Tribhuvan University
Institute Of Medicine
Maharajgunj, Kathmandu, Nepal

[FINAL YEAR CURRICULUM &QUESTION COLLECTION SERIES]

[2061-2075]

QUESTION COMPILER: SANJEEV KHANAL [B. PHARMA 16TH BATCH]

► Success is not the key to happiness. Happiness is the key to success. If you love what you are doing, you will be successful. - Herman Cain

► Success means having courage, the determination and will to become the person you believe you were meant to be. - George Sheehan

Booklet Content

Tribhuvan University
Institute of Medicine
Maharajgunj, Kathmandu, Nepal

Curriculum of Bachelor of Pharmacy
[Final Year]

Evaluation Table

Subjects	University Exam	Internal Assessment	Full Marks	Pass Marks
Theory				
Pharmaceutical Engineering and Drawing	80	20	100	50
Clinical and Hospital Pharmacy	80	20	100	50
Pharmaceutical Analysis and Quality Assurance II	80	20	100	50
Ayurvedic Pharmacy	40	10	50	25
Practicals				
Pharmaceutical Engineering and Drawing	80	20	100	50
Clinical and Hospital Pharmacy and Pharmacotherapeutics	80	20	100	50
Pharmaceutical Analysis and Quality Assurance II	80	20	100	50
Ayurvedic Pharmacy	40	10	50	25
Thesis defence and Viva	100	-	100	50
Inplant Training	80	20	100	50
Total	740	160	900	450

[Pharmaceutical Engineering]

1. Define unit operations. Explain the concept of material and energy balances. Describe units and carry out their conversions.

2. Define distillation. State Rault's law and Henry's law. Explain about Boiling point diagram, Vapour liquid equilibrium, Relative volatility, Constant boiling mixture, Relative volatility and Equilibrium diagram of binary mixture. Explain about bubble cap plates column, packed column, column efficiency and plate efficiency. Explain about Simple Steam and flash distillation, azeotropic, molecular and extractive distillation Equilibrium distillation, Differential distillation, Principles of Rectification, Partial condensers, Effect of heat losses, Petroller distillation, Steam distillation and Optimum reflux ratio.

3. Explain mechanism of drying, Factors affecting drying, Drying rate curves, Drying equipment, Cabinet or tray dryer, Spray dryer, Rotary dryer, Fluidized bed dryer, Infra-red drying, freeze drying and vacuum dryer. Classify dryers. Explain Special drying methods, Drying theory, Equilibrium moisture content, Rate of drying curves, Constant drying rate, Factors affecting constant drying rate and Variable drying conditions.

4. Describe extraction, liquid-liquid extractors, batch and continuous equipment, concurrent and counter current extraction, solid liquid extraction (leaching) process and equipment. Explain Equipment for leaching coarse solids, Intermediate solids, Fixed bed diffusion batteries, Continuous diffusion batteries, Oil seed extraction, Basket extractor, Rotocel extractor, Flow sheet of extraction plant, Extraction of fine material, Continuous leaching of fine materials, Continuous counter-current decantation systems, Liquid-liquid extraction, Solid-liquid extraction, Solubility and equilibrium diagram, System with complete immiscibility, Rates of extraction, percolation, maceration and decoction.

5. Give fundaments of mixing. Explain mixers for solid-solid, liquid-liquid and solid-liquid system and homogenization. Give a brief account of mixing with special emphasis on mixing of liquid with liquids, Gas with liquid, Viscous masses mixing, Solids with liquid, Theory of mixing, Mixing of miscible liquids and Solids with small amount of liquids.

6. Describe the properties of important materials employed in fabrication of pharmaceutical equipment such as iron and its alloys, copper and its alloy, nickel and its alloy, rubber, plastic, enamel and glass.

7. Describe the flow of fluids. Explain the laws and principles of fluid flow, Bernoulli's equation, streamline, transition and turbulent flows, Reynold's experiment, fluid friction and roughness of pipe surfaces, drop in pressure due to sudden contraction and enlargement in pipe fittings, flow measuring devices, Venturi meter, orifice meter, rotameter, ultrasonic meter and pilot tube. Discuss the transportation of fluids with special emphasis on apparatus of Fluid Flow, its parts, material used in parts, different types of Pumps, Transportation of gas (Ejectors, Compressors, Fans and Blowers).

8. Define heat transfer. List modes of heat transfer. Describe conductivity of heat through plain and cylindrical surfaces and heat transfer by convection, natural convection, forced convection. Explain the concept of film coefficient, heat transfer from condensing vapour, heat transfer to boiling liquids and heat interchangers. Classify and describe the heat flow processes with special emphasis on:

✦ **Conduction:** Fourier's law, Thermal conductivity, Series resistance and Conduction through fluids.

✦ **Convection:** Temperature Gradient in forced convection, Surface coefficients, Overall coefficients, General considerations regarding surface coefficients, Consistent unit, Laminar flow of fluids inside tubes and Fluids in natural convection.

✦ **Radiation:** Black body, Rates of Radiation, Effect of Temperature, Radiation from gases, Heat transfer by combined radiation and convection, Angle of vision, Radiation errors in thermometry, Heaters, Tubular heaters, Heat interchangers (exchanger), Double pipe heat exchangers, Finned tubes.

9. Define evaporation. Explain types of evaporators, overall heat transfer coefficient, multiple effect evaporator, steam economy, condensation of vapours, entrainment separator. Explains Condensers, Vacuum pumps, Removal of condensate, Self-removal, Separators, Evaporators capacity, Effect of feed temperatures, Choice of steam pressure, Elevation of boiling point, Temperature drop, Factors influencing heat transfer coefficients, Scale formation, Rate of scale formation, Multiple effect evaporation and its principles, Evaporation by Thermo-compression, Theory of vapour compression and its method.

