | Assessment of hearing: Define an audiogram, conductive hearing loss and sensory neural hearing loss, the principle of Rinne’s and Weber’s test |  |  |
|  |  |  | Vestibular Apparatus: Functional anatomy of vestibular apparatus, List the structures which make up vestibular apparatus and their functions, Mechanism of stimulation vestibular hair cells: the mechanism of stimulation of otolith organs - deflection of hair cells using gravitational force/inertial force of otolith membrane the mechanism of stimulation of semicircular canals - deflection of hair cells using inertial force of endolymph Vestibular pathway: The connections of vestibular nucleus to the cortex and cerebellumThe Projections Through Vestibulospinal TractsThe Functions Of Vestibular System - Maintenance Of Balance, Equilibrium And Posture  |  |  |
|  |  |  | Smell: The arrangement of olfactory sensory neuron within the olfactory epithelium ,List the types of cells within the olfactory bulbThe Connections Of Olfactory Sensory Neurons With Cells In The Olfactory Bulb,The Olfactory Pathway From The Olfactory Sensory Neurons To The Cortex  |  | Abnormalities of olfactory and taste sensation\*\* |
|  |  |  | Taste: The Arrangement Of Taste Cells Within Taste Buds And Organization Of Taste Buds Within Papillae.List the four basic qualities of taste sensation Test For The Four Basic Qualities Of Taste Sensation The taste pathway from the anterior two-third and posterior one- third of the tongue to the gustatory cortex  |  |  |
| 11 | Nerve muscle physiology | 8 HRS |   | Functional anatomy of skeletal muscle\*.-the structure of sarcomere **, actin filament**, myosin filament, I band, A band, H band, Z line and sarcomere Structure and function of the sarco-tubular systemFunctions of contractile and regulatory proteins involved in muscle contraction \*, Composition of muscle, muscle mass, muscle fiber\*Types of smooth muscles and mechanism of contraction\*.EMG \*Compare structural differences and similarities between skeletal, cardiac and smooth muscle\*, similarities and differences in the mechanism of contraction of skeletal, cardiac and smooth muscle \* | Myohemoglobin\*\* Fibrillation and fasciculation\*\* |
| Properties of skeletal muscles , simple muscle curveFrank-starling law | Contractions and types- Isotonic & isometric contraction\*Chronaxie, rheobase and utilization time\* | Rigor mortis, tetanus, fatigue. |
| Mechanism of muscle contraction and relaxation, molecular basis of muscle contraction, contracture, rigor mortis, , motor unit, events involved in excitation contraction coupling. Calcium transporters in muscle cells, effects of pre and after load. Thermal and Chemical changes during muscle contraction |  |  |
| Neuron: Structure in briefNeuromuscular junction - the structure of the neuromuscular junction, Diagramevents involved in neuromuscular transmission | Myasthenia gravis\*Muscular Dystrophy\*\* | Neuromuscular blockers\*\*Motor unit significance\* |

**Bio Chemistry**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Sl No** | **Topic** | **Time** | **Must Know** | **Desirable to Know** | **Nice to Know** |
| 1 | **Introduction to Biochemistry** | 1hr | Define Biochemistry. scope in clinical practice of Homeopathy |  |  |
| 2 | **Carbohydrates****Chemistry**  |  | Definition, Classification with suitable examples | functions of CarbohydratesMucopolysaccharidesdisaccharides and polysaccharidesInvert sugar |  |
| 3 | Lipids Chemistry  |  | classification | Functions of LipidsBiological importance of triacyl glycerol, phospholipids, glycolipids, fatty acids (PUFA), prostaglandin steroids and lipoproteins. Ketosis and KetonemiaBrown fat.ProstaglandinsLungs surfactantsRancidity |  |
| 4 | proteins Chemistry  |  | Definition, classification of amino acids | Biologically important peptides-classification, properties Biological importance of proteins. Structural organization of proteinsDenaturation of Proteins essential amino acids |  |
|  |  |  |  |  | Semi essential amino acids |
| **6** | **Enzymes** |  | Classification with suitable examples.General properties of Enzymes | Enzyme Inhibition with examplesDifferent mechanisms of Enzyme Action.Diagnostic Enzymes with Clinical Significance, Diagnostic Enzymes in Myocardial infarctionIsoenzymesProenzymesDigestive EnzymesMention the Factors affecting enzyme activity.Competitive Enzyme Inhibition |  |
| **7** | **Biological Oxidation** |  | Respiratory Chain (Mitochondrial Electron Transport ChainOxidative Phosphorylation and sites ATP synthesis  | Biological OxidationRespiratory Chain role of Inhibitor and Uncouplers |  |
| 8 | **Vitamins** |  | Define Vitamins. Classify Vitamins. daily requirement General properties of VitaminsThe Sources, RDA, Biochemical functions and Deficiency manifestations of Vitamin A.,D and C | functions and Deficiency manifestations of Niacin Thiamine, folic acidCynocobalamin Vitamin B12, pyridoxine. Vit E.Absorption of Vit B12.Pernicious AnemiaAntivitaminesWalds Visual Cycle Antioxidants with exampleshypervitaminosis.  |  |
| 9 | Carbohydrate Metabolism |  | digestion and absorption of carbohydrates | Synthesis and break down of Glycolysis, Citric acid cycleGluconeogenesis, HMP shunt pathwayMetabolism of Glycine. Blood sugar level and its regulation, oral GTT and glycosuria, Biochemistry of diabetes mellitus | Pentose phosphate pathway |
| 10 | Lipid Metabolism |  | Digestion and absorption of Lipids | Beta oxidation, biosynthesis of saturated fatty acids only, cholesterol biosynthesis, transport (role of HDL & LDL) Excretion, Adipose tissue metabolism Ketogenesis Ketolysis and Ketosis | Cholesterol biosynthesis. Fatty acid synthesisLipolysis and re-esterification, fatty liver and atherosclerosis. |
| 11 | Protein Metabolism |  | digestion and absorption ofProtiens | Fate of amino acid in the body (Deamination, Transmination, Transdeamination,Decarboxylation) Fates of ammonia (Urea cycle, glutamine formation), | Pathways of synthesis and catabolism of amino acids other than aromatic and sulphur-containing amino acids Purine and pyrimidine synthesis.Synthesis of phospholipids, prostaglandins and the related moleculesMetabolism of aromatic and sulphur containing amino acids and their inborn errorsUronic acid pathway |
| 12 | Mineral Metabolism |  | Study of (i) Calcium and phosphorous (ii) sodium, potassium & chloride | Study of; (iii) magnesium, copper & iodine; (iv) Iron, (v) manganese, selenium, zinc & fluoride. Their importance in body in brief.  |  |
| 11 | Water and electrolyte |  |  | Water and electrolyte balance and imbalance. Acid base balance and imbalance |  |
| 12 | Function tests |  | Function tests - (i) Liver function tests, (ii) Kidney function tests (iii) gastric function test |  |  |

**Practical skills**

**Competencies at the end of practicals in Physiology and Biochemistry:**

* Use and handle microscope for methodical focusing
* Recognise importance of chemical laboratory hazards and safety measures in laboratory practice
* Perform laboratory procedures accurately with documentation of results

**Objectives:**

*At the end of the course in physiology and biochemistry, the student will be able to:*

* Collect and store specimens for various laboratory tests
* Perform with accuracy and reliability basic haematological estimations
* Perform complete urine examination
* Document and present laboratory values of common investigations

