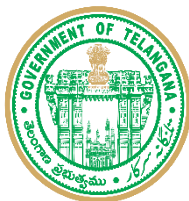


PHARMA TECHNOLOGY (616)



**State Institute of Vocational Education
O/o the Commissioner of Intermediate
Education,
Telangana State, Hyderabad**
&
**Board of Intermediate Education
Telangana State, Hyderabad**

Dr. A. Ashok I.A.S
COMMISSIONER



INTERMEDIATE EDUCATION
Government of Telangana
Nampally, Hyderabad- 500001
Phone: 040-24655915

Fore word

In any developing society with a booming population, Vocational Education occupies an important position for generating large scale employment opportunities. Viewed in this context the importance of Vocational Education for our country cannot be over emphasized. Vocationalization of Secondary Education was introduced in 1988 at the Intermediate level. Recently, the Government of India has developed a National Skills Qualification Framework for establishing a clear path for vocational education from the school level to the highest level. The Department of Intermediate Education has recently framed a new curriculum to bring greater value to the system of vocational education. The primary aim of this reform is to prepare the students with employable skills for absorption in organized sectors and in few cases, even for self-employment.

State Institute of vocational education and Board of Intermediate Education, Telangana have reviewed the curriculum of vocational courses of second year from the academic year 2019-20 in order to reorient them for their practical approach. Greater emphasis is now being placed on Laboratory work and on the job training.

Simultaneously, The State Institute of Vocational Education and the department of Intermediate Education are presently making efforts to upgrade the quality of infrastructure in the colleges to meet the challenges of the changed curriculum. I am confident that the revised curriculum of second year for Vocational Courses would prove to be beneficial to the students in the vocational stream and help them train in need based productive courses leading to gainful employment.

COMMISSIONER OF INTERMEDIATE EDUCATION

SCHEME OF INSTRUCTION AND EXAMINATION
ANNUAL SCHEME OF INSTRUCTION AND EXAMINATION FOR
FIRST YEAR

| Part-A | | Theory | | Practicals | | Total | |
|---------------|---|------------|------------|------------|------------|-------------|------------|
| | | Periods | Marks | Periods | Marks | Periods | Marks |
| 1. | English | 150 | 50 | 0 | 0 | 150 | 50 |
| 2. | General Foundation course | 150 | 50 | 0 | 0 | 150 | 50 |
| Part-B | | | | | | | |
| 3. | Paper-I Human anatomy and Physiology | 135 | 50 | 135 | 50 | 270 | 100 |
| 4. | Paper-II Pharmaceutical Technology I | 135 | 50 | 135 | 50 | 270 | 100 |
| 5. | Paper-III Pharmaceutical Chemistry and Quality Management systems | 135 | 50 | 135 | 50 | 270 | 100 |
| Part-C | | | | | | | |
| 6. | OJT | 0 | 0 | 365 | 100 | 365 | 100 |
| Total | | 705 | 250 | 770 | 250 | 1475 | 500 |

SECOND YEAR

| Part-A | | Theory | | Practicals | | Total | |
|---------------|---|------------|------------|------------|------------|-------------|------------|
| | | Periods | Marks | Periods | Marks | Periods | Marks |
| 1. | English | 150 | 50 | 0 | 0 | 150 | 50 |
| 2. | General Foundation course | 150 | 50 | 0 | 0 | 150 | 50 |
| Part-B | | | | | | | |
| 3. | Paper-I Pharmacology and Pharmaceutical Regulations | 110 | 50 | 115 | 50 | 225 | 100 |
| 4. | Paper-II Pharmaceutical Technology- II | 110 | 50 | 115 | 50 | 225 | 100 |
| 5. | Paper-III Pharmaceutical Engineering | 110 | 50 | 115 | 50 | 225 | 100 |
| Part-C | | | | | | | |
| 6. | OJT | - | - | 450 | 100 | 450 | 100 |
| Total | | 630 | 250 | 795 | 250 | 1425 | 500 |

TOTAL FIRST YEAR AND SECOND YEAR MARKS 1000

EVALUATION OF ON THE JOB TRAINING:

The “On the Job Training” shall carry 100 marks for each year and pass marks is 50. During on the job training the candidate shall put in a minimum of 90 % of attendance. The evaluation shall be done in the last week of January.

Marks allotted for evaluation:

| S.No | Name of the activity | Max. Marks allotted for each activity |
|------|-------------------------------------|---------------------------------------|
| 1 | Attendance and punctuality | 30 |
| 2 | Familiarity with technical terms | 05 |
| 3 | Familiarity with tools and material | 05 |
| 4 | Manual skills | 05 |
| 5 | Application of knowledge | 10 |
| 6 | Problem solving skills | 10 |
| 7 | Comprehension and observation | 10 |
| 8 | Human relations | 05 |
| 9 | Ability to communicate | 10 |
| 10 | Maintenance of dairy | 10 |
| | Total | 100 |

NOTE: The On the Job Training mentioned is tentative. The spirit of On the Job training is to be maintained. The colleges are at liberty to conduct on the job training according to their local feasibility of institutions & industries. They may conduct the entire on the job training periods of (365) First year and (450) Second year **either by conducting classes in morning session and send the students for OJT in afternoon session or two days in week or weekly or monthly or by any mode which is feasible for both the college and the institution.** However, the total assigned periods for on the job training should be completed. The institutions are at liberty to conduct On the Job training during summer also, however there will not be any financial commitment to the department.

PHARMA TEFCHNOLOGY
PART B – VOCATIONAL SUBJECTS
FIRST YEAR
PAPER – I: HUMAN ANATOMY AND PHYSIOLOGY (THEORY)
TIME SCHEDULE, WEIGHTAGE & BLUE PRINT

| S. No | Name of the Unit | No of Periods | Weightage in marks | Short Answer Questions | Essay/ Problem Questions |
|-------|--|---------------|--------------------|------------------------|--------------------------|
| 1. | Basic Introduction 1) Scope of Anatomy and Physiology 2) Structure of cell, function of its components with special reference to mitochondria and microsomes. 3) Elementary tissues of the body. | 12 | 8 | 1 | 1 |
| 2 | Blood & Components Disorders and Drugs affecting Blood disorders 1) Composition of blood, functions of blood elements. Blood group and coagulation of blood 2) Disorders affecting blood and blood cells | 10 | 8 | 1 | 1 |
| 3 | Central Nervous System(CNS) and Autonomous Nervous System(ANS) , Disorders and Drugs affecting CNS and ANS 1) Parts of brain and spinal cord 2) Physiology of the CNS and ANS 3) Diseases affecting CNS and ANS | 35 | 2 | 1 | 0 |
| 4 | Cardiovascular system , Disorders 1) Structure and functions of various parts of the heart and Blood vessels 2) Disorders of the Cardiovascular system | 20 | 8 | 1 | 1 |
| 5 | Skeletal & Muscular System 1) Structure and functions of skeletal system 2) Physiology of muscle contraction 3) Disorder of Skeletal and muscle system | 8 | 2 | 1 | - |
| 6 | Respiratory System, Disorders and Drugs affecting respiratory system 1) Various parts of respiratory system and their functions. 2) Physiology of respiration. 3) Disorder of respiratory system | 7 | 2 | 1 | - |