10. List and explain screening and sieving equipment, explain the theory of sedimentation, classification and elutriation. Explain size separation, Standard screen analysis, Wire screen, Types of screening equipment, Air separation methods, Air separators, Bag filters, Precipitators, Scrubbers, Air filters, Size separation by settling, General laws of free settling, Viscous resistance or Stoke's law, Resistance to motion of geometric shapes other than spheres, Irregular shaped particles, Separation of size by free settling, Differences in density and Sedimentation.

11. Explain theory of centrifugation and Kozeny's equation, filtration equipment, filter medium, filter aids and centrifuges. Describe filtration and centrifugation with special emphasis on the theory of filtration, filter aids, filter media and industrial filters including filter press, rotary filter, and edge filter. Explain factors affecting filtration, mathematical problems on filtration and optimum cleaning cycle in batch filters. Explain principles of centrifugation, industrial centrifugal filters and sedimenters.

11. Define size reduction and explain objectives of size reduction. Explain factors affecting size reduction and laws of crushing and grinding. Similarly explain dispersing agents and grinding aids and selection of equipment. Explain the mechanism, processes and applications of ball mill, pot mill, colloid mill, hammer mill, fluid energy mill, edge runner and end runner mill. Classify size reduction process. Explain theory of crushing by using Rittinger's law, Crusher operation and Closed circuit grinding.

12. Explain the characteristics of crystals (purity, size, shape, geometry, habit, forms, size), factors affecting solubility curves and calculation of yields, material and heat balances around Swenson Walker Crystallizer, supersaturation theory and its limitations, nucleation mechanism, crystal growth. Give a brief account of various types of crystallizers, tanks, agitated batch, single vacuum, circulating magma and caking of crystals and its prevention.

13. Give a brief account on plant location with its layout, utilities and services. Describe industrial pollution and give different ways to control it. Give a brief account of environmental engineering, solid and liquid waste disposal, industrial hazards and safety measures.

14. Explain Dehumidification and humidity control. Similarly define and explain humidity, humid heat, humid volume, interpret psychrometric charts, wet bulb theory and theory of air conditioning. Explain air conditioner, dehumidifier and refrigerator and their application in pharmacy.

15. Define and explain gas absorption, Mass transfer within a gas phase, Rate equation for gas phase mass transfer, Wetted – well column and mass transfer coefficients, Properties of tower packing and its types, Tower construction, Two phase flow through packed towers, Pressure drop, Liquid phase mass transfer in packed towers, Gas absorption and Overall mass-transfer coefficients.

[Pharmaceutical analysis and quality assurance II]

1. Explain the theoretical aspects, basic instrumentation, elements of interpretation of spectra and applications and operate and apply the following analytical techniques:

- ► UV and visible spectrophotometry
- ► Flame Photometry
- ► Fluorimetry
- ► Emission Spectrometry
- ► Infrared spectrophotometry
- ► Atomic Absorption Spectroscopy
- ► Mass Spectrometry
- ► X-Ray Diffraction & Radioimmunoassay
- ► Nuclear Magnetic Resonance Spectroscopy including 13 C NMR (theoretical aspects only)

2. Describe the quality assurance process:

- ► ISO 9000, TQM, Quality Review and Quality documentation
- ► Regulatory control, Regulatory Drug Analysis and interpretation of analytical data
- ► Validation, quality of equipment, validation of equipment and validation of analytical instruments

3. Describe the total quality management process with special reference to the following:

a. **ISO 9000 series**: Elements and applications of ISO 9000 systems

b. **GMP**

- ► GMP manufacturing practices as per WHO guidelines and USFDA guidelines
- ►Application for registration, quality audit and quality manual for operations
- ►Documentation of quality system
- ► GLP (Good laboratory practices)
- ►Approach to certification
- ►ISO Guide 17025 and quality audit
- ►Quality policy
- ► Validation process

[Clinical and Hospital Pharmacy]

1. Define and give a brief account of the history and development of clinical pharmacy.

2. List and explain the activities of clinical pharmacist: Drug therapy monitoring (medication chart review, clinical review, TDM and Pharmacist interventions), ward round participation, ADR management, drug information and poison information, medication history interview, patient counseling and assessment of compliance

3. Interpret and discuss the clinical significance of some clinical laboratory tests: Haemogram, liver function tests, pulmonary function tests and renal function tests

4. Take the patients' medication history.

5. Explain the general prescribing guidelines for pediatric patients, geriatric patients, pregnant and breast-feeding women.

6. Describe the long-term care facilities, prevention of drug abuse.

7. Explain the adverse drug reactions with special emphasis on epidemiology, classification, risk factors, monitoring and detecting ADR, assessing causality, reporting ADRs.

Drug interactions: Define drug-drug and drug-food interactions. Classify and explain mechanism of drug-drug interactions.

8. Explain the concept of Essential drugs and National Drug Policy (Production, access, safety, quality and rational drug use)

✦ Access: Availability, affordability, pricing/price competition, prepaid reimburse schemes, generic drugs, bulk procurement, priority licensing and drugs for priority diseases

✦ Policy: Development and review, implementation, collaboration, coordination with development parties, monitoring of policy indicators, drug financing and supply of narcotic & psychotropic drugs

✦ Safety/Quality: Drug evaluation

9. Describe the investigational drugs and phases of clinical trials, pharmacist's role in clinical trials, statistical methods of interpretation, legal and ethical considerations.