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Sl. No** | **Topic** | **Time** | **Must Know** | **Desirable to Know** |
| 1 | Haematology | 80 | 1.    Study of compound microscope2.    Introduction to haematology3.    Collection of blood sample4.    Estimation of haemoglobin5.    Hemocytometry6.    Total RBC count7.    Total leucocytes count 8.  Preparation and examination of blood smear 9.       Differential Leucocyte count *10.*  Determination of erythrocyte sedimentation rate (demonstration)11.     *D*etermination of blood group *(demonstration)*12.     Determination of bleeding time and clotting time | 1.Absolute eosinophil count 2. Platelet count 3.Reticulocyte count4.    Determination of hematocrit (demonstration)5.   Determination of Blood indices (demonstration)6.  Osmotic fragility of red cells (demonstration)  |
| 2 | Human experiments  | 60 | 1. General examination
2. Respiratory system – clinical examination,
	1. spirometry,
	2. stethography
3. Gastrointestinal system – clinical examination
4. Cardiovascular system – blood pressure recording, radial pulse, , clinical examination
	1. ECG
5. Nerve muscle physiology – Mosso’sergography, handgrip dynamometer (demonstration)
6. Nervous system – clinical examination

7.   Special senses – Clinical examination | Reproductive system – diagnosis of pregnancy (demonstration)          |
| 3 | Biochemistry | 60 | 1. Demonstration of uses of instruments or equipment
2. Qualitative analysis of carbohydrates and proteins (Analysis of lipid is presently not done)
3. Normal characteristics of urine
4. Abnormal constituents of urine
5. Demonstration practical
 | 1. Qualitative estimation of glucose, total proteins, uric acid in blood
2. Liver function test
3. Kidney function test
4. Lipid profile
5. Interpretation and discussion of results of biochemical tests
 |
| 4 | Tutorials/seminar/inter departmental symposium | 75 |    |

**B.**

**Theory Examination**

|  |  |  |  |
| --- | --- | --- | --- |
| **Types of question** | **No. Of questions** | **Marks per question** | **Total** |
| Long Essays | 02 | 10 | 20 |
| Short essays | 10  | 05 | 50 |
| Short Answers | 10 | 03 | 30 |

**Question Paper Blueprint for Paper 1**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Sl No** | **Topic** | **Must Know** | **Desirable to Know** | **Long Essay** | **Short Essay** | **Short Answer** | **Total Marks** |
| 1 | General Physiology and Biophysical science | 3 | 3 | 0 | 0 | 2 | 6 |
| 2 | Body Fluids and RE System | 3 | 3 | 0 | 0 | 2 | 6 |
| 3 | Blood | 15 | 3 | 1 | 1 | 1 | 20 |
| 4 | Cardiovascular system | 15 | 3 | 1 | 1 | 1 | 20 |
| 5 | Respiratory System | 15 | 6 | 0 | 3 | 2 | 20 |
| 6 | Renal Physiology | 10 | 6 | 0 | 2 | 2 | 15 |
| 7 | Skin and Regulation of Body Temperature | 10 | 0 | 0 | 2 | 0 | 5 |
| 8 | Nerve muscle physiology | 5 | 0 | 0 | 1 | 0 | 8 |
| **Total** | 76 | 24 | 2 | 10 | 10 | 100 |

**Question Paper Layout for Paper 1**

**Long Essay : 2 X 10 = 20 Marks**

|  |  |
| --- | --- |
| 1 | Blood |
| 2 | CVS |

**Short Essay : 10 X 5 = 50 Marks**

|  |  |
| --- | --- |
| 3 | Blood |
| 4 | CVS |
| 5 | Respiratory system |
| 6 |
| 7 |
| 8 | Renal physiology |
| 9 |
| 10 | Skin and regulation of body temperature  |
| 11 |
| 12 | Nerve muscle physiology |

**Short Answer : 10 X 3 = 30 Marks**

|  |  |
| --- | --- |
| 13 | General physiology and biophysical sciences |
| 14 |
| 15 | Body fluids and RE System |
| 16 |
| 17 | Blood |
| 18 | CVS |
| 19 | Respiratory system |
| 20 |  |
| 21 | Renal physiology  |
| 22 |

**Question Paper Blueprint for Paper 2**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Sl No** | **Topic** | **Must Know** | **Desirable to Know** | **Long Essay** | **Short Essay** | **Short Answer** | **Total Marks** |
| 1 | Digestive System and Metabolism | 10 | 5 | 0 | 3 | 0 | 15 |
| 2 | Endocrinology | 10 | 5 | 1 | 1 | 0 | 15 |
| 3 | Reproductive System | 5 | 6 | 0 | 1 | 2 | 10 |
| 4 | Central Nervous System | 13 | 3 | 0 | 2 | 2 | 20 |
| 5 | Special Senses | 8 | 3 | 0 | 1 | 2 | 10 |
| 6 | Biochemistry | 20 | 6 | 1 | 2 | 2 | 25 |
| 7 | Nutrition | 6 | 0 | 0 | 0 | 2 | 5 |
| Total | 72 | 28 | 2 | 10 | 10 | 100 |

**Question Paper Layout for Paper 2**

**Long Essay : 2 X 10 = 20 Marks**

|  |  |
| --- | --- |
| 1 | Endocrinology |
| 2 | Biochemistry |

**Short Essay : 10 X 5 = 50 Marks**

|  |  |
| --- | --- |
| 3 | Digestive system |
| 4 |
| 5 |
| 6 | Reproductive system |
| 7 | CNS |
| 8 |
| 9 | Special senses |
| 10 | Endocrinology |
| 11 | Biochemistry |
| 12 |

**Short Answer : 10 X 3 = 30 Marks**

|  |  |
| --- | --- |
| 13 | CNS |
| 14 |
| 15 | Special senses |
| 16 |
| 17 | Reproductive system |
| 18 |
| 19 | Nutrition |
| 20 |
| 21 | Biochemistry  |
| 22 |

**Practical skills**

**Competencies at the end of practicals in Physiology and Biochemistry:**

* Use and handle microscope for methodical focusing
* Recognise importance of chemical laboratory hazards and safety measures in laboratory practice
* Perform laboratory procedures accurately with documentation of results

**Objectives:**

*At the end of the course in physiology and biochemistry, the student will be able to:*

* Collect and store specimens for various laboratory tests
* Perform with accuracy and reliability basic haematological estimations
* Perform complete urine examination
* Document and present laboratory values of common investigations

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Sl. No** | **Topic** | **Time** | **Must Know** | **Desirable to Know** |
| 1 | **Haematology** | 80 | Study of compound microscopeIntroduction to haematologyCollection of blood sampleEstimation of haemoglobinHemocytometryTotal RBC countTotal leucocytes count Preparation and examination of  blood smear Differential Leucocyte count Determination of erythrocyte sedimentation rate (demonstration)Determination of blood group (demonstration)Determination of bleeding time and clotting time | Absolute eosinophil count Platelet count Reticulocyte countDetermination of hematocrit (demonstration)Determination of Blood indices (demonstration)Osmotic fragility of red cells (demonstration)  |
| 2 | **Human experiments**  | 60 | General examinationRespiratory system – clinical examination: spirometry, stethographyGastrointestinal system – clinical examinationCardiovascular system – blood pressure recording\*, radial pulse,\* clinical examination: ECG Nerve muscle physiology – Mosso’s ergography, handgrip dynamometer (demonstration)Nervous system – clinical examination reflexes\*Special senses – Clinical examinationBody temperature\* | Reproductive system – diagnosis of pregnancy (demonstration)        |
| 3 | **Biochemistry** | 60 | Demonstration of uses of instruments or equipmentQualitative analysis of carbohydrates and proteins (Analysis of lipid is presently not done)Normal characteristics of urineAbnormal constituents of urineDemonstration practical | Qualitative estimation of glucose, total proteins, uric acid in bloodLiver function testKidney function testLipid profileInterpretation and discussion of results of biochemical tests |
| 4 | **Tutorials/seminar/inter departmental symposium:** 75 hours |