| | | | | | |
|-----|---|----|---|---|---|
| | 4) Drugs affecting respiratory system | | | | |
| 7 | Digestive System , Parts of the Gastro intestinal system(GIT) 1) Digestion of food and absorption 2) Structure and functions of liver 3) Diseases affecting the GIT system | 8 | 8 | 1 | 1 |
| 8 | Endocrine System , Disorders Parts of the Endocrine system 1) Mechanism of Hormonal release 2) Diseases of Endocrine system | 8 | 8 | 1 | 1 |
| 9 | Urinary System(Excretory system,Parts of the Urinary system 1) Physiology of Urine formation and excretion 2) Diseases affecting urinary system | 6 | 8 | 1 | 1 |
| 10 | Reproductive System,Parts of Male reproductive system 1) Diseases of male reproductive system 2) Parts of Female reproductive system 3) Diseases of Female reproductive system 4) Family planning methods | 10 | 8 | 1 | 1 |
| 11. | Health education- a) General hygiene b) Water and air borne diseases c) Environmental pollution | 11 | 6 | 0 | 1 |

Text Books:

- ❖ Principles of Anatomy and Physiology by Tortora G.J., and N.P. Anagnokos,
- ❖ Principles of Anatomy and Physiology by Ross & Wilson.
- ❖ Goyal, R. K, Natvar M.P, and Shah S.A, Practical anatomy, physiology and biochemistry, latest edition, Publisher: B.S Shah Prakashan, Ahmedabad.

Reference Books:

- ❖ Human Physiology by C.C. Chatterjee, Medical Allied Agency, India.
- ❖ Text Book of Medicinal Physiology by A.C. Guyton, W.B. Prism Books Pvt. Ltd.,
- ❖ Ranade VG, Text book of practical physiology, Latest edition, Publisher: PVG, Pune
- ❖ Anderson Experimental Physiology, Latest edition, Publisher: NA

PHARMA TEFCHNOLOGY
PART B – VOCATIONAL SUBJECTS
FIRST YEAR
PAPER – I: HUMAN ANATOMY AND PHYSIOLOGY (PRACTICALS)
TIME SCHEDULE

| S.No | Name of the Unit | No of Periods | Weight age in Marks |
|------|--|---------------|---------------------|
| 1. | Human Skeleton | 18 | 15 |
| | Name of the Bones- Identification points, Surfaces of [Skull, Scapula, clavicle, humerus, radius, ulna, carpal bones, meta carpal bones, phalanges – Innominate bone, Femur, patella, tibia, fibula, tarsal bones, meta tarsal bones, Phalanges, Ribs classification, vertebrae, sternum | | |
| 2. | Human Organs[POP Models] | 25 | 10 |
| | Brain, Stomach, Lungs, Intestines, Heart, Kidney, Liver, Uterus, Spleen, Fallopian tubes. | | |
| 3. | Human Slides [Permanent Slides] | 21 | 10 |
| | Epithelial Tissue. Connective Tissue. Muscular Tissue. Nervous Tissue. Liver Kidney Spleen Pancreas Lymph nodes Skin Testes Ovary, Uterus Tonsil Stomach layers Small intestine, Large intestine. | | |
| 4. | Blood pressure Estimation of Blood pressure | 06 | 5 |
| 5. | T.P.R. [Temperature, pulse, respiration] chart | 10 | 5 |
| 6. | TC,DLC [RBC Total Count, WBC Total Count, differential Leucocytes count] | 15 | 5 |
| 7. | Estimation of glucose in blood and urine | 10 | 5 |
| 8. | Estimation of plasma proteins | 06 | 2 |
| 9 | Use of biochemical kits for quick testing(pregnancy test , HIV test , widal test) | 12 | 3 |
| 10. | First aid methods (Emergency case (CPR and burns) | 12 | 3 |
| | Total | 135 | 50 |

Reference Books :

1. S.R. Kale and R.R. Kale, Practical Human Anatomy & Physiology, Nirali Prakashan, Pune 2003.
2. CL Ghai, Text book of Practical Physiology, Jay Pee, New Delhi, 2005.
3. Best and Taylor's Physiological Basis of Medical Practice, Williams & Wilkins, Baltimore

PHARMA TEFCHNOLOGY
PART B – VOCATIONAL SUBJECTS
FIRST YEAR
PAPER – II: PHARMACEUTICAL TECHNOLOGY – I (THEORY)
TIME SCHEDULE, WEIGHTAGE & BLUE PRINT

| S.No | Name of the Unit | No of Periods | Weight age in marks | Short Answer Questions | Essay/ Problem Questions |
|------|---|---------------|---------------------|------------------------|--------------------------|
| 1. | Introduction to Pharmaceutical Sciences; 1) History of Pharmacy 2) Pharmacy in India 3) Classification of Dosage forms | 10 | 8 | 1 | 1 |
| 2. | Metrology –Systems of weights and measures, Percentage calculations Preformulation studies 1) Solubility 2) Partition coefficient 3) Powder flow 4) Bulk density , tapped density, porosity, hausner ratio, carr’s index of powders/granules 5) Specific gravity and viscosity. | 12 | 8 | 1 | 1 |
| 3. | Over view of oral solids dosage forms 1) Definition of Tablets and Capsules and types of tablets and capsules 2) Different methods of manufacture of tablets and capsules. I. a) dry granulation b) wet granulation II. direct compression III. Introduction to tablet coating i) Film coating ii) Sugar coating 3) General equipment for different processes. 4) Excipients used in OSD 5) a) In-process quality controls for tablets and capsules b) Defects in tablet formulations and possible reasons for | | 10 | 2 | 1 |

| | | | | | |
|----|--|----|----|---|---|
| | <p>observed defects .</p> <p>6) Quality control tests for finished tablets and capsules.</p> <p>7) Introduction to controlled release tablets and pellets</p> <p>a) Matrix systems</p> <p>b) Reservoir systems</p> <p>8) a) Wurster coating of pellets for controlled release and delayed release products.</p> <p>b) Construction , operation and performance of fluid bed coater (FBC) and fluid bed drier(FBD) .</p> <p>c) Top spray granulation.</p> | | | | |
| 4. | <p>Over view of liquid oral dosage forms</p> <p>Types of Liquid oral dosage forms</p> <p>1. Different processes of formulating liquid oral dosage forms</p> <p>2. General equipment for different processes.</p> <p>3. Excipients used in liquid oral dosage forms.</p> <p>4. General in process checks and methods for performing these tests.</p> | 15 | 8 | 1 | 1 |
| 5. | <p>Over view of injectable dosage forms</p> <p>1) Types of injectable dosage forms</p> <p>Different processes involved in manufacturing injectable dosage form</p> <p>General equipment for different processes</p> <p>2) Water for injection and other excipients used in injectable dosage forms</p> <p>3) General in process checks and methods for performing these tests</p> | 23 | 10 | 2 | 1 |
| 6. | <p>Over view of semisolid dosage forms</p> <p>1) Types of semi-solid dosage forms</p> | 23 | 8 | 1 | 1 |