10. Therapeutic drug monitoring (TDM): Give brief account of TDM, necessity of TDM, criteria for valid TDM, essentials for effective TDM, organization of a TDM service, information and requirement for TDM

11. Define hospital pharmacy and explain the following:

► Organization and structure of a hospital and hospital pharmacy.

► Responsibilities of a hospital pharmacist: Pharmacy and therapeutic committee, budget preparation and implementation.

► Hospital formulary: Contents, preparation and its revision.

► Drug store management and inventory control: Organization of drug store, types of materials stocked and storage contents, Purchase and inventory control principles, purchase procedure, purchase order, procurement and stocking.

► Drug distribution systems in hospitals: Types of drug distribution systems, dispensing to outpatients, ambulatory patients and inpatients, dispensing of controlled drugs, labeling and charging policy.

► Central sterile supply unit and their management: Types of material for sterilization, packing of materials prior to sterilization, sterilization equipments and supply of sterile materials.

► Manufacture of sterile and non-sterile products and their quality control: Policy making of manufacturable items, demand and costing, personal requirements, manufacturing practice, master formula card, production control and manufacturing records.

► Drug and poison information services: Drug information services and centres, activities, sources of information on drugs, diseases, treatment schedules, procurement of information's, computerized services, critical evaluation of clinical trial reports and other literatures, medication errors.

► Records and reports: prescription filing, drug profile, patient medication profile, cases on drug interaction and adverse reactions, idiosyncratic cases.

► Nuclear pharmacy: Clinical applications of radiopharmaceuticals, production of radiopharmaceuticals, methods of isotopic tagging, preparation of radio isotopes in laboratory using radiation dosimetry, radiation hazards and their prevention, specifications for radioactive laboratory.

[Ayurvedic Pharmacy]

1. Introduction to Ayurveda and other traditional systems of medicine with their scope and importance.
2. History, Present status and future prospective of Ayurveda in Nepal. Important institutions of Ayurveda in SAARC countries and research aspects of Ayurveda.
3. Introduction to important ayurvedic texts and their relevance to pharmacy.
4. Introduction to basic concepts of Ayurveda and the terminology. Introduction to drug action in ayurveda Rasa, Guna, Vipaka, Veerya and Pradhan.
5. Measurements in ayurveda and their relation to metric system.

6. Formulation section:
a) Introduction to the principles of drug formulations and their forms with examples.
b) Pancavidha Kasaya Kalpana, Suarasa (expressed juice), Churna (Powder), Phanta (hot infusion), Srita (cold infusion), Cluather (Decoction)
c) Concept of Posology in Ayurveda: Dose, Form, Route, Time and Sahabana arubana
d) Formulations: Vate (pills), Araleha (malt), Asava, Arista (Fermented liquids), Bhasmas - Minerals in oxidized and processed forms and Kupi Pakua.
e) Demonstration/observation: Triphala churna, Dashamool kwatha, Lauha bhashma, Chandra prabha vati, Ashoka arista, Vasavaleha, Triphala ghrita, Shad vindu tari purification and detoxification, Shilajeet, Canualsis and Datura.

7. Quality control and GMP of ayurvedic products
8. Sources of Ayurvedic drugs with examples of plants, minerals and animal origin.
9. Legal aspects of ayurvedic drug and formulations.

[Dissertation]

Introduction to the course: This course will provide the students some knowledge and practice of pharmaceutical research activity which will enable them to carry out researches and solve problems. This course will also help them in writing scientific papers and defending their findings.

General objective: After completion of the course the students will be able to carry out simple researches, prepare reports and defend their findings.

Specific objectives: Upon completion of the course, the students will able to develop a research proposal, implement the proposal, analyze the data, write the research report/thesis and defend the thesis.

Proposal Development: As the fourth year starts, students in consultation with designated teachers and extensive literature survey will develop research proposal during the initial 4-month period.

Data collection/Report writing: The real dissertation, data collection, interpretation and final write-up will be carried out during the 3 months period dedicated to the dissertation.

The thesis should contain the following headings:

1. Title
2. Background / Introduction
3. Materials / Methods
4. Results
5. Discussion
6. Conclusion
7. Acknowledgements
8. References

Evaluation:

Full marks (Thesis defense and viva): 100

Pass marks: 50

[Inplant Training]

Course Introduction: Recognizing the need to develop the ability to translate theory into practice, students will be placed for inplant training in pharmaceutical manufacturing units, hospitals, community and social pharmacy, regulatory bodies and quality research labs initially in the form of non-credit pre-exposures during vacations of second year and third year and as a two and a half months credit-bearing course at the end of the fourth year.

The students will be provided non-credit pre-exposure inplant trainings as given below:
Second year: Community/Hospital (1 week)
Third year: Regulatory, QC, Industry (2 weeks)

During the 2 and half months dedicated to the inplant training, the students will carry out / observe the activities under the guidance of the local supervisor in pharmaceutical manufacturing units, hospitals, Department of drug administration, drug research laboratories and drug stores as following:

1. Hospitals: 2 Weeks
2. Drug Research Laboratories: 1 Week
3. Pharmaceutical Industries: 5 Weeks
4. Department of Drug Administration: 1 Week
5. Community/ Social Set-ups
(Whole sales and Retail Shops): 1 Week

Evaluation:
Full Marks: 100 (20% for internal assessment and 80% for report writing and viva)
Pass Marks: 50

Report writing should include the following:

1. Industry: In the case of industrial sector, the report should include procurement, processing, handling, documentation and quality assurance during the various steps from the raw material to the end product of the unit they have been placed.
2. Hospital: The report should include the purchase of drugs, supply system to wards, dispensing to OPD patients and small-scale manufacturing.
3. DDA: The report should include the responsibilities and different components of the units they are placed like registration, import / export, monitoring, inspection, DINON units.
4. Drug stores: The report should include procurement process, drug storage, distribution and management, record keeping and rational dispensing.
5. Drug research laboratories: Report should include quality assessment of different dosage forms.