**Practical Examination: Maximum Marks (including Viva): 200 Marks**

|  |  |
| --- | --- |
| 2.2.1. **Haematology (any one): 15 marks** | Time |
|  | Hemoglobin estimation, RBC total count, bleeding time, clotting time, WBC total count/differential  | Procedural skills: 5 marks Practical skills: 5 marksDiscussion: 5 marks | 25 to 30 minutes |
|  2. | **Examination of urine for chemical constituents** (any one): 15 marks |
|  |  (Glucose, Albumin, Ketone Bodies, Bile Salt, Bile Pigments)  | Practical skills: 5 marksIdentification of glucose and Protein in a given solution: 5marksDiscussion 5 marks |  |
| 2.2.2 | Spotters (any six – three from physiology and three from biochemistry): 30 marks |
|  | Hb Pipette; Albuminometer; Neubauer counting chamber; RBC pipette; Sahli’s Hbmeter; Urinometer; WBC pipette; Westergren tube; Wintrobe tube; Tuning fork; ECG machine; Glucometer; Stethograph; Sphygmomanometer-mercury and dial type; Snellen chart; Ischiara color plates; Dynamometer; Knee hammer; Tonometer; Thermometer - mercury /digital | Identification: 1Description: 2Uses : 33 minutes for each spotting |
| 2.2.1. Clinical or Applied Physiology: 20 Marks |
|  | Examination of Blood pressure, Pulse, Temperature, Reflexes  | Procedural Skills 05 marks Practical Skills 05 maks Discussion 10 marks |  |
| 2.2.4. | Journal or Practical record | Physiology: 10 Marks |
| Biochemistry: 10 Marks |
| 2.2.5 | Viva voce (oral) | 50 Marks |

**Basic Books**

* Ambika Shanmugam *(2012) Fundamentals of Biochemistry for Medical students*,7th edition Lippincott Williams & Wilkins. Philadelphia
* ChaudhuriSK (2006). *Concise Medical Physiology*, 5th Edition New Central Book Agency (P) Ltd, Kolkatta
* Hall JE (2010). *Guyton and Hall Textbook of Medical Physiology*, 12th edition. Saunders. Philadephia
* Rama Rao (2002) *Text book of Biochemistry*, UBS Publishers & Distributors Pvt. Ltd., New Delhi
* Sembulingum and Prema Sembulingam(2012). *Essentials of Physiology*,6th edition Jaypee Brothers medical publishers, New Delhi

**Reference Books**

* Bickley LS (2009). *Bates’ Guide to Physiology Examination And History Taking* illustrated 10th edition J.B. Lippincott Com, Philadelphia
* Bijlani (2004)*. Understanding Medical Physiology* 3rd edition Jaypee Brothers Medical Publishers, New Delhi
* Chatterjee CC (2007). *Human Physiology Vol I &II* .Medical Allied Agency, Kolkatta
* Chatterjee MN & Shinde R (2005) *Textbook of Medical Biochemistry* 6th edition Jaypee Brothers, New Delhi
* Deb AC (2006). *Fundamentals of Biochemistry* 8th edition New Central Book Agency (P) Limited, Kolkatta
* GanongWF (2005). *Review of medical physiology,* Lange Medical Publications, New York
* Keele CA, Neil E & Joels N (1982). *Samson Wright's applied physiology* 13th edition Oxford Medical Publications, Oxford
* Murray RK, Granner DK, Mayes PA, Rodwell VW (1993), *Harpers Biochemistry* 23rd Edition. Prentice-Hall International, London
* Pal GK (2009). *Textbook of Medical Physiology* Ahuja Book Publishers and Distributors, New Delhi
* Satyanarayan U & Chakrapani U (2014). *Textbook of Biochemistry.* 4th revised edition. Elsevier Health Sciences, New Delhi
* Swash M (2012). *Hutchison's clinical methods* 23rd Edition ELBS with W.B. Saunders co, Philadelphia
* Tortora GJ, Derrickson BH (2011). *Principles of Anatomy & Physiology* 13th edition Wiley, Hoboken, NJ
* West JB (2011).  *Best & Taylor’s Physiological basis of medical practice* 13th edition, Lippincott Williams & Wilkins, Philadelphia

**Appendix – Checklist for practical skills**

**Blood Pressure Measurement Procedure**

|  |  |  |
| --- | --- | --- |
| **Observation** | **Yes** | **No** |
| Performed beginning tasks- CONSENT |  |  |
| Cleaned earpieces of stethoscope. |  |  |
| Positioned subject sitting or lying. |  |  |
| Made sure the room was quiet |  |  |
| Selected the appropriate size cuff and applied it directly over the skin, above the elbow. |  |  |
| Positioned the stethoscope over the brachial artery. |  |  |
| Inflated the cuff per the instructor’s direction. |  |  |
| Identified the systolic and diastolic measurements while deflating the cuff. |  |  |
| Deflated the cuff in a timely manner. |  |  |
| Re-measured, if necessary, to determine the accuracy (waited one minute if using the same arm or use the other arm, if appropriate). |  |  |
| Recorded blood pressure measurement to be compared with the blood pressure recorded by the evaluator. |  |  |
| Performed completion tasks. |  |  |

**Discussion**

* Importance of positioning the subject
* When is systolic identified?
* When is diastolic identified?
* What are the precautions taken while recording the blood pressure?
* What are the different methods of recording blood pressure?
* Korotkoff sounds and their cause
* Physiological variations in blood pressure
* Advantages and disadvantages of palpatory method
* Auscultatory gap

**Procedure for measuring Radial Pulse**

|  |  |  |
| --- | --- | --- |
| **Observation** | **Yes** | **No** |
| Performed beginning tasks |  |  |
| Positioned resident, sitting or lying down. |  |  |
| Located radial pulse at wrist. |  |  |
| Placed fingers over radial artery. Student does this first, then evaluator locates pulse on opposite wrist. |  |  |
| Determined whether to count for 30 seconds or 60 seconds. |  |  |
| Counted pulsations for 30 seconds and multiplied the count by 2; or for one minute if irregular beat. Student must tell when to start and end count. |  |  |
| Recorded the pulse rate within + or – two beats per minute of pulse rate recorded by evaluator. |  |  |

**Discussion**

* [Radial pulse definition](https://www.google.co.in/search?biw=1280&bih=633&q=radial+pulse+definition&revid=1708533959&sa=X&ved=0ahUKEwisqd-huu3JAhUKBY4KHdRFCNkQ1QIIUCgA)
* [Radial pulse examination](https://www.google.co.in/search?biw=1280&bih=633&q=radial+pulse+examination&revid=1708533959&sa=X&ved=0ahUKEwisqd-huu3JAhUKBY4KHdRFCNkQ1QIIUSgB) by three fingers
* [Normal radial pulse rate](https://www.google.co.in/search?biw=1280&bih=633&q=normal+radial+pulse+rate&revid=1708533959&sa=X&ved=0ahUKEwisqd-huu3JAhUKBY4KHdRFCNkQ1QIIUigC)
* [Apical pulse and radial pulse difference](https://www.google.co.in/search?biw=1280&bih=633&q=apical+pulse+and+radial+pulse+difference&revid=1708533959&sa=X&ved=0ahUKEwisqd-huu3JAhUKBY4KHdRFCNkQ1QIIVCgE)
* [Carotid pulse vs radial pulse](https://www.google.co.in/search?biw=1280&bih=633&q=carotid+pulse+vs+radial+pulse&revid=1708533959&sa=X&ved=0ahUKEwisqd-huu3JAhUKBY4KHdRFCNkQ1QIIVSgF)
* [Radial pulse characteristics](https://www.google.co.in/search?biw=1280&bih=633&q=radial+pulse+characteristics&revid=1708533959&sa=X&ved=0ahUKEwisqd-huu3JAhUKBY4KHdRFCNkQ1QIIVigG)
* [Where is the radial pulse located](https://www.google.co.in/search?biw=1280&bih=633&q=where+is+the+radial+pulse+located&revid=1708533959&sa=X&ved=0ahUKEwisqd-huu3JAhUKBY4KHdRFCNkQ1QIIVygH)