| | | | | | |
|----|---|----|---|---|---|
| | <ul style="list-style-type: none"> 2) Different processes involved in manufacturing semisolid dosage form 3) General equipment for different processes 4) Excipients used in dosage form 5) General in process checks and methods for performing these tests | | | | |
| 7. | <p>Over view of Pharmaceutical Packaging</p> <ul style="list-style-type: none"> 1) Types of packaging for different dosage forms 2) Regulatory guidelines regarding labeling 3) In process checks in packaging 4) Visual Inspection of finished dosage forms | 23 | 8 | 1 | 1 |
| 8. | <p>Safety Health and Environment Concepts of safety</p> <ul style="list-style-type: none"> 1) Use of Materials safety data sheet 2) Process safety analysis and hazard 3) Fire safety 4) PPEs Used in different production operations 5) Industrial and Job Safety Analysis for Various production equipment and machinery. 6) Managing Emergency Procedures 7) First Aid | 8 | 8 | 1 | 1 |

Text Books:

1. Cooper and Gunns Dispensing for pharmacy students.
2. A text book Professional Pharmacy by N.K.Jain and S.N.Sharma
3. L. Lachman, H.A. Lieberman and J.L. Kanig, Theory and Practice of Industrial Pharmacy Varghese Publishing House, Mumbai, 3 Rd Edn, 1991.
4. Ansel's Phramceutical dosage forms and Drug delivery systems, 8 Th edn, 2004, Lippincott Williams & Wilkins, USA.
5. Micheal E Aulton, Pharmaceutics – The science of dosage form design, 1St edition, 1998, Churchill living stone.
6. Martin, J. Swarbrick & A. Cammarata, "Physical Pharmacy" Lea and Febiger, Philadelphia, III Edition, 1983.
7. C.V.S. Subrahmanyam, Essentials of Physical Pharmacy , Vallabh Prakashan, Delhi,
i. 2005
8. Blake, R.P., "Industrial Safety", Prentice Hall, 1953.
9. Lees, F.P., "Loss Prevention in Process Industries", 2nd Edition, Butterworth Heinemann, 1996.
10. Mechanical and Industrial Measurements R.K. Jain
11. Industrial Instrumentation and Control S.K. Singh
12. <http://ncerthelp.com/cbse%20notes/class%2011/physics/Physics%20Notes%20Class%2011%20CHAPTER%202%20UNITS%20AND%20MEASUREMENTS%20.pdf>
13. <http://saba.kntu.ac.ir/eecd/ecourses/inst%2086/Projects/Velocity%20Measurement/Velocity%20Measuremnt.pdf>
14. <http://enggyd.blogspot.in/2011/05/pressure-measuring-instruments.html>
15. <http://nptel.ac.in/courses/101106040/chapter%205.pdf>
16. http://www.engineeringtoolbox.com/flow-meters-d_493.html

Reference Books

1. A.R. Gennaro, Remington: The Science and Practice of Pharmacy, 20th Edition, Vol. 1, Lippincott Williams & Wilins, Philadelphia, 2004.
2. E.A. Rawlins, Bentley's Textbook of Pharmaceutics, 8Th Edition, Baillere Tindill, London, 2002.
3. The Prevention of Food Adulteration Act 1954 with Rules.
4. Vijay Malik Drugs & Cosmetic Act 1940, 10 Th edition.
5. Introduction to Pharmaceutical dosage forms by Howard C. Ansel
6. Remington's Pharmaceutical Sciences.
7. Register of General Pharmacy by Cooper and Gunn
8. General Pharmacy by M.L.Schroff

PHARMA TEFCHNOLOGY
PART B – VOCATIONAL SUBJECTS
FIRST YEAR
PAPER – II: PHARMACEUTICAL TECHNOLOGY – I (PRACTICALS)
TIME SCHEDULE

| S.No | Name of the Unit | No of Periods | Weight age |
|------|---|---------------|------------|
| 1 | Determination of Particle size of powders by Sieve analysis | 10 | 3 |
| 2 | Determination of particle size by optical microscope | 10 | 3 |
| 3 | Determination of Bulk density and Tapped Density of powders and calculation of Hausner's ratio and Compressibility Index. Hardness ,dimensions of tablets and disintegration time. | 13 | 5 |
| 4 | Determination of Viscosity of liquids using Oswald's viscometer | 10 | 4 |
| 5 | Determination of Surface tension of liquids | 10 | 4 |
| 6 | Performance of in process checks in compressed tablets | 10 | 4 |
| 7 | Performance of in process checks in filled capsules | 10 | 4 |
| 8 | Visual inspection of uncoated and coated tablets. Defects in uncoated and coated tablets – identification and rectification . Specific defects in film coated tablets and mitigation plans. | 10 | 4 |
| 9 | Preparation of Syrup IP and evaluation of the specific gravity of the syrup | 12 | 5 |
| 10 | Visual inspection of ampoules and vials- leak test | 10 | 4 |
| 11 | Determination of equilibrium solubility of drugs | 10 | 4 |
| 12 | In process checks in Liquid preparation | 10 | 3 |
| 13 | Evaluation of different semi solid bases | 10 | 3 |
| | Total | 135 | 50 |

References:

1. Pharmaceutical Dosage Forms: Parenteral Medications, Volume I, Kenneth E. Avis, Herbert A. Lieberman (Editor), Leon Lachman (Editor)
2. Pharmaceutical Dosage Forms: Disperse Systems, Volume 1 -Leon Lachman, Herbert A. Lieberman
3. The Theory and Practice of Industrial Pharmacy By Lachman and Lieberman (3rd Edition)
4. Hard capsules, development and technology. Edited by K. Ridgway. The Pharmaceutical Press: London, UK. 1987. 320 pp.ISBN 085369-159-2