[B. Pharmacy/Final Year/ Clinical and Hospital Pharmacy/2061]

1. What is drug interaction? Write about mechanisms of drug interactions. Briefly describe rationale of combination therapy. [10]

2. What do you mean by ADR? Discuss the mechanisms of ADR. Discuss with examples about gastrointestinal diseases resulting from drug therapy. [10]

3. What is TDM? What are the important criteria to be considered for TDM to have clinical significance? List the commonly monitored drugs in Nepal. [10]

4. Why patient compliance is important in pharmaceutical care? Discuss the factors associated with non-compliance. How a pharmacist can improve compliance? [10]

5. Write the main functions of poison information centre. Discuss the various poison prevention techniques to decrease accidental poisoning. What are the resources needed for poison information to its services? [10]

6. Why it is important to have different prescribing guidelines for pediatrics population? Discuss the general prescribing guidelines for pediatrics population. [10]

7. What are the goals for institutional pharmacy? Explain minimum standard for pharmacy institution as set by ASHP? [10]

8. What do you mean by DTC? How it is organized? What are its functions and advantages?

9. What is CSSR? What are its objectives? Give a material flow diagram of CSSR. What are the advantages of having a CSSR in hospital? [10]

10. Establish importance of nuclear pharmacy in a hospital. What are the different types of radioisotopes used in hospitals? What are the hazards associated with these types of isotopes? How can they be prevented? [10]

[B. Pharmacy/Final Year/ Clinical and Hospital Pharmacy/2062]

1. Prove hospital is an organization. Classify hospital into various categories. What are its different departments? Draw a typical organization chart of a hospital. [10]

2. What are the competencies required to practice institutional pharmacy? Give separate flow charts for out-patients and in-patients in a hospital pharmacy. [10]

3. What are the different factors responsible for deterioration of drugs? What is the cold chain system? Interpret temperature to store drugs. As a professional pharmacist how can you detect visually the spoiled drugs? [10]

4. What is drug interaction? Write about mechanisms of drug interactions. What types of patient shows increased chances of drug interaction? Briefly describe rationale of combination therapy. [10]

5. What do you mean by ADRs? Explain the mechanism of ADRs. Write about gastrointestinal diseases from drug therapy. Describe briefly the predisposing factors of ADRs. [10]

6. What is TDM? What are the important criteria to be considered for TDM to have clinical significance? What types of drugs are to be monitored therapeutically? [10]

7. Define compliance. What are the consequences of non-compliance? And how can you improve compliance? [10]

8. Short notes on any TWO: [5+5]

a. Organizational chart of pharmacy department hospital **c.** Inventory control

b. Informational resources to prepare formulary

[B. Pharmacy/Final Year/ Clinical and Hospital Pharmacy/2063]

All the questions carry equal marks. [8×10=80]

1. Explain minimum standards for an institutional pharmacy as outlined by the ASHP. What are the objectives/philosophies to open a hospital pharmacy?

2. What theoretical considerations should be made to open a new hospital pharmacy? Give a functional /departmental activity chart of a hospital pharmacy.

3. Define budget. What are the factors affecting and the points to be consider to prepare a good budget? Mention the advantage of good budget.

4. What is formulary? What are its benefits? Explain the criteria for the selection of drugs for formulary. Present an outline on layout/contents of a typical formulary.

5. What are 5R of purchasing? Give a diagrammatic representation of purchasing procedure. Explain different methods of inventory control.

6. In a hospital pharmacy, average monthly consumption (CA) of ciprofloxacin tablet 500mg is 2000 tablets; suppliers Lead Time (LT) is 3 months; Procurement Period (PP) is 4 months and Safety Stock (SS) is 1000 tablets. Calculate its Minimum Stock (S_{min}) and Maximum Stock (S_{max}).

7. What is DTC? What are its function and advantages? Present an organizational chart of DTC.

8. Short notes on any TWO:

a. CSSD b. Functions and types of hospital c. Location & layouts of a hospital pharmacy

[B. Pharmacy/Final Year/ Clinical and Hospital Pharmacy/2064]

1. Describe the roles of clinical pharmacists. [10]

2. Define the therapeutic drug monitoring. Give four examples of drugs for which TDM is essential with justification. [2+8=10]

3. Classify adverse drug reactions according to severity and onset of reactions. Give examples. [2×6=12]

4. Explain the concept of essential drugs. What are the criteria for selection of a drug as essential? [3+5=8]

5. Describe different phases of a clinical trial. [8]

6. Explain the general prescribing guidelines for pediatrics and geriatric patients. [2×5=10]

7. List three diseases for which the following diseases are indicated: [2×5=10]

a. Renal function test **b.** Liver function test

8. Describe the problems encountered by hospital pharmacist in ensuring quality drug supply and rational drug use. [10]

9. List four drugs banned in Nepal. [2]

[B. Pharmacy/Final Year/ Clinical and Hospital Pharmacy/2065]
All the questions carry equal marks. [10×8=80]

1. What is drug interaction? List the types of drug-drug interactions with an example each.
2. What is inventory control? Describe in brief the narcotic supply management in hospital.
3. What is the importance of Therapeutic Drug Monitoring [TDM]? Justify the TDM for carbamazepine.