**Procedure for measurement of Body Temperature**

|  |  |  |
| --- | --- | --- |
| **Observation** | **Yes** | **No** |
| Selects appropriate site and thermometer type.  |  |  |
| “Zeroes” or shakes down glass thermometer as needed.  |  |  |
| Inserts thermometer in sheath or uses thermometer designated only for the patient.  |  |  |
| Inserts in chosen route/site. |
| Oral: Places thermometer tip under the tongue in the posterior sublingual pocket (right or left of frenulum). Asks patient to keep lips closed. |  |  |
| Rectal: Lubricates thermometer; uses rectal thermometer; inserts 1 to 1.5 inches (2.5–3.7 cm) in an adult; 0.9 inches (2.5 cm) for a child, and 0.5 inch (1.5 cm) for infant |  |  |
| Axillary: Dries axilla; Places thermometer tip in the middle of the axilla; lowers patient’s arm. |  |  |
| Tympanic membrane: Positions the patient’s head to one side and straighten the ear canal.  |  |  |
| For an adult, pulls the pinna up and back. 2) For a child, pull the pinna down and back  |  |  |
| Leaves glass thermometer recommended time (oral 3– 5 min, rectal 2 min, axillary 6–8 min).  |  |  |
| Holds rectal thermometer securely in places; does not leave patient unattended.  |  |  |
| Leaves electronic thermometer until it beeps.  |  |  |
| Reads temperature. Holds glass thermometer at eye level to read.  |  |  |
| Shakes down (as needed) and cleans or stores thermometer |  |  |

**Discussion**

* Where is body temperature measured?
* What are Fahrenheit and Celsius?
* What is normal body temperature?
* What is a fever?
* Several different types of thermometers
* How to take an ear (tympanic) temperature

**Test for Reflexes**

|  |  |  |  |
| --- | --- | --- | --- |
| **No** | **Observation** | **Yes** | **No** |
| Deep Tendon Reflexes: Using the patella hammer |
|  | The patella hammer should be held nearer the end. The movement as the tendon is being struck with the hammer should be delivered from the wrist. The head of the hammer should be allowed to fall with gravity on the intended forefinger or muscle tendon An observation of the rapidity and strength of muscle contraction / jerk is observed. A comparison is made with the opposite side,  |  |  |
|  | Results are reported as: Normal / present Increased / brisk Decreased / absent. |  |  |
| Biceps Jerk (C5, C6)  |
|  | Forefinger of one hand is placed on the biceps tendon The biceps tendon is struck by the patella hammer. An observation is made of contraction of biceps with flexion of the forearm at the elbow followed by prompt relaxation. For the corresponding biceps tendon (furthest away from the examiner’s side) the thumb of the hand may be substituted for the forefinger |  |  |
| Brachioradialis (Supinator) Jerk (C5, C6)  |
|  | The patient’s elbow is flexed and pronated. The student places two fingers over the lower end of the patient’s radius just above the wrist. The tendon of the brachioradialis is struck on examiner’s two fingers placed over this area. An observation is made of contraction of the brachioradialis with flexion of the elbow |  |  |
| Triceps Jerk (C7, C8)  |
|  | Student supports the wrist with one hand as the forearm is pronated and resting across the patient’s body The triceps tendon is struck with the tendon hammer. An observation is made of the triceps contracting with elbow extension  |  |  |
| Knee Jerk (L3, L4)  |
|  | Student slides his arms under the patient’s slightly flexed knees and supports them. The tendon hammer is struck over the infrapatellar tendon. An observation is made of Quadriceps contracting causing extension of the knee  |  |  |
| Ankle Jerk (S1, S2)  |
|  | Patient’s foot is held in mid position at the ankle, whilst the student bends the knee, externally rotates the hip and holds the foot dorsiflexed. The Archilles tendon is struck with the tendon hammer. An observation is made of Plantar flexion of the foot  |  |  |
| **Superficial Reflexes** |
|  | 1. The patient’s skin is stroked with an object that is moderately sharp but should not injure the skin (e.g. with the end of the reflex hammer).
2. The skin response is observed and
3. Compared to the opposite side and
4. Graded

Grading of superficial reflexes (upper abdominal: Normal / Absent; Lower abdominal: Normal / Absent; Plantar: Down going / Up going) |  |  |
| Upper Abdominal  |
|  | * The student strokes the skin just above and on either side of the patient’s umbilicus using the object chosen for the examination.
* The skin response is observed i.e. the umbilicus moving up and toward area being stroked
* A comparison is made of the two sides
 |  |  |
| Lower Abdominal  |
|  | * The skin below the umbilicus is similarly stroked with an instrument as in 2a above
* The skin response is observed i.e. the umbilicus moving down
* A comparison is made of the two sides.
 |  |  |
| Plantar Reflex (Babinski) (L5, S1, S2) |
|  | * The patient’s foot should be dorsi flexed at 90 degrees to the ankle.
* The student strokes the lateral aspect of the patient’s sole with a blunt instrument such as a car key before
* Curving the stroke inwards towards the M.T. P. and ending at the toes
* An observation is made of the response of the toes i.e. plantar flexion (down going) of the toes
 |  |  |

**Discussion for testing Reflexes**

* 1. Response after the stimulus
	2. Afferent / efferent paths involved
	3. Centre /spinal segments involved
	4. Applied physiology

**3) HOMOEOPATHIC PHARMACY**

**Introduction**

Instruction in Homoeopathic Pharmacy should be so planned as to present general working knowledge of an industry and dispensing various preparation. Major emphasis should be laid on evolution and relationship of Homoeopathic Pharmacy to Organon and Materia Medica, the concept of drug Proving and Dynamisation.

**Objectives:**

*After completing the course in homoeopathic pharmacy, the student will be able to:*Recall the basic principles of Homoeopathic Pharmacy.

1. Describe the evolution of the various aspects of Homoeopathic Pharmacy and its future projections.
2. Discuss the scientific and logical basis of the principles and practice of dynamisation.
3. Describe the techniques of drug proving.
4. Enumerate the methods of quality testing, storing, dispensing.
5. State laws relating to Pharmaceutical industry in general and Homoeopathy in particular.

**Theory (100 Hours)**

Instruction in Homoeopathic Pharmacy should be so planned as to present general working knowledge of an industry and dispensing various preparation. Major emphasis should be laid on evolution and relationship of Homoeopathic Pharmacy to Organon and Materia Medica, the concept of drug Proving and Dynamisation. The curriculum of Homoeopathic Pharmacy is described as follows:­