PHARMA TEFCHNOLOGY
PART B – VOCATIONAL SUBJECTS
FIRST YEAR
PAPER – III: PHARMACEUTICAL CHEMISTRY & QUALITY MANAGEMENT
SYSTEMS (THEORY)
TIME SCHEDULE , WEIGHTAGE & BLUE PRINT

| S.No | Name of the Unit | No of Periods | Weight age in marks | Short Answer Questions | Essay/ Problem Questions |
|------|--|---------------|---------------------|------------------------|--------------------------|
| 1. | I) To have a detailed knowledge about Basics of pharmaceutical Science and Chemistry inclusive of 1) Organic Nomenclature System 2) Organic Reaction Mechanism II) Basic Analytical Chemistry fundamentals including 1) Balancing chemical equations 2) Chemical equilibrium 3) Acid and base chemistry 4) Stoichiometric calculations 5) Reduction and oxidation chemistry III) Interaction of light with matter | 30 | 10 | 2 | 1 |
| 2. | Organization of quality control lab in industry and process flow. | 8 | 10 | 2 | 1 |
| 3. | Types of samples and sample preparation methods (air, liquid and solids). | 8 | 8 | 1 | 1 |
| 4. | Good laboratory practices 1) Glassware and other utensils cleaning , drying and storage. 2) Weighing and measuring procedures and documentation. 3) Calibration, preventive maintenance and regular use maintenance. 4) Installation qualification , operational qualification and performance qualification (IQ,OQ AND PQ). | 15 | 10 | 2 | 1 |

| | | | | | |
|-------|--|--|---------|--------|--------|
| 5. | <p>Wet lab</p> <p>a. Volumetric analysis b. Gravimetr</p> <p>b. Gravimetric analysis mointure analyser, ash values etc</p> <p>c. Spectral analysis – IR & UV</p> <p>d. Water by Karl-Fischer (KF).</p> | | 8 | 1 | 1 |
| 6 & 7 | <p>Chromatography</p> <p>a. Paper and thin layer</p> <p>b. HPLC</p> <p>c. GC</p> <p>QUALITY MANAGEMENT SYSTEMS</p> <p>Introduction to quality management systems.</p> <p>ICH-Q10:</p> <p>Raw material quality control</p> <p>Conceptual scientific knowledge</p> <p>--Identification tests</p> <p>--LOP and water KF</p> <p>--Ash values</p> <p>--Limit tests</p> <p>In process quality control(IP& C)</p> <p>a) solid oral dosage forms</p> <p>b)liquid oral dosage forms</p> <p>c)sterile products</p> <p>d)semisolids</p> <p>Finished products quality controls</p> <p>Analytical methods, vaidation – introduction and significance</p> <p>Specifications ,</p> <p>OOS,OOT,CAPA, change control and documentation as Per QMS.</p> <p>Basics of</p> <p>1.)Root cause analysis.</p> <p>2.)FMEA(Failure Mode Effect Analysis or fish bone diagram).</p> <p>3.)Auditing.</p> <p>4) cGMP</p> | | 8 14 | 1 1 | 1 2 |

Inorganic Pharmaceutical Chemistry (Practical), 2nd Edition, Dhake & Belsare.

1. Vogel's Text Book of Quantitative Analysis, 5th Ed.
2. Vogel's Quantitative Inorganic Analysis.
3. www.fda.gov/downloads/Drugs/.../Guidances/ucm073517.pdf
4. **Pharmaceutical Manufacturing Handbook: Production and Processes** by Shayne Cox Gad

PHARMA TEFCHNOLOGY
PART B – VOCATIONAL SUBJECTS
FIRST YEAR
PAPER – III: PHARMACEUTICAL CHEMISTRY & QUALITY MANAGEMENT
SYSTEMS (PRACTICALS)

| S.No | Name of the Unit | No of Periods | Weight age in Marks |
|------|---|---------------|---------------------|
| 1 | Basic inorganic salt analysis | 10 | 4 |
| 2 | Basic functional group analysis | 10 | 4 |
| 2 | Acid base titrations | 10 | 5 |
| 4 | Complex metric titrations | 15 | 5 |
| 5 | Iodimetric titrations | 15 | 5 |
| 6 | Lab glass ware: 1) Identification 2) Handling 3) Care and Maintenance 4) Uses | 10 | 4 |
| 7 | Preparation of 1) Percentage solution 2) Normal solution 3) Molar solution | 15 | 5 |
| 8 | Weighing skills: 1) Types of Weighing balances 2) Calibration of weighing balances 3) How to perform weighing for analytical tests | 10 | 4 |
| 9 | Sample preparation skills: 1) Sample grinding 2) Pipetting 3) Ultra sonication 4) Filtration 5) Centrifugation 6) Dilutions | 15 | 4 |
| 10 | Chromatographic separation by using TLC or Paper chromatography | 15 | 5 |
| 11 | Good Documentation Practices practical | 10 | 5 |
| | Total | 135 | 50 |

- Inorganic Pharmaceutical Chemistry (Practical), 2nd Edition, Dhake & Belsare.
- Vogel's Text Book of Quantitative Analysis, 5th Ed.
- Vogel's Quantitative Inorganic Analysis.
- <http://www.mgel.msstate.edu/pdf/solutions.pdf>
- www.nabl-india.org/nabl/file_download.php?filename=201412081129-NABL-122...
- <http://vlab.amrita.edu/?sub=3&brch=63&sim=154&cnt=1>
- <https://www.chem.wisc.edu/deptfiles/OrgLab/handouts/CHEM 344 TLC info.pdf>
- <https://pharmout.net/downloads/white-paper-how-to-implement-good-documentation-practices.pdf>
- http://apps.who.int/prequal/trainingresources/pq_pres/stakeholders_2011/presentation_s/day_2/good_documentation_practices.pdf

PHARMA TEFCHNOLOGY
PART B – VOCATIONAL SUBJECTS
SECOND YEAR

PAPER – I: PHARMACOLOGY & PHARMACEUTICALS REGULATIONS (THEORY)
TIME SCHEDULE, WEIGHTAGE & BLUE PRINT

| S.No | Name of the Unit | No of Periods | Weightage in marks | Short Answer Questions | Essay/ Problem Questions |
|---|--|---------------|--------------------|------------------------|--------------------------|
| 1. | General Pharmacology 1. Introduction 2. Routes of drug administration 3. Bioavailability 4. Drug Interactions | 7 | 8 | 1 | 1 |
| DEFINITION, CLASSIFICATION AND THERAPEUTIC USES OF THE FOLLOWING CLASSES OF DRUGS | | | | | |
| 2. | Drugs acting on blood and blood forming organs 1. Antiplatelet agents 2. Anticoagulants 3. Thrombolytic agents | 5 | 6 | 0 | 1 |
| 3. | Drugs acting on CNS and ANS CNS 1. Sedatives and Hypnotics 2. General Anaesthetics 3. Analgesics ANS 1. Adrenergic drugs 2. Cholinergic drugs 3. Skeletal muscle relaxants | 12 | 2 | 1 | 0 |
| 4. | Drugs acting on cardiovascular system 1. Anti Hypertensives 2. Antiarrhythmics 3. Pharmacotherapy of angina pectoris 4. Atherosclerosis | 7 | 6 | 0 | 1 |
| 5. | Drugs acting on respiratory system 1. Pharmacotherapy of cough 2. Antiasthmatics | 4 | 2 | 1 | 0 |
| 6. | Drugs used in disorders of GIT 1. Digestives & Antiflatulents 2. Emetics 3. Laxatives | 7 | 2 | 1 | 0 |