4. Define ADRs. Classify ADRs with two examples of each.
5. Explain the concept of essential drugs. What are the criteria in selection of essential drugs?
6. What is clinical trial? Discuss the different stages of clinical trials.

7. List the ten drugs included in TUTH formulary emergency drugs list. Write down their indications and contraindications.
8. Who is clinical pharmacist? Write down his/her roles in detail.
9. What special considerations have to be taken when prescribing drugs to pediatric and geriatric patients?
10. Define hospital pharmacy. What are the responsibilities of a hospital pharmacist?

[B. Pharmacy/Final Year/ Clinical and Hospital Pharmacy/2066]

1. List and explain the different activities of a clinical pharmacist. [8]

2. Write down the purposes and significance of the following tests: [3×4=12]
a. Liver function test
b. Renal function test
c. Hemogram

3. Explain the general prescribing guidelines for pregnant and breastfeeding women with example. [4+4=8]
4. Classify the ADRs with examples. What are the risks factors involved with the ADRs? [8+4=12]

5. Explain concept of the essential drugs. What is the basis in their selection? Describe with examples. [8]
6. Write down the criteria for valid TDM. What are the essentials for effective TDM? [4+4=8]
7. Describe the different drug distribution systems in hospital. [8]

8. Short notes on: [5×2=10]
a. Method of isotopic tagging
b. Hospital formulary
c. Food-drug interaction
d. National Drug Policy
e. History of clinical pharmacy

9. Write down the different phases of clinical trials. What are the major differences among them? [2+4=6]

[B. Pharmacy/Final Year/ Clinical and Hospital Pharmacy/2067]

1. Define drug. Write down the criteria for selection of essential drugs. [8]

2. What is meant by Pharmacokinetic drug interactions? Classify them with two examples of each. [8]

3. What is understood by controlled substances in pharmaceutical sector? Describe in brief the psychotropic management in a hospital. [8]

4. List and discuss the different stages of clinical trials. Write down the importance of preclinical tests. [8]

5. Write down the roles of hospital pharmacist in detail. [6]

6. Justify the Therapeutic Drug Monitoring for: [4×2=8]

a) Theophylline **b)** Carbamazepine

7. Explain the preventable adverse drug reactions. What roles can hospital pharmacist play in minimizing such reactions? [8]

8. **a**. Write a critical note on "Every drug is a potential poison". [5]
b. Write down the management of carbon monoxide poisoning. Mention the logic behind it. [5]

9. **a.** Write down the roles and responsibilities of Drug Therapeutic Committee [DTC] of a hospital. [4]
b. Give a brief account of a Hospital Formulary [4]

6. Write short notes on any TWO: [4×2=8]

a. Radio pharmaceuticals **b.** ADR reporting system

c. Voluntary product recall

[B. Pharmacy/Final Year/ Clinical and Hospital Pharmacy/2068]

1. Write down FDA pregnancy classification system for medicines with examples. [8]

2. Explain the valid TDM criteria. How the TDM data should be interpreted? [8]

3. What are investigational drugs? List the phases of clinical trials and their purposes. What precautions should be taken while reading clinical trial reports? [2+4+6=12]

4. Write down in brief about the roles of a hospital pharmacist. [8]

5. Classify ADRs in terms of time of onset and severity with examples. [10]

6. Describe hospital formulary with all its elements. How should it be revised? [8]

7. Explain in brief poisoning situation in Nepal. How can you get information related to poisoning management? [8]

8. List major drug distribution systems in hospitals. Compare their merits and demerits. [6]

9. Write short notes on: [4×2=8]

a. Radio pharmaceuticals **b.** Central sterile supply unit

10. Give two examples of each: [2×2=4]

a. Pharmacodynamic drug interaction **b.** Drugs that can cause SJ syndrome

[B. Pharmacy/Final Year/ Clinical and Hospital Pharmacy/2069]

1. Justify the inclusion of pharmacist in a health care team. [8]

2. What do you mean by individualization of therapy? Explain how TDM can be helpful in it. [4+4=8]

3. A cardiologist feels the drugs included in the hospital formulary insufficient in the management of MI in diabetic patient and a new drug added to the formulary. State how he/she should proceed for it. How will it be decided whether the new drug is added to the formulary? [8]

4. Define clinical trials. Describe in brief what is understood by post- marketing surveillance. [3+5=8]

5. In Nepalese context, how can adverse drug events be reported. How can evaluation be made whether a drug was responsible for alleged reactions? [3+5=8]

6. As a pharmacist working in a poison's management center, what suggestions would you give to the patient party so as to minimize the risks of drug overdose poisoning in future? [8]

7. What do you understand by the term 'Radiopharmaceuticals'? What are the conditions applicable while producing, distributing and using them? [3+5=8]

8. Describe the importance of liver function tests, renal function tests, BMI and immune function tests in pharmacotherapy. [2+2+2+2=8]

9. What are the types of drug distribution systems in hospitals? Write down the merits and demerits of unit dose drug distribution system. [2+6=8]

10. Explain the general prescribing guidelines for pediatric patients and pregnant women. [4+4=8]

[B. Pharmacy/Final Year/ Clinical and Hospital Pharmacy/2070]