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Sl. No** | **Topic** | **Time allotted** | **Must know** | **Desirable to know** | **Nice to know** |
| **General Concepts and Orientation: 16 hrs** |
| 1 | History of Pharmacy with emphasis on emergence of Homoeopathic Pharmacy | 2 hrs | * Definition of Pharmacy
* History of Pharmacy – primitive period, period before 13th century& period after 13th century
* Definition of Homoeopathic Pharmacy
* Homoeopathic Pharmacy is an art & science
* Sources of Homoeopathic Pharmacy
* Branches of Pharmacy
 | Compare & contrast Homoeopathic Pharmacy with other schools of Pharmacy (Allopathic, Ayurveda, Siddha, &Unani Pharmacy)  | Other branches of Pharmacy- Hospital Pharmacy, Clinical Pharmacy, Theoretical Pharmacy etc.Spagyric PharmacyAspects of pharmacy- doctrinal aspects & technical aspectRelationship of Hom. Pharmaceutics with allied sciences |
| 2 | Official HomoeopathicPharmacopoeia (German, Britain, USA,India) | 3 hrs | * Definition of Hom. Pharmacopoeia
* Objectives of Hom. Pharmacopoeia
* Types of Hom. Pharmacopoeias
* General plan of pharmacopoeias (monograph)
* Official Hom. Pharmacopoeia (German, Britain, USA,India)
 | * Functions of Homoeopathic Pharmacopoeia
* History & development of HPI
* Unofficial Homoeopathic Pharmacopoiea with examples
 | * History & development of pharmacopoeia
* FHP
 |
| 3 | Important terminologies like scientific names, common names, synonyms | 1 hr | Definition of scientific names, common names, synonyms | * Demerits of common names
* Advantages & disadvantages of scientific names or botanical name
 | Meaning of hyponyms, typonyms, invalid names |
| 4 | Definitions in Homoeopathic pharmacy | 1 hr | Pharmaceutics, Pharmacologist Pharmacomania, Pharmacophilia Pharmacophobia, Pharmacopraxy Pharmacology, Pharmacognosy, Drug, Medicine, Remedy, Mother Tincture, Mother Solution, Mother Substance, Polychrest Remedy, Deep Acting Remedy, Long Acting & Short Acting Remedy, Therapeutics, Complementary Remedy, Inimical Remedy, Antidote, Active Principle, Alkaloid, Glycosides, Resinoids, Tannins, Resins | **--** | Pharmacogenetics Pharmacography, Pharmacopsychosis, Pharmacokinetics, Pharmacotherapy, Pharmacopedics, Pharmacophore, Pharmacopollaxy, Characteristics Symptoms, Common Symptoms, Concomitant Symptom, Clinical symptom |
| 5 | Components of pharmacy | 6 hrs | * Parts of pharmacy – identification, collection, combining etc.
* Relationship between Hom. Pharmacy and Materia Medica, Organon of Medicine & National Economy
* Scope of Homoeopathic Pharmacy
* Specialty and originality of Homoeopathic Pharmacy
* Definition of Pharmacist
* Qualities & functions of Pharmacist
 | -- | -- |
| 6 | Weights & measurements | 2 hrs | Different systems for weights& measures - Metric system, Imperial system (British) & Apothecary’s system (USA) with their fundamental units | Domestic/ household measures with their equivalents in imperial system & metric system - 1 drop, 1 tea spoonful, dessert spoonful, table spoon, tea cupful, tumblerful | * Relations of metric system with other systems
* Standard drop measure
 |
| 7 | Nomenclature of Homoeopathic drugs with their anomalies | 1 hr | -- | Introduction to Binomial system of nomenclature | Anomalies & errors in the nomenclature of Homoeopathic medicines |
| **II. Raw Materials: Drug and Vehicle - 21 hrs** |
| 1 |  Sources of drugs (taxonomic classification with reference to utility) | 4 hrs | Different sources of Homoeopathic drugsVegetable kingdom, Animal kingdom, Mineral kingdom, Nosodes, Sarcodes, Imponderabilia, Synthetic source, with reference to their clinical utility**1.Vegetable kingdom (Morphological classification):**Drugs prepared from whole plant, roots& rhizome, stem, leaves, flowers, fruits, seeds, bark, wood, extract & other plant constituents**2.Animal kingdom:**Drugs prepared from whole living animal, whole dried animal, different parts, and secretion of animal, including ophiotoxins**3.Mineral kingdom &Chemicals**Drugs prepared from acids, elements, compounds, minerals, mineral spring water**4.Nosodes**Definition & examples for nosodes prepared from human, animal & plant**5. Sarcodes**Definition & examples of sarcodes prepared from hormones, extracts & whole endocrine gland, including Lacs**6. Imponderabilia**Definition & examples for natural & artificial source.7. **Tautopathic or synthetic source**Definition& examples | * Taxonomic classification of plant drugs with examples (Benthem & Hooker classification)
* Classification of animal drugs with examples

**Non vertebrate****Phylum**–arthropoda, porifera, coelentirata, annelida, mollusca, echinodermata**Vertebrate** **Class-**osteichthes, amphibian, reptilian, aves, mammalia | * Different sources of Homoeopathic drugs – Allergodes & Isodes
* Classification & preparation of nosodes per HPI
* Bowel nosodes
* Tissue remedies
* Bach flower remedies
 |
| 2 | Collection of drug substances | 2 hrs | * General rules for collecting plant drug substances
* Particular rules for collecting whole plant & its various parts
* General rules for collecting animal drug substances
* Rules for collecting mineral drugs, sarcodes, nosodes, imponderabilia
* Preservation of drugs – raw materials & finished products
 | Rules for Collection of snake venoms | Collection of Cantharis, Bufo rana, Apis mel |
| 3 | Vehicles | 10 hrs | * Definition of vehicle
* Properties of an ideal vehicle
* Uses or utility of vehicles
* **Sugar of milk –** sources, preparation, purification (Stapf’s process), properties, uses & impurities
* **Globules**– source & preparation, properties & uses
* **Tablets**–preparation & properties & advantages
* **Purifiedwater** – preparation, properties, uses & demerits, impurities present in water
* **Ethyl Alcohol** – sources, preparation, properties, advantages & disadvantages, precautions in preserving alcohol, uses & impurities of alcohol, varieties of alcohol with their strength, uses & conversions to different varieties of alcohol

Proof spirit (alcoholometry) – definition & significance* **Glycerine–**source, properties and uses
* **Simple syrup (syrup simplex) –** source, preparation & uses
* **Olive oil –**source, properties & uses
* **Vaseline (soft paraffin)** – source, varieties & uses
* **Waxes** –definition, varieties & uses
 | * Classification of vehicles with examples
* Lanolin
* Starch- source &uses
 | * Source, preparation, properties and uses of cane sugar
* Preparation, properties, uses & advantages of cones
* Solvent ether – source, properties & uses
* Almond oil
* Sesame oil
* Chaulmoogra oil
* Sandalwood oil
* Lavender oil
* Rosemary oil
* Soap – source, varieties & uses
* Spermaceti
* Isinglass
* Prepared lard
 |
| 4 | Homoeopathic pharmaceutical instruments and appliances  | 5 hrs | Features & uses of: mortar & pestle, water bath, microscope, porcelain dish, percolator, macerator, hot air oven, pycnometer, balances, chopping board, knife, press & sieves | Crucible, pill tiles, hydrometer, alcoholometer, lactometer, desiccator, various glassware | **--** |
| III. **Homoeopathic Pharmaceutics: 31 hrs** |
| 1 | Mother tincture and its preparation | 6 hrs | * Definition of mother tincture
* Different classes of preparation of Homoeopathic medicines according to old method with examples
* Drug power of mother tinctures and other preparations according to old method
* Utility of drug power of mother tincture, solution & substance
* Peculiarities of new method of mother tincture preparation
* Importance of moisture content of plant
* Definition of maceration, percolation, menstruum, merc, magma, digestion
* Procedure of maceration
* Diagrammatic description of percolator
* Procedure of percolation
	+ Preparation of percolator(tow)
	+ Preparation of drug substances for percolation
	+ Actual process of preparation of mother tincture
 | * Difference between allopathic mother tincture & homoeopathic mother tincture
* Difference between old method and new method of mother tincture preparation
* Disadvantages of old method of mother tincture preparation
* Mechanism of percolation – different forces acting during percolation like gravitational force, capillary force, osmotic pressure & surface tension
* Difference between percolation and maceration
 | Tincture triturates |
| 2 | Various scales used in Homoeopathic pharmacy  | 5 hrs | * Different scales (ratio) used in Hom. Pharmacy- decimal scale, centesimal scale & fifty millesimal scale
* **Decimal** scale: inventor, principle, designation & application (utility) of the scale
* Preparation of potencies under decimal scale – liquid potency and solid potency
* **Centesima**l scale: inventor, principle, designation & application (utility) of the scale
* Preparation of potencies under centesimal scale – liquid potency and solid potency
* **Fifty millesimal** scale: inventor, principle, designation
* Reasons why Hahnemann arrived at the concept of fifty millesimal scale (disadvantages of centesimal scale)
* Preparation of fifty millesimal potency – liquid & solid
* Dispensing & Administration of fifty millesimal potency
* Advantages & disadvantages of fifty millesimal potency
 | * Relation between decimal scale and centesimal scale
* Difference between centesimal potency and fifty millesimal potency
 | Background of fifty millesimal scale of potentisation |
| 3 | Drug dynamization or potentization | 4 hrs | * Definition of Potentization
* Objectives (benefits) of Potentization
* Process of Potentization – trituration & succussion
* Definition & procedure of trituration
* Precaution to be taken during trituration
* Merits & demerits of trituration
* Conversion of trituration into liquid potency (jumping potency/ fluxion potency)
* Definition of straight potency
* Definition of high fluxion potency
* Single vial & multiple vial method
* Definition of back potency & its utility
* Definition, procedure & utility of succession
 | * Difference between potency and dilution
* Advantages of succussion over trituration
 | * History & development of the theory of dynamization
* Post-Hahnemannian potentization
 |
| 4 | External application (focus on scope of Homoeopathic lotion, glycerol, liniment and ointment) | 4 hrs | * List of external application used in Homoeopathy
* Different vehicles used as bases for external application
* **Glycerol**: definition, preparation, uses and examples
* **Liniment** (embrocations): definition, preparation, uses and examples
* **Lotion**: definition, preparation, uses and examples
* **Ointment**: definition, methods for preparation of ointments (mechanical incorporation method & fusion method), uses and examples
 | * Hahnemannian view on external application with reference to Organon
* Types of external application – liquid and solid/semisolid
 | * Glycerol of starch (glycerol amyli)