| | | | | | |
|-----------------------------------|--|-----|----|----|---|
| | 4. Pharmacotherapy of peptic ulcer | | | | |
| 7. | Drugs acting on endocrine system 1. Anterior pituitary hormones 2. Thyroid hormones and anti thyroid drugs 3. Anti diabetics 4. Adrenal cortical steroids | 10 | 6 | 0 | 1 |
| 8. | Diuretics | 2 | 6 | 0 | 1 |
| 9. | Hormones | 3 | 2 | 1 | 0 |
| 10. | Anti-biotics , Anti-infectives and antiseptics | 7 | 2 | 1 | 0 |
| 11. | Immunity and Immunological products | 7 | 8 | 1 | 1 |
| PHARMACEUTICAL REGULATIONS | | | | | |
| 1 | Introduction to Pharmacopoeia 1) Indian Pharmacopoeia 2) British Pharmacopoeia 3) European Pharmacopoeia 4) United States Pharmacopoeia- Drug and drug product Monograph. . | 12 | 2 | 1 | 0 |
| 2. | a) Drug control administration in India – organization and DCGI . b) Drugs and Cosmetics Act and rules – over view. c) Schedule - M | 14 | 2 | 1 | 0 |
| 3. | ICH guidelines : over view and important information from each guideline . | 14 | 6 | 0 | 1 |
| 4 | a) Introduction to Hatch – Waxman Act and its amendments. b) Brief account of ANDA . c) Over view of approval process of ANDA . | 18 | 2 | 1 | 0 |
| 5 | a) Introduction to EMEA and WHO organization. b) Drug product approval process | 20 | 6 | 0 | 1 |
| | Total | 135 | 68 | 10 | 8 |

PHARMA TEFCHNOLOGY
PART B – VOCATIONAL SUBJECTS
SECOND YEAR
PAPER – I: PHARMACOLOGY (PRACTICALS)

| S.No | Name of the Unit | No of Periods | Weightage in marks | Short Answer Questions | Essay/ Problem Questions |
|------|---|---------------|--------------------|------------------------|--------------------------|
| 1. | Lay out of animal house | 3 | 2 | 1 | - |
| 2. | Caging and outdoor housing of lab animals | 3 | 2 | 1 | -- |
| 3. | Feeding of lab animals | 3 | 2 | 1 | - |
| 4. | Bedding of lab animals | 3 | 2 | 1 | - |
| 5. | Breeding of lab animals | 3 | 2 | 1 | - |
| 6. | Handling of lab animals | 3 | 2 | 1 | - |
| 7. | Collection of blood from lab animals | 7 | 5 | 1 | - |
| 8. | Anaesthesia of lab animals | 5 | 3 | 1 | - |
| 9. | Euthanasia of lab animals | 4 | 2 | 1 | - |
| 10. | Sanitation of animal house | 4 | 4 | 1 | - |
| 11. | Record keeping in animal house | 4 | 4 | 1 | - |
| 12. | Effect of drugs on frog's heart | 10 | 10 | - | 1 |
| 13. | Bioassay of digitalis | 10 | 10 | - | 1 |
| 14. | Bioassay of adrenaline | 10 | 10 | - | 1 |
| 15. | Bioassay of acetyl choline | 10 | 10 | - | 1 |
| 16. | Pyrogen testing | 14 | 10 | - | 1 |
| 17. | Screening of diuretics | 10 | 7 | - | 1 |
| 18. | Gastric acid secretion studies | 9 | 8 | - | 1 |

Recommendation :

Simulated experiments may be used

PHARMA TEFCHNOLOGY
PART B – VOCATIONAL SUBJECTS
SECOND YEAR
PAPER – II: PHARMACEUTICAL TECHNOLOGY (THEORY)

TIME SCHEDULE, WEIGHTAGE & BLUE PRINT

| S.No | Name of the Unit | No of Periods | Weightage in marks | Short Answer Questions | Essay/ Problem Questions |
|------|--|---------------|--------------------|------------------------|--------------------------|
| 1. | <p>Oral Solid Dosage form Manufacturing:</p> <p>(1) Process flow diagram of Tablets manufacturing</p> <p>(2) Different types of manufacturing processes</p> <p>(3) Size separation:</p> <p>i. Definition and scope</p> <p>ii. Types of sifters</p> <p>iii. Operation, cleaning and maintainence of sifter</p> <p>(4) Milling:</p> <p>i. Definition and scope</p> <p>ii. Types of mills</p> <p>iii. Operation, cleaning and maintainence of mills</p> <p>(5) Mixing and Granulation</p> <p>i. Definition and scope</p> <p>ii. Types of granulators</p> <p>iii. Operation, cleaning and maintainence of granulators</p> <p>(6) Drying</p> <p>i. Definition and scope</p> <p>ii. Types of dryers</p> <p>iii. Operation, cleaning and maintainence of dryers</p> <p>(7) Blending</p> <p>i. Definition and scope</p> <p>ii. Types of Blenders</p> <p>iii. Operation, cleaning and maintainence of blenders</p> <p>(8) Compression:</p> <p>i. Definition and scope</p> <p>ii. Types of Compression machines</p> <p>iii. Operation, cleaning and maintainence of compression machines and related line equipments</p> <p>iv. Tablet toolings</p> <p>(9) Capsules filling:</p> | 25 | 16 | 2 | 2 |

| | | | | | |
|----|---|----|----|---|---|
| | <ul style="list-style-type: none"> i. Definition and scope ii. Types of Capsules filling machines iii. Operation, cleaning and maintainence of capsules filling machines iv. defects in filled capsules v. Handling of empty capsules shells <p>(10) Tablet Coating:</p> <ul style="list-style-type: none"> i. Definition and scope ii. Types of Coating machines iii. Operation, cleaning and maintainence of coating machines iv. defects in coated tablets v. Inspection of coated tablets | | | | |
| 2. | <p>Liquid Oral Manufacturing</p> <ul style="list-style-type: none"> i. Monophasic Liquid Oral Manufacturing: ii. Process flow diagram of manufacturing iii. Preparation of different types of vehicles iv. Operating and cleaning of tanks, utensils and pipelines v. In process checks <p>(1) Filtration</p> <ul style="list-style-type: none"> i. Definition and scope ii. Types of filtration equipments iii. Operation, cleaning and maintenance of Filtration equipments <p>(2) Suspension Manufacturing</p> <ul style="list-style-type: none"> i. Process flow diagram of manufacturing ii. Preparation of different types of suspensions iii. In process checks iv. Operation cleaning and maintenance of different types of mills and homogenizers <p>(3) Emulsion Manufacturing</p> <ul style="list-style-type: none"> i) Process flow diagram of manufacturing | 20 | 16 | 2 | 2 |