1. Classify adverse drug reactions with examples. Describe the role of pharmacist in reducing ADRs? [6+4=10]

2. Describe the criteria for TDM with suitable examples. [10]

3. Give a brief account of development of clinical pharmacy. [8]

4. Enlist the process of development and revision of hospital pharmacy. [8]

5. Write down the symptoms and management of OP poisoning. [5+5=10]

6. Define clinical trials. Mention its phases with short descriptions. [2+8=10]

7. Mention different drug distribution systems in a hospital. List their merits and demerits. [4+8=12]

8. List the roles of a clinical pharmacist in long term care facilities. [6]

9. Write short notes on: [3×2=6]

a. DOTS **b.** Treatment card [Cardex]

c. Nuclear pharmacy

[B. Pharmacy/Final Year/ Clinical and Hospital Pharmacy/2071]

1. Justify why the following are included in the ER drug list. [4×4=16]

a. Injection Adrenaline **c.** Activated charcoal

b. Normal saline **d.** Injection Paracetamol

2. Name any two drugs known to cause skin reactions. Describe the reactions. [5+5=10]

3. Sample taking is an important aspect of TDM. Justify [8]

4. Describe how a pharmacist can contribute to the prevention of drug abuse. [8]

5. List the methods of isotopes tagging. [4]

6. Explain how a hospital formulary is revised? [8]

7. Explain different phases of clinical trials. [10]

8. Discuss why liver function tests and renal function tests are important in the pharmacotherapy of infectious diseases. [10]

9. Explain how supply of psychotropic drugs can be assured. [6]

[B. Pharmacy/Final Year/ Clinical and Hospital Pharmacy/ Regular Paper/ 2072]

1. List roles of clinical pharmacy assistants working in a geriatric care centre. [8]

2. Decide whether TDM is necessary for the following drugs. Justify with suitable reasons. [16]

a) Verapamil b) Vancomycin c) Digoxin d) Isoniazid

3. Write down the management of: [10]

a) Organophosphorus poisoning b) Methanol poisoning

4. Define drug- drug and drug food interactions. Classify and explain the mechanism of drug-drug interactions. [10]

5. Write down the contents, preparation and the revision process of a hospital formulary. [10]

6. Write down the merits and demerits of unit dose drug distribution system. [8]

7. With the help of a diagram, show organogram of a hospital pharmacy of a tertiary level Hospital. [8]

8. List the problem faced by hospital pharmacy in the smooth supply of medicines round the year due to unavoidable circumstances while minimizing financial loss due to expiry. [10]

[B. Pharmacy/Final Year/ Clinical and Hospital Pharmacy/ Back Paper/ 2072]

1. Write in detail about ADRs, its classification, monitoring and reporting of ADRs. [10]

2. Describe the phases of clinical trials and their purposes and pharmacist's role in clinical trials. Write its precautions in reading the clinical trial reports. [10]

3. Explain the roles and responsibilities of a hospital pharmacist, hospital formulary content and its preparation. [10]

4. Explain the valid TDM criteria. How the TDM data should be interpreted? [10]

5. What do you understand by the term 'Radiopharmaceuticals'? What are the conditions applicable while producing, distributing and using them? [10]

6. What are the prescribing guidelines for Pediatric patient, Geriatric patient and Pregnant women? [10]

7. Write in detail about the drug store management and inventory control on hospital pharmacy? [10]

8. Describe the importance of Liver function tests, Renal function tests, BMI and Immune function tests in pharmacotherapy. [10]

[B. Pharmacy/Final Year/ Clinical and Hospital Pharmacy/ 2073]

1. Write down the problems faced by pharmacists working in Nepalese government hospitals. [8]

2. "A good example of team work is reflected in the pharmacology of tuberculosis", justify it. [8]

3. Define Pharmacovigilance. How does it help in minimizing health costs? [2+6=8]

4. Write down the different phases of clinical trials. Who are the participants in each of them? What is the sample size? What are the aims of each of these phases? [1+2+2+3=8]

5. Write down the ways to minimize non-intentional poisonings related with occupation, environment and health care. [8]

6. Write down the sign and symptoms and management of Organophosphate Poisoning. [3+5=8]

7. Define Therapeutic Drug Monitoring. Describe the importance of sampling time and patient education in the interpretation and utilization of TDM. [2+6=8]

8. Give your critical opinion regarding the pros and cons of "Unit dose dispensing" and "Full course dispensing". How would you make your decision in different contexts? [8]

9. What is the implication of the expression "Children are not little adults" in drug therapy? [8]

10. Write down the clinical significance of Pharmacokinetic drug interactions. Give examples from each steps of Pharmacokinetics. [4+4=8]

[B. Pharmacy/Final Year/ Clinical and Hospital Pharmacy/ 2074]

1. Define adverse drug reactions. List the major ADRs of immune-suppressants. [2+6=8]
2. Write down the major components of a hospital formulary. What is its relation with essential drugs list of a country? [5+3=8]
3. How are liver function and renal function tested? What are their importance? [6+2=8]
4. Write down how the safety of medication in pregnancy can be ensured. Give your opinion regarding towards the recent changes made by FDA in this regard. [4+4=8]
5. Describe how a hospital can contribute in tackling with the problem of AMR. What strategies do you suggest to the hospital? [4+4=8]

6. Define clinical trials. Write down the ethical issues related with the clinical trials. Write down the importance of Phase III trials. [2+3+3=8]
7. Write down the symptoms and management of Mushroom Poisoning. [3+5=8]
8. What is mean by Individualization of therapy? How can it be done in practical set-ups? [2+6=8]
9. Define new drug. How can its efficacy and safety established? [2+6=8]
10. Write down the responsibilities of hospital pharmacist. [8]