Other external application like poultice (cataplasms), fomentations, opodeldocs, cerates, plasters, suppositories, mulliein oil |
| 5 | Doctrine of signature | 1 hr | * Definition
* Examples
 | Utility of this theory in Homoeopathy | History of doctrine of signature |
| 6 | Posology (focus on basic principles; related aphorisms) | 5 hrs | * Definition of Posology.
* Various kinds of doses.
* Definition of Homoeopathic Posology
* Principles of Homoeopathic Posology with reference to Organon
* Special emphasis on minimum dose
* Factors responsible for selection of potency
* Reasons for applying only one single simple medicinal substance at a time
* Repetition of doses
 | Difference between Allopathic and Homoeopathic concept of doses | **--** |
| 7 | Prescription writing(including abbreviations) | 2 hrs | * Definition of Prescription
* Principles of writing an ideal prescription (norms, forms, legibility, accuracy, reliability)
* Different parts of a prescription
* Precaution to be taken while writing a prescription
* Utility of prescription
* Abbreviation with meaning-

Agit, Aqua dist, BD, BID, Cap., D, d, Ft., Ft.mist, Ft.pulv, Ft.solut, Gr, Gtt, HS, Lot, M, m, mist, OD, Oz, QID, SOS, Stat, TID, Vac ven | Writing model prescription based on cases | **--** |
| 8 | Concept of placebo | 1 hr | * Synonyms
* Definition
* Utility of placebo
 | **--** | Hahnemannian view regarding placebo (related aphorisms) |
| 9 | Pharmaconomy – routesof Homoeopathic drug administration | 1 hr | * Definition of Pharmaconomy
* Various routes or channels of administration of Homoeopathic medicines
 | **--** | **--** |
| 10 | Dispensing of medicines | 1 hr | * Different dosage forms
* Dispensing of mother tincture, liquid potencies and powder triturates
* Different vehicles used for dispensing medicine
* Advantages & disadvantages of dispensing in solid & liquid form
* Plussing method
 | Reference to Organon | **--** |
| 11 | Basics of adverse drug reactions and pharmaco-vigilance | 1 hr | * Meaning of drug reaction
* Drug interactions
* Antidotes
* Inimicals
* Definition of pharmaco-vigilance
* Importance of pharmaco-vigilance
 | Medication errors – overdose, misuse & abuse of a drug as well as drug exposure during pregnancy & breastfeeding | * Incompatible remedies
* Drug safety with special reference to HPI
* Hazards associated with use of external applications & other pharmaceutical products
* Adverse event reporting

Risk management |
| IV. **Pharmacodynamics: 14 hrs** |
| 1 | Homoeopathic pharmacodynamics | 3 hrs | * Definition of pharmacology
* Branches of pharmacology
* Definition of pharmacodynamics
* Procedure for ascertaining disease producing power

 a)Homoeopathic drug proving b) Toxicological findings c) Laboratory experiments* Drug action on healthy human being (three fold action on human being) – chemical action, mechanical action, &dynamic action
* Dynamic effects on healthy human being according to Hahnemann – primaryaction & secondary action
 | * Dynamic effects on healthy human being according to Carol Dunham – genericaction & specific action
* Difference between Homoeopathic pharmaco-dynamics &that of old school
 | * Definition of dynamic power with examples
* Relative merits and demerits of employing excessive large dose, moderate dose and infinitesimal dose
 |
| 2 | Drug proving (related aphorisms 105-145 of Organon of medicine) and merits& demerits of proving on humans and animals | 5 hrs | * Definition of drug proving
* Pre-requisites (essentials) of drug proving
* Reference of Organon
* Objectives of drug proving
* Criteria for selection of provers
* Types of provers – ideal prover, best prover & idiosyncratic prover
* Merits and demerits of proving on animals
* Merits and demerits of proving on sick persons
* Merits of proving on healthy human beings
* Methods of preparation of drugs for proving
* Dose and mode of administration of drugs during proving
* Recording of symptoms during proving including importance of day book
* Precautions to be taken during proving – regarding medicine & prover
* Conditions when medicine is to be considered to have been thoroughly proved
 | * Drug proving team
* Single blind method & double blind method
 | * History of drug proving
* Recent advances in drug proving (Homoeopathic pathogenetic trial/ HPT)

Methodological flaws in Hahnemannian drug-proving |
| 3 | Pharmacological action, study of drugs listed in Appendix-A | 6 hrs | * Definition of drug action
* Principles of drug action
* Definition of physiological action
* Physiological action of 30 drugs
 | Classification of drugs according to their pharmacological actions | **--** |
| **V. Quality Control: 11 Hrs** |
| 1 | Standardization of Homoeopathic medicines, raw materials & finished products | 8 hrs | * Introduction & definition
* Objectives of quality control in Homoeopathy
* Sampling& Official sample
* Methods of standardization
 | **--** | Standardization of vehicles & finished products  |
| 2 | Good manufacturing practices; industrial pharmacy | 2 hrs | * Definition of GMP
* Guidelines for GMP
* Ideal Homoeopathic manufactory
* Standard operating procedures
* Important lab methods such as dilution, solution, sedimentation, precipitation, crystallization, decantation, filtration, sublimation, moisture content estimation
 | **--** | * Sieving
* Mixing
* Extraction
* Drying
* Sterilization
* Pulverizing
* Marketing & finance

Administration of Pharmaceuticals |
| 3 | Homoeopathic pharmacopoeia laboratory- functions & activities, relating to quality control of drugs. | 1 hr | * Fixation of raw material standards
* Finished product standards
 | HPL publications | * Verification of standards
* Drug testing of survey samples
* Drug testing of referred samples
* Collection of medicinal plants

Reference nosode collection |
| **VI. Legislations pertaining to Pharmacy: 7 Hrs** |
| 1 | The Drugs and Cosmetics Act, 1940 (23 of 1940) (in reaction to Homoeopathy); | Definition of Drugs, Cosmetics & Homoeopathic medicine | **--** | Schedule M1 |
| 2 | Drugs and Cosmetics Rules, 1945 (in relation to Homoeopathy) | Provisions governing Sales, Manufacture & Labelling of Homoeopathic drugs | **--** | **--** |
| 3 | Poisons Act, 1919(12 of 1919) | **--** | Poisons Act, 1919 (12 of 1919) | **--** |
| 4 | The Narcotic Drugs and Psychotropic Substances Act, 1985 (61 of 1985)  | **--** | The Narcotic Drugs and Psychotropic Substances Act, 1985 (61 of 1985) | **--** |
| 5 | Drugs and Magic Remedies (Objectionable Advertisement) Act, 1954 (21 of 1954) | Drugs and Magic Remedies (Objectionable Advertisement) Act, 1954 (21 of 1954) | **--** | **--** |
| 6 | Medicinal and Toilet Preparations (Excise Duties)Act, 1955 1. f 1955)
 | Medicinal and Toilet Preparations (Excise Duties) Act, 1955 (16 of 1955) | **--** | **--** |