| | | | | | |
|----|--|----|----|---|---|
| | <ul style="list-style-type: none"> ii) Preparation of different types of emulsions iii) In process checks iv) Operation cleaning and maintenance of different types of mills and homogenizers (4) Operation cleaning and maintenance of Liquid filling equipments and line equipments (5) Visual inspection of filled product | | | | |
| 3. | <p>Injectable Manufacturing</p> <ul style="list-style-type: none"> (a) Introduction to aseptic areas (b) Gowning procedures for sterile area entry and working (c) Process flow diagram for aseptic manufacturing (d) Sterilization: <ul style="list-style-type: none"> i) Definition and scope ii) Types of sterilization processes iii) Operation, cleaning and maintenance of sterilization equipments like Autoclave, Dry heat sterilizers iv) Operation and maintenance of Laminar hoods v) Operation and maintenance off Isolators (e) Ampoule/Vial washing and sterilization <ul style="list-style-type: none"> i) Operation, cleaning and maintenance of equipment (f) Ampoule/Vial filling and sealing <ul style="list-style-type: none"> i) Operation, cleaning and maintenance of equipment (g) Visual Inspection of filled ampoules and vials (h) Lyophilisation: <ul style="list-style-type: none"> i) Principle and scope ii) Operation, cleaning and maintenance of Lyophilized iii) In process checks iv) Common problems and trouble shooting | 20 | 10 | 2 | 1 |
| 4. | <p>Semi solids Manufacturing and Filling</p> <ul style="list-style-type: none"> (a) Process flow diagram for Ointment, Ceams and Gels | 20 | 16 | 2 | 2 |

| | | | | | |
|----|--|-----|----|----|---|
| | (b) Operation, cleaning and maintenance of manufacturing tanks, transfer pumps, lines and homogenizers and mills (c) Different types of Filling machines (for e.g. for tubes, jars etc) Operation, cleaning and maintenance of filling machines and associated line equipments | | | | |
| 5. | Packaging and Labeling a) Types of packaging for different dosage forms b) Regulatory guidelines regarding labeling c) Different types of packaging and labeling machines d) Operation, maintenance and cleaning of packaging and labeling machines. e) In process checks for packaging operations | 25 | 10 | 2 | 1 |
| | Total | 110 | 68 | 10 | 8 |

PHARMA TECHNOLOGY
PART B – VOCATIONAL SUBJECTS
SECOND YEAR

PAPER – II: PHARMACEUTICAL TECHNOLOGY (PRACTICALS)
TIME SCHEDULE, WEIGHTAGE & BLUE PRINT

| S. No | Name of the Unit | No of Periods | Weightage in Marks |
|-------|--|------------------------------|----------------------------|
| 1 | Preparation of Tablets using the following unit operations i. Weighing ii. Sifting iii. Wet granulation iv. Drying v. Sizing and milling vi. Compression vii. Coating | 10 | 3 |
| 2 | 1) Evaluation of the granules and tablets for the following parameters. Granules , Tablets i. Loss on drying. ii. Bulk density and tapped density iii. Particle size distribution by sieve analysis iv. Angle of repose to find flow of granules v. Hausner ratio and compressibility 2) Blending and lubrication of granules. Evaluation of blend : i) flow of blend –angle of repose ii) Blend uniformly.. 3) Compression of lubricated blend into tablets i)adjustment of fill weight of blend ii)adjustment of hardness of tablet iii) compression and sampling.. 4) Physical evaluation of tablets. i) Weight variation ii) Tablet dimensions- Variations --length, width, thickness iii) Hardness iv) Friability v) Disintegration Time 5) Identifying the parts , setting up and dismantling of tablet compression machine. 6) Identifying the parts , setting up and dismantling of capsule filling machine | 10 5 5 10 5 5 | 4 5 2 3 5 5 |
| 3. | Preparation and evaluation of monophasic liquid oral dosage form | 5 | 3 |
| 4. | Preparation and evaluation of suspension | 10 | 3 |
| 5 | Preparation and evaluation of emulsion | 10 | 3 |
| 6 | Preparation and evaluation of O/W and W/O Cream. | 10 | 3 |
| 7 | Preparation and evaluation of Gels. | 5 | 3 |
| 8 | Preparation of an autoclave sterilization cycle load. | 5 | 3 |
| 9 | Developing skills of working in glove box isolator. | 5 | 2 |
| 10 | Gowning practices and working in sterile area/aseptic area | 5 | 3 |
| | TOTAL | 115 | 50 |

PHARMA TEFCHNOLOGY
PART B – VOCATIONAL SUBJECTS
SECOND YEAR

PAPER – III: PHARMACEUTICAL ENGINEERING (THEORY)

TIME SCHEDULE, WEIGHTAGE & BLUE PRINT

| S. No | Name of the Unit | No of Periods | Weightage in marks | Short Answer Questions | Essay/ Problem Questions |
|-------|---|---------------|--------------------|------------------------|--------------------------|
| 1 | Size Reduction Classification of Size Reduction Equipment modes of stress applied in size reduction, Principles, working and construction of (i) Cutter Mill (ii) Roller Mill (iii) Ball Mill | | 8 | 1 | 1 |
| 2 | Mixing Mechanism of Mixing, Ideal Mixing, Random Mixing, Acceptable Mixing. Principle, Working and Construction of Double Cone blender planetary mixer sigma blade mixer. | | 8 | 1 | 1 |
| 3 | Evaporation Factors Effecting Evaporation. Principle, Construction and working of Steam Jacket Kettle Evaporator Horizontal Tube Evaporator | | 8 | 1 | 1 |
| 4 | Distillation Classification of Distillation. Study of Simple Distillation, Flash Distillation and Fractional Distillation | | 8 | 1 | 1 |
| 5 | Filtration Mechanism of Filtration, Factors Effecting Filtration, Working of Buchner Funnel and Filter Paper Sintered Glass Filter Membrane Filter | | 8 | 1 | 1 |
| 6 | Transportation of Solids Objective and Advantages of Conveying (Transportation) Classification of Conveyors, | | 2 | 1 | 0 |

| | | | | | |
|-----|---|-----|----|----|---|
| | Construction and Working of Belt Conveyer Construction and Working of Screw Conveyer | | | | |
| 7. | Maintenance Concepts: Preventive maintenance, predictive maintenance, breakdown maintenance, spares, inspection, keeping the machine efficiency, partnership with operator and maintenance, reliability centered maintenance, operator care, CLITA, how to direct mechanic | 10 | 8 | 1 | 1 |
| 8. | Machine elements: Structure, classification, applications, and typical troubles of: bolt and nut; keys; bearing; gear; belt and pulleys; chain and joint. | 12 | 2 | 1 | 0 |
| 9. | Basics of Electrical Engineering: 1) Types, grades, shapes and sizes of insulated wires and cables, their proper selection and use, cable termination, cable safety,different type of joints e.g. Britannia, Straight, Tee, Western union, letters signs and symbols used in Electrical Technology. 2) Ohm's Law & its application, Concept of Electrical Circuit e.g. Series, Parallel and Mixed Circuits. Identification of AC & DC Meters. 3) Resistance and laws of resistance, Kirchhoff laws and their application, Wheat stone bridge and its application, | 9 | 8 | 1 | 1 |
| 10. | Automation of Pharmaceutical Operations | 4 | 8 | 1 | 1 |
| | Total | 110 | 68 | 10 | 8 |

Ref Books:-

- 1) S.J Carter, Cooper and Gunn's Tutorial Pharmacy 6th Edition, CBS Publishers, Delhi.
- 2) Pharmaceutical unit Operations by CVS Subramanyam, Vallabha Prakashan Publications .
- 3) Pharmaceutical Engineering by K.Smbamurthy.
- 4) Introduction to Chemical Engineering by Badzer and Banchemo.