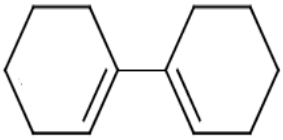
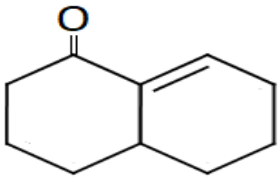
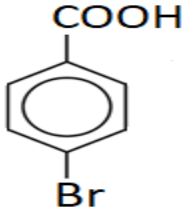
[B. Pharmacy/Final Year/ Clinical and Hospital Pharmacy/ 2075]

1. Define investigational drugs. Write down how a chemical molecule can become a marketable medicine. [3+7]
2. Write down the roles of a hospital pharmacist. [10]
3. Define medication error. Explain how a pharmacist can contribute in minimizing such errors. [3+7]
4. Explain how a hospital pharmacy can supply medicines at a relatively affordable cost. [10]

5. Describe symptoms and management of organophosphate poisoning. [3+7]
6. Describe how a hospital pharmacy can contribute to prevention of drug abuse. [10]
7. What precautionary steps are necessary while producing a sterile product in hospital pharmacy? [10]
8. Characterize pediatric, geriatric patients and pregnant women in terms of prescribing medicines. [10]

[B. Pharmacy/Final Year/ Pharmaceutical Analysis and Quality Assurance II/2062]
Attempt any EIGHT questions.
All questions carry equal marks.

1. Define chromophore, auxochrome, bathochromic and hypsochromic effect. Describe the Woodward Fieser rules for calculating adsorption maximum for diene and triene. Calculate the absorption maximum in the UV spectrum for following compounds:

a. 
b. 
c. 

d. 2,4 hexadiene

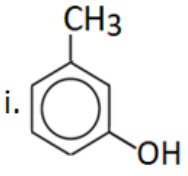
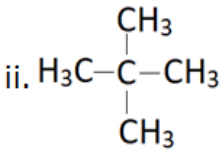
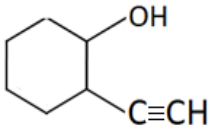
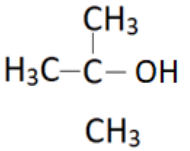
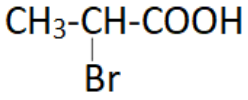
2. State and derive Lambert's and Beer's law. Does solvent affect the UV spectra? Explain the effects of polar solvents on π-π* & n-π* transitions. Describe briefly how an UV spectrum of a pure organic compound is scanned?

3. Describe the basic principles of mass spectrometry. What is McLafferty rearrangement? Explain with examples. The peaks in the mass spectrum appears at m/e values of 124, 122, 81, 79, 43 (base peak), 41, 29, 27. What is the structure of the organic compound?

4. Describe the various molecular vibrations in the IR spectroscopic techniques. Write the method of preparation of samples of IR spectroscopy. Write the importance of finger print region.

5. What do you mean by chemical shift? Write with examples about the shielding and deshielding effects involved on NMR spectroscopy. What do you understand by 'spitting of signals'? Explain with examples. Write briefly about the solvents used in NMR spectroscopy.

6. Write the expected NMR spectra of following compounds taking TMS as the standard reference.

i. 	ii. 	iii. 	iv. 	v. 
vi. $CH{\equiv}C{-}CH_2OH$	vii. $CH_2Br\text{-}CH_2Br$	viii. CH_3CH_2COOH		
ix. $CH_3CH_2CH_2CH_3$	x $(CH_3)_2CH\text{-}CH_3$			

7. What is validation? Discuss the stage of validation with different formats.
8. Discuss the pharmaceutical water manufacturing process. Define different types of water used in pharmaceuticals.
9. Discuss PDCA cycle (140 9000:1994). What will be additional advantage for GMP certified pharmaceutical company to be 140 certified?
10. Describe with diagram the instrumentation of flame photometry? Point out the major applications of flame photometry.

[B. Pharmacy/Final Year/ Pharmaceutical Analysis and Quality Assurance II/2063]
All questions carry equal marks.

1. Sketch and explain the principle of NMR instrument. Why do nuclei such as ^{12}C and ^{16}C don't show NMR spectra?

2. Write the expected NMR spectra of following compounds taking TMS as per the standard reference:
a. P-ter-butyltoluene
b. 1-bromo-propane
c. Ethyl benzene
d. Benzyl alcohol

3. Describe with diagram the instrumentation of Mass Spectrometry. Enumerate its major applications in pharmaceutical analysis. What is McLafferty rearrangement? What is its significance?

4. Sketch and explain the instrumentation of UV spectrophotometer. What is the difference between single beam and double beam spectrometer?

5. Discuss in detail about the sample handling of IR spectrophotometer with their advantages and disadvantages. Why we cannot use water in IR spectroscopy?

6. The absorption of spectrum for Titanium peroxide complex ion on perchloric acid showed a maximum at 400nm. The absorbance of 32mcg/ml solution of titanium gives an absorbance of 0.456. An unknown solution treated in an identical fashion gave an absorbance of 0.501. Assuming identical cells, find out the concentration of the unknown solution.

7. Write short notes on Lamor frequency, spin-spin coupling, coupling constant, spin-spin splitting and Equivalent hydrogen.

8. Discuss the chemical shift. Derive the equation for calculation of chemical shift in NMR.

Section A: Short Answer Questions:
Attempt any FOUR: [4×5=20]
1. Write a note on mass spectrometry.
2. Describe the methods of preparation sample in IR spectroscopy.

3. List out Deming's 14 points for management.
4. Elaborate the term 'quality of design' according to TDM movement.

5. What is a document control and the documents controlling procedures according to ISO 17025?
6. Write a short note on ISO 9000 series.

Section B: Very Short Answer Questions:
Attempt any SIX: [6×2=12]
1. In UV visible spectrophotometer how absorbance can be controlled?
2. What are the characteristic of flame in flame photometry?

3. What do you mean by Emission Spectroscopy?
4. What do you mean by spin-spin coupling and spin-spin splitting?

5. Define 'Clean area'.
6. Define 'Cross contamination'.
7. Define 'Quality assurance'.

Section C: Long Answer Questions:
Attempt any SIX: [6×8=48]
1. What is GMP? What are the salient features that come under GMP?
2. Explain the term Quality control and elaborate its basic requirements.

3. What is GLP [Good Laboratory Practice]? What are the basic requirements for a pharmaceutical quality control laboratory to get GLP compliance?
4. Explain TQM [Total Quality Management] and QC [Quality Control] with examples.

5. Discuss UV spectrophotometry with its principle types, instrumentation and with its advantages.
6. Explain Atomic Absorption Spectroscopy with its instrumentation and how can be operated.
7. What do you understand by NMR spectroscopy? Explain

[B. Pharmacy/Final Year/ Pharmaceutical Analysis and Quality Assurance II/2065]

Section A: Attempt any SIX: [6×8=48]

1. Illustrate the term 'Personnel' according to GMP for pharmaceutical products. What are the joint and individual responsibilities of QC head and production head?

2. What is 'Documentation' according to GMP for pharmaceutical products? List some of the types of documents mostly used in manufacturing and explain about 'SOP'.

3. What is GLP? Describe several important divisions for a section for carrying on various tests according to profile of QC lab?

4. Write the scope of ISO 17025 and explain its 'Quality system'.

5. What is IR spectrophotometer? Write its principle. How the verification of wave number scale is performed and how the sample is performed and analyzed in IR?

6. Explain mass spectrophotometry.

7. What do you understand by NMR spectroscopy? Explain.

Section B: Attempt any FIVE questions: [5×4=20]

1. What is beer's law? Explain how the absorbance can be determined in UV.

2. Describe instrumentation of AAS.

3. Do you think certification to ISO 17025 operates in accordance with ISO 9000 or 9002? If yes why? And if no why? Give your reason.

4. Write a note on monochromators.

5. List out Deming's 14 points for management.

6. Write a note on flame photometry.

Section C: Attempt all questions: [6×2=12]

1. List out some of the documents frequently used in manufacturing pharmaceuticals.

2. Define quality circle.

3. What is Spectrophotometry?

4. What are the essential components of Spectrophotometry?

5. What are the demerits of AAS?

6. Define the term quality.

Section A: Attempt any SIX: [6×10=60]

1. How flame photometer works and what types of chemical can be analyzed. Explain the followings:
a. Bohr's equation
b. Boltzmann equation

2. Describe ISO guide 17025 and how you applied this for quality product in the pharmaceutical industries.
3. Good laboratory practice is an integral part of pharmaceutical industries. Explain.

4. Explain the following statement with respect to AAS [Atomic Absorption Spectroscopy]:
a. Merits of AAS over flame photometers
b. Demerits of AAS

5. Describe the flow diagram of IR spectrophotometer. Explain IR is the fingerprint of the chemical substance. What is the use of IR in the drug analysis?

6. Describe with the flow diagram of single and double beam UV visible spectrophotometer. What grade of solvent should be used in the analysis and why?

7. Describe the scope of QC in pharmaceutical industry. How QC department can help to produce a quality product.

Section B: Attempt any TEN: [10×2=20]

1. List out Deming 14 points for QC.
2. What is ISO 9000?
3. Describe about the Master batch card.

4. Describe about the Cross contamination on the factory.
5. Describe about the Laminar flow system.
6. Describe about the HEPA filter.

7. Why Beer's law should be followed in UV visible spectrophotometer.
8. Describe about the Air lock system in the factory.
9. Describe about the Important of first come and first out in store.
10. Describe about the Fluorimetric analysis
11. Describe about the Validation equipment.

[B. Pharmacy/Final Year/ Pharmaceutical Analysis and Quality Assurance II/2067]

1. What is quality assurance to GMP guidelines? What are the salient features that pharmaceutical companies should have to ensure quality assurance? And what are the general features of documentation according to GMP? [10]

2. What is 'Quality' according to TQM philosophy? State Deming's 14 points for management. Describe the terms 'Quality of design' and 'Conformance to design'. [10]

3. What is the purpose of ISO 9000? What are the 20 elements of ISO quality system model? [2+6=8]

4. What is the scope of ISO 17025? How the technical requirements test and calibration methods are validated? [2+6=8]

5. Define ISO 9001, ISO 9002, ISO 9003 and ISO 9004. Describe the instrumentation of flame photometer. [4+4=8]

6. Elaborate beer's law. What are essential components of spectrophotometer? [6+4=10]

7. What is GLP? Describe the data required for testing specifications established for each item in GLP. [2+4=6]

8. Write a note on IR spectroscopy. [10]

9. What is mass spectroscopy? Describe its instrumentation. [10]

[B. Pharmacy/Final Year/ Pharmaceutical Analysis and Quality Assurance II/2068]

1. List the key personnel's responsibilities of head of production and head of QC according to group requirements. [10]

2. List out the 20 elements of ISO quality system model. [10]

3. What is IR spectroscopy? Write its principle. How is the verification of wave number scale performed and how is the sample analyzed in IR? [10]

4. Define quality in terms of TQM philosophy with appropriate examples. [10]

5. What is AAS [Atomic Absorption Spectroscopy]? Describe its principle and apparatus in detail