**Practical Skills to be performed: 70 Hours**

*After completing the course in Pharmacy, the student will be able to –*

1. Identify the drug substances as per the list provided.
2. Perform laboratory procedures like sublimation, distillation, decantation, filtration, crystallisation
3. Perform purity tests for sugar of milk, distilled water and ethyl alcohol
4. Determine specific gravity of distilled water and ethyl alcohol.
5. Estimate moisture content of drug substance using water bath.
6. Prepare dispending alcohol and dilute alcohol from strong alcohol.
7. Identify the appropriate vehicles for preparing and potentising the medicine.
8. Prepare medicines as per the specifications in Homoeopathic Pharmacopeia of India
9. Prepare external applications like lotion, glycerol, liniment, ointment.
10. Prepare mother tincture by the process of maceration and percolation.
11. Estimate the size of globules.
12. Medicate globules and prepare doses with sugar of milk and distilled water.
13. Write prescriptions as per the standard formula.
14. Dispense medicines as per the prescription.
15. Explain to the patients and attendants the dosage and method of taking homeopathy medicines.
16. Explain to the patients and attendants the do’s and don’ts for taking homeopathy medicines.

|  |  |  |
| --- | --- | --- |
| **No** | **Topic** | **Time** |
| 1. | Estimation of size of globules | 2 Hr |
| 2. | Medication of globules and preparation of doses with sugar of milk and distilled water  | 2 Hr |
| 3. | Purity test of sugar of milk, distilled water and ethyl alcohol  | 6 Hrs |
| 4. | Determination of specific gravity of distilled water and ethyl alcohol. | 2 Hrs |
| 5. | Preparation of dispending alcohol and dilute alcohol from strong alcohol. | 2 Hrs |
| 6. | Trituration of one drug each in decimal and centesimal scale. |  4 Hrs |
| 7. | Succussion in decimal scale from Mother Tincture to 6X potency. | 2 Hrs |
| 8. | Succussion in centesimal scale from Mother Tincture to 3C potency. | 2 Hrs |
| 9. | Conversion of Trituration to liquid potency: Decimal scale 6X To 8X potency. | 1 Hrs |
| 10. | Conversion of Trituration to liquid potency: Centesimal scale 3C to 4C potency. | 1 Hrs |
| 11. | Preparation of 0/ 1 potency (LM scale) of 1 Drug | 2 Hrs |
| 12. | Preparation of external applications –lotion glycerol, liniment, ointment | 8 Hrs |
| 13. | Laboratory methods – sublimation, distillation, decantation, filtration, crystallisation | 8 Hrs |
| 14. | Writing of prescription | 2 Hrs |
| 15 | Dispensing of medicines | 2 Hrs |
| 16. | Process of taking minims. | 2 Hrs |
| 17 | Identification of drugs(listed in Appendix B)-i) Macroscopic and Microscopic characteristic of drug substances – minimum 05 drugs; ii)Microscopic study of trituration of two drugs (up to 3X potency) | 4 Hrs2 Hrs |
| 18. | Estimation of moisture content using water bath. | 2 Hrs |
| 19. | Preparation of mother tincture – maceration and percolation | 4Hrs. |
| 20. | Collection of 30 drugs for herbarium |  |
| 21 | Visit to Homoeopathic Pharmacopoeia Laboratory & visit to a large scale manufacturing unit of Homoeopathic medicines (GMP compliant). (Students shall keep detailed visit reports as per Proforma at Annexure B) |  |

**C. Demonstration**

1. General instructions for practical or clinical in pharmacy
2. Identification & use of Homoeopathic pharmaceutical instruments & appliances & their cleaning – **10 hrs**
3. Estimation of moisture content using water bath
4. Preparation of mother tinctures – maceration & percolation

**D. Appendices**

**Appendix – A:** List of Drugs included in the Syllabus of Pharmacy for study of Pharmacological action

|  |  |  |  |
| --- | --- | --- | --- |
| 1.  | Aconite nap  | 16.  | Glonine |
| 2.  | Adonis vernalis | 17.  | Hydrastis can  |
| 3.  | Allium cepa | 18.  | Hyoscynamusnig |
| 4.  | Argentum nit  | 19.  | Kali bich |
| 5.  | Arsenic alb | 20.  | Lachesis |
| 6.  | Belladonna  | 21.  | Lithium carb  |
| 7.  | Cactus G  | 22.  | Mercuriuscor |
| 8.  | Cantharis  | 23.  | Naja tri  |
| 9.  | Cannabis ind | 24.  | Nitric acid  |
| 10.  | Cannabis sat  | 25.  | Nux vomica  |
| 11.  | Cinchonna of  | 26.  | Passifloraincarnata |
| 12.  | Coffea crud  | 27.  | Stannum met  |
| 13.  | Crataegus | 28.  | Stramonium |
| 14.  | Crotalus hor | 29.  | Symphytum |
| 15.  | Gelsemium | 30.  | Tabacum |

**APPENDIX – B: List of Drugs for Identification**

I. Vegetable Kingdom

|  |  |  |  |
| --- | --- | --- | --- |
| 1.  | Aegle folia  | 14.  | Holerrhena antidysentrica |
| 2.  | Anacardium orientale | 15.  | Hydrocotyle |
| 3.  | Andrographis penniculata | 16.  | Justisia adhatoda |
| 4.  | Calendula offic | 17.  | Lobelia inflata |
| 5.  | Cassia sophera | 18.  | Nux vomica  |
| 6.  | Cinchonna off  | 19.  | Ocimum |
| 7.  | Cocculus indicus | 20.  | Opium  |
| 8.  | Coffea cruda | 21.  | Rauwolfia serpentine  |
| 9.  | Colocynth cittrallus | 22.  | Rheum  |
| 10.  | Crocus sativa  | 23.  | Saraca indica |
| 11.  | Croton tig | 24.  | Senna (cassia acutifolia)  |
| 12.  | Cynodon dact | 25.  | Stramonium met |
| 13.  | Ficus religiosa | 26.  | Vinca minor  |

II. Chemicals or Minerals

|  |  |  |  |
| --- | --- | --- | --- |
| 1.  | Acetic acid  | 7.  | Carbo veg (charcoal)  |
| 2.  | Alumina  | 8.  | Graphites |
| 3.  | Argentum metallicum | 9.  | Natrum mur |
| 4.  | Argentum nitricum | 10.  | Silicea |
| 5.  | Arsenic alb | 11.  | Sulphur |
| 6.  | Calcarea carb  | 12. |  |

III. Animal Kingdom

|  |  |  |  |
| --- | --- | --- | --- |
| 1.  | Apis mellifica | 4.  | Sepia  |
| 2.  | Blatta orientalis | 5.  | Tarentula cubensis |
| 3.  | Formica rufa |  |  |

**Note:**

1. Each student shall maintain practical or clinical record or journal and herbarium file separately.
2. College authority shall facilitate the students in maintaining record as per Appendix-C.

**E. Examinations:**

**1. Theory (100 marks)**

**Types of questions with Marks**

|  |  |  |  |
| --- | --- | --- | --- |
| **Type of Questions** | **No. of Questions** | **Marks per Question**  | **Total** |
| Long Essays (LE) | 02  | 10  | 20  |
| Short Essays (SE) | 10 | 05  | 50  |
| Short Answers (SA) | 10  | 03  | 30  |
| **MAXIMUM MARKS** | **100**  |