PHARMA TEFCHNOLOGY
PART B – VOCATIONAL SUBJECTS
SECOND YEAR

PAPER – III : PHARMACEUTICAL ENGINEERING (PRACTICALS)

| S.No | Name of the Unit | No of Periods | Weightage in Marks |
|------|---|---------------|--------------------|
| 1. | Measurement of flow of fluids and their Pressure, Calculation of Frictional Losses | | |
| 2. | Evaluation of Filter Media, Determination of Rate of Filtration | | |
| 3. | Determination of Rate of Evaporation | | |
| 4. | Determination of Rate of Drying, Free Moisture Content and Bound Moisture Content | | |
| 5. | Experiment to illustrate Size Reduction | | |
| 6. | Experiment to illustrate solid solid Mixing, determination of Mixing Efficiency by Different Mixers | | |
| 7. | Illustrate Influence of Various Parameters on the time of Drying | | |
| 8 | Work shop practice i. Fitting ii. Welding iii. Lathe | 25 | 10 |
| 9 | Electrical Work bench practical i. Identify different types of electrical circuits ii. Meter bridge iii. Wheat stone's bridge practical iv. Demonstration of Ohm's law v. Tangent galvanometer vi. DC motors and alternators | 25 | 10 |
| 10 | Electronic Work Bench i. HMI ii. P-n junction diode iii. Transistor characteristics iv. Process control mechanisms v. Feedback and feed forward loops | 25 | 10 |
| 11 | Engineering Drawing i. Lettering and dimensioning ii. Geometrical construction iii. Projection of straight lines and planes | 20 | 10 |
| 12 | Fire extinguishers demonstration | 20 | 10 |
| | TOTAL | 115 | 50 |

**PHARMA TECHNOLOGY
SECOND YEAR
MODEL QUESTION PAPERS
PAPER – I – PHARMACOLOGY & PHARMACEUTICAL REGULATIONS (THEORY)**

Time: 3 hrs

Marks: 50

SECTION – A

Note: i) Answer all questions

10 x 2 = 20

ii) Each question carries Two marks

1. Define **PHARMACOLOGY**.
2. Write the purpose of “Drugs and Cosmetics act”.
3. Write the normal values of B.P. and Define Anti Hypertensives
4. Write the introduction to EMEA.
5. Define an Emetic.
6. Explain the terms i). SELF INSPECTION ii). PRODUCT RECALL
7. Give two examples of laxatives.
8. What is meant by “CONTINUOUS PROCESS VERIFICATION”.
9. Write the definition of Analgesic and give two examples.
10. Define “PHARMACOPOEIA”.

SECTION – B

Note: i) Answer any FIVE questions

5 x 6 = 30

ii) Each question carries SIX marks

11. Explain the routes of drug administration.
12. Write a short note on Indian Drug Regulatory Agency.
13. Write the classification of sedatives.
14. Explain European Medical Agency.
15. Give a note on Pharmacotherapy of Angina pectoris.
16. Write about anti diabetics.
17. Give an explanation on the concepts of continuous process verification.
18. Classify diuretics and write their uses .

**PHARMA TECHNOLOGY
SECOND YEAR
MODEL QUESTION PAPERS
PAPER-II – PHARMACEUTICAL TECHNOLOGY-II (THEORY)**

Time: 3 hrs

Marks: 50

SECTION – A

Note: i) Answer all questions

10 x 2 =20

ii) Each question carries Two marks

1. Define TABLET.
2. Mention different types of Granulators.
3. What are the different types of filtration equipments in liquid oral manufacturing.
4. Write the Definition of SUSPENSION.
5. What is meant by aseptic area.
6. Give the definition of Sterilisation.
7. Mention different types of filling machines for tubes.
8. Mention different types of semi solid dosage forms.
9. Mention different types of packaging for tablets.
10. Write the contents of a label.

SECTION –B

Note: i) Answer any FIVE questions

5 x 6 = 30

ii) Each question carries SIX marks

11. Give the process flow diagram of tablets manufacturing and mention the Steps.
12. Write about tablet coating.
13. Explain “In process checks” in liquid oral manufacturing.
14. Discuss the various aspects of Emulsion manufacturing.
15. Write about different types of Sterilisation process.
16. Describe LYOPHILISATION in detail.
17. Write about operation cleaning and maintenance of filling machines.
18. Give a note on different types of packaging and labelling machines.

**PHARMA TECHNOLOGY
SECOND YEAR
MODEL QUESTION PAPERS
PAPER – III- PHARMACEUTICAL ENGINEERING (THEORY)**

Time: 3 hrs

Marks: 50

SECTION – A

Note: i) Answer all questions

10 x 2 =20

ii) Each question carries Two marks

1. Differentiate Mechanism, Attrition and impact in size reduction
2. Ball mill is not useful for size reduction of fibrous material explain
3. Define Distillation and give two applications of Distillation.
4. Mention the equipment for Solid-Solid Mixing
5. What is ideal Mixing of Powders
6. Mention two objectives of conveying of solids
7. Give Principle of Filtration
8. Define Preventive Maintenance
9. Write the classes of machine elements
10. Write the definition of Automation of Pharmaceutical operations

SECTION –B

Note: i) Answer any FIVE questions

5 x 6 = 30

ii) Each question carries SIX marks

11. What is meant by steam Distillation. What are its special advantages.
12. Describe construction and working of distillation operators for preparation of Distilled water
13. Explain Construction and working of wall Mill
14. Explain advantages and disadvantages of Size reduction
15. Describe the working and construction of double cone blender
16. Describe the principle and working of belt conveyer
17. Describe the working of sintered glass filter.
18. a) Explain briefly about basics of Electrical Engineering
b) Discuss the concepts of Maintenance

PHARMA TECHNOLOGY REQUIRED LAB EQUIPMENTS

| S.No. | Item | Quantity per batch (30 students in a batch) |
|-------|---|---|
| | Wet / Chemical Lab | Item Qty Required |
| 1 | Syringes (2ml, 5ml, 10ml) (Is it for lab?/if it is then required) | 5 each |
| 2 | UV Analyser (Make: Perkin elmer/shimadzu/Thermo) | 1 |
| 3 | FT-IR (Make: Shimadzu/Thermo) | 1 |
| 4 | Mortar and Pessel (Type: Silica, SS-316L, Agate, Granite) | 1 |
| 5 | Halogen Moisture Analyzer | 1 |
| 6 | Seive Shaker | 1 |
| 7 | Seive meshes (All grade levels like 100, 150, 200, 250 etc,..) | 2 each |
| 8 | Motor grinder | 4 |
| 9 | Silica(Costs less) / Platinum Crucibles (Costs more) | 4 & 2 |
| 10 | Muffle Furnace | 1 |
| 11 | Loss on Drying Machine with Vaccum, pressure gauge meter | 1 |
| 12 | Refractometer | 1 |
| 13 | Polarimeter | 1 |
| 14 | Auto titrator | 1 |
| 15 | Melting point | 1 |
| 16 | Capillary tubes | 1 |
| 17 | TLC chamber | 1 |
| 18 | Brook filed Viscometer | 1 |
| 19 | Black particle size analyzer | 1 |
| 20 | Density meter | 1 |
| 21 | Bulk density and Tapped density tester | 1 |
| 22 | Friabilator | 1 |
| 23 | Vernier callipers | 5 |
| 24 | Micrometer screw gauge | 3 |
| 25 | Karl Fisher Apparatus (Make: Metrom) | 1 |
| 26 | Particle Size Analyzer (Make: Malvern Master 2000) | 1 |
| 27 | Hardness Tester | 1 |
| 28 | Labelling Machine | 1 |
| 29 | Laboratory Microscopes(40X and 100X) | 10 |
| 30 | Barcode scanner | 1 |
| 31 | Torque tester | 1 |
| 32 | Induction cap sealer | 1 |
| 33 | Bursting strength | 1 |
| 34 | Pin hole tester | 1 |
| 35 | Differential scanning calorimeter | 1 |
| | Instrumentation | |
| 1 | HPLC (Make: Agilent/Waters/Shimadzu) | 1 each |

| | | |
|----|--|----------------------------|
| 2 | Mobile phase filtration kit with filters (MilliQ) with vaccum motor | 1 |
| 3 | Milli-Q / TKA water for HPLC | 1 each |
| 4 | Syringe Filters (6,6-Nylon,PVTF, PVDPE, PTFE etc..) | 1 each |
| 5 | Specific optical rotation Analyser (Make: Rudolph Autopol V/ Jasco 2000 or 3000) | 1 (any one) |
| 6 | HPLC vials | 1 |
| 7 | Crimpers | 1 |
| 8 | Dissolution filters (1 micron) | 1 |
| 9 | Gas chromatographer | 1 |
| 10 | GC vials | 1 |
| 11 | GC injection needle | 1 |
| 12 | HPLC columns (Different sizes) | 1 each |
| 13 | GC columns | 1 |
| 14 | Dissolution Apparatus | 1 |
| 15 | DT Apparatus | 1 |
| | Common for use in lab | |
| 1 | Analytical balance with printer | 4 |
| 2 | Pipettes (1mL, 2mL, 5 ml/10 ml) | 1 |
| 3 | Sonicators | 1 |
| 4 | Hot air oven | 1 |
| 5 | Rotary shaker | 1 |
| 6 | water bath | 1 |
| 7 | Glassware drying oven | 1 |
| 8 | Cleaning agents (soap/alconox etc) | 1 |
| 9 | Centrifuge | 1 |
| 10 | Centrifuge tubes | 1 |
| 11 | pH meter with ATC Probe/ Glass electrode | 1 |
| 12 | conductivity meter | 1 |
| 13 | Scale | 1 |
| 14 | Magnetic stirrers | 1 |
| 15 | Hot plate with magnetic stirrer | 1 |
| 16 | LOD bottles | 1 |
| 17 | Dessicator | 1 |
| 18 | Droppers | 1 |
| 19 | Vortex mixer | 1 |
| 20 | Lab equipped with Fume Hoods | 1 |
| 21 | Glassware for Lab | As required to run the lab |
| 22 | Burette stand with white tile | 1 |
| | Saftey related | |
| 1 | Half Face Mask | 4 |
| 2 | Full Face Mask | 4 |
| 3 | Various Cartridges | 4 |
| 4 | Safety Goggles | 4 |

| | | |
|----|---|-------------------------------|
| 5 | Safety Shoes | 4 |
| 6 | Gum Boots | 1 |
| 7 | Chemical Absorbent | 1 |
| 8 | Self Contained Breathing Apparatus | 2 |
| 9 | PVC Apron | 2 |
| 10 | Gloves(Nitrile, {Heat, acid, chemical} resitant, washing etc..) | 2 |
| 11 | Lab Coat | 1 per trainee |
| 12 | Surgical Gloves (in Microbiology) | As required to run the lab |
| 13 | Eye washer with sprinkler/ Manual bottle eye washer | As required for safety in lab |
| 14 | CO2 type Fire Extinguisher | 2 |
| 15 | ABC Type Fire Extinguisher | 2 |

(B) List of on the job training sites

1. Pharmaceutical Industries
2. Pharmacy Colleges
3. Medical Colleges
4. Pharmacies

On job training syllabus –Pharmatechnology

Pharma industry area of training :

- a. Pharmatech operators
- b. Production supervisor
- c. Warehouse assistant
- d. Assistant formulation R&D
- e. Assistant –analytical R&D
- e. Assistant D & A.

GENERAL :

1. Training on standard operation procedures(SOPs)
2. Training on on-site safety procedures.
3. Training on good laboratory procedures(GLPs)
4. Training on documentation.
5. Communication skills and soft skills.

FORMULATION AREA:

1. Flow chart of a particular dosage form . Eg. Tablets
2. Training on all equipment in the flow : installation, operational and performance qualification of each equipment.
3. Setting and operation of each equipment and calibration
4. Dismantling , cleaning and re-installation of parts of equipment .

LIST OF COMPANIES FOR ON JOB TRAINING

1. DR Reddy's laboratories
2. Mylan
3. Aurobindo pharma
4. Hetero drugs.
5. MSN Laboratories
6. NATCO laboratories
7. Neuheit pharma technologies pvt ltd.
8. Sri Krishna Pharma Technologies pvt ltd.

LIST OF COLLEGES

1. **University College of Pharmaceutical Sciences. Kakatiya University.**
2. **Dept of Pharmacy, Palamur University , Mahaboobnagar.**

ANALYTICAL AREA :

1. Overview of various analytical techniques used in pharma industry.
2. Training and practical involvement in all analytical equipment used.
3. Wet lab analysis training .
4. Training to support analysis with sophisticated instruments such as HPLC & GC
- 5 Hands on experience v with all equipment