**Question Paper Blueprint**

|  |  |  |  |
| --- | --- | --- | --- |
| **No.** | **Topic** | **Marks** | **Question type** |
| **I . General Concepts and Orientation**  |
| 1. | History of pharmacy with emphasis on emergence of Homoeopathic Pharmacy. | **10** | **5 + 5 (2 SE)** |
| 2. | Official Homoeopathic Pharmacopoeia (Germany, Britain, U.S.A, India) |
| 3. | Important terminologies like scientific names, common names, synonyms. |
| 4. | Definitions in Homoeopathic Pharmacy. |
| 5. | Components of Pharmacy.  |
| 6. | Weights and measurements. |
| 7. | Nomenclature of Homoeopathic drugs with their anomalies. |
| **II. Raw Material : Drugs and Vehicles** |
| 1 | Source of drugs (taxonomic classification, with reference to utility)  | **26** | **10 + 5 + 5 + 3 + 3** **(1 LE + 2 SE + 2 SA** |
| 2 | Collection of drug substances |
| 3 | Vehicles  |
| 4 | Homoeopathic Pharmaceutical Instruments and appliances |
| **III. Homoeopathic Pharmaceutics**  | **36** | **10 + 5 + 5 + 5 + 5 + 3 + 3** **(1 LE + 4 SE + 2 SA** |
| 1. | Mother tincture and its preparation – old and new methods. |
| 2. | Various scales used in Homoeopathic Pharmacy |
| 3. | Drug dynamisation or potentisation  |
| 4. | External applications (focus on scope of Homoeopathic lotion, glycerol, liniment and ointment). |
| 5. | Doctrine of Signature  |
| 6. | Posology (focus on basic principles; related aphorisms of Organon of medicine). |
| 7. | Prescription (including abbreviations) |
| 8. | Concept of placebo  |
| 9. | Pharmaconomy - routes of Homoeopathic drug administration.  |
| 10. | Dispensing of medicines  |
| 11. | Basics of adverse drug reactions and pharmaco – vigilance  |
| **IV. Pharmacodynamics** |
| 1. | Homoeopathic Pharmacodynamics  | **08** | **5 + 3** **(1 SE + 1 SA)** |
| 2. | Drug Proving (related aphorism 105-145 of organon of medicine) and merits and de-merits of Drug Proving on Humans and Animals  |
| 3. | Pharmacological study of drugs listed in Appendix –A |
| **V. Quality Control** |
| 1. | Standardization of Homoeopathic medicines, raw materials and finished product | **09** | **3 + 3 + 3****(3 SA)** |
| 2. | Good manufacturing practices; industrial pharmacy. |
| 3. | Homoeopathic pharmacopoeia laboratory – functions and activities , relating to quality control of drugs  |
| **VI. Legislation pertaining to Pharmacy** |
| 1. | The Drugs and Cosmetics Act, 1940 (23 of 1940) (in reaction to Homoeopathy) | **11** | **5 + 3 + 3****(1 SE + 2 SA)** |
| 2. | Drugs and Cosmetics Rules, 1945 (in relation to Homoeopathy) |
| 3. | Poisons Act, 1919(12 of 1919) |
| 4. | The Narcotic Drugs and Psychotropic Substances Act, 1985 (61 of 1985)  |
| 5. | Drugs and Magic Remedies (Objectionable Advertisement ) Act, 1954 (21 of 1954) |
| **6.** | Medicinal and Toilet Preparations (Excise Duties)Act, 1955 (16 of 1955) |
|  | **Total** |  | **100** |

**Question Paper Layout**

**Long Essay : 2 X 10 = 20 Marks**

|  |  |
| --- | --- |
| 1 | Raw material: drug and vehicles |
| 2 | Homoeopathic pharmaceutics  |

**Short Essay : 10 X 5 = 50 Marks**

|  |  |
| --- | --- |
| 3 | General concepts and orientation  |
| 4 |
| 5 | Raw material: drug and vehicles |
| 6 |  |
| 7 | Homoeopathic pharmaceutics |
| 8 |
| 9 |
| 10 |
| 11 | Pharmacodynamics |
| 12 | Legislation pertaining to pharmacy |

Short Answer : 10 X 3 = 30 Marks

|  |  |
| --- | --- |
| 13 | Raw material: drug and vehicles |
| 14 |
| 15 | Homoeopathic pharmaceutics |
| 16 |
| 17 | Pharmacodynamics |
| 18 | Quality control |
| 19 |
| 20 |
| 21 | Legislation pertaining to pharmacy  |
| 22 |

**Practical (including Viva): 100 Marks**

|  |  |  |
| --- | --- | --- |
| **No** | **Skill** | **Marks** |
| 1 | Specimens: 2 Marks X 5 SpecimenIdentification: 1 MarkDescription: 1 Mark | 10 |
| 2 | Spotters: 2 Marks X 5 SpecimenIdentification: 1 MarkDescription | 10 |
| 3 | ExperimentProcedural Skills: 5 MarksPractical Skills: 5 MarksDiscussion: 5 Marks | 15  |
| 4 | Practical Record Book | 10 |
| 5 | Herbarium documentation | 05 |
| **Viva voce** | 50 |

**List of Specimen for identification**

I. Vegetable Kingdom

|  |  |  |  |
| --- | --- | --- | --- |
| 1.  | Aegle folia  | 14.  | Holerrhena antidysentrica |
| 2.  | Anacardium orientale | 15.  | Hydrocotyle |
| 3.  | Andrographis penniculata | 16.  | Justisia adhatoda |
| 4.  | Calendula officinalis | 17.  | Lobelia inflata |
| 5.  | Cassia sophera | 18.  | Nux vomica  |
| 6.  | Cinchonna off  | 19.  | Ocimum |
| 7.  | Cocculus indicus | 20.  | Opium  |
| 8.  | Coffea cruda | 21.  | Rauwolfia serpentine  |
| 9.  | Colocynth citrallus | 22.  | Rheum  |
| 10.  | Crocus sativa  | 23.  | Saraca indica |
| 11.  | Croton tig | 24.  | Senna (cassia acutifolia)  |
| 12.  | Cynodon dact | 25.  | Stramonium met  |
| 13.  | Ficus religiosa | 26.  | Vinca minor  |

II. Chemicals or Minerals

|  |  |  |  |
| --- | --- | --- | --- |
| 1.  | Acetic acid  | 7.  | Carbo veg (charcoal)  |
| 2.  | Alumina  | 8.  | Graphites |
| 3.  | Argentum metallicum | 9.  | Natrum mur |
| 4.  | Argentum nitricum | 10.  | Phosphorus |
| 5.  | Arsenic alb | 11.  | Silicea |
| 6.  | Calcarea carb  | 12. | Sulphur |

III. Animal Kingdom

|  |  |  |  |
| --- | --- | --- | --- |
| 1.  | Apis mellifica | 4.  | Sepia  |
| 2.  | Blatta orientalis | 5.  | Tarentula cubensis |
| 3.  | Formica rufa |  |  |

**List of Spotters for Identification**

|  |  |  |  |
| --- | --- | --- | --- |
| **Sl. no** | **Spotter** | **Sl No** | **Spotter** |
| **1** | Crucible with lid | **13** | Hydrometer |
| **2** | Porcelain dish | **14** | Alcoholometer |
| **3** | Tripod stand with wire gauze | **15** | Lactometer |
| **4** | Pyknometer | **16** | Leather pad |
| **5** | Spatula | **17** | Desiccator |
| **6** | Ointment slab | **18** | Pipette |
| **7** | Percolator | **19** | Burette |
| **8** | Macerator | **20** | Funnel |
| **9** | Hot Air Oven | **21** | Conical flask |
| **10** | Water bath- Copper/Electric | **22** | Round/Flat bottom flask |
| **11** | Mortar | **23** | Volumetric flask |
| **12** | Pestle | **24** | Measuring cylinder |

**RECOMMENDED BOOKS**

**Basic Books**

* Banerjee DD (2nd reprint edition, 2012). *Augmented Textbook of Homoeopathic Pharmacy*. B Jain Publishers, New Delhi
* Goel, Sumit (1st edition, 2002). *Art and Science of Homoeopathic Pharmacy*. Leo Enterprises, Ahmedabad
* Mandal & Mandal (3rd edition, 2012). *A Textbook of Homoeopathic Pharmacy*. New Central Book Agency, Kolkata

**Reference Books**

* Banerjee SK & Sinha N. (Reprint edition, 1993). *A Treatise on Homoeopathic Pharmacy*. B Jain Publishers, New Delhi
* Govt. of India, Ministry of Health & Family Welfare, New Delhi (1971 to 2006). *Homoeopathic Pharmacopoeia of India (1-9 Vol.)*
* Hughes R (Reprint edition, 1999). *A Manual of* *Pharmacodynamics.* B Jain Publishers, New Delhi
* Wartikar M J (1st reprint edition, 2002). *A Textbook of Homoeopathic Pharmacy*. Vidyarthi Griha Prakashan, Pune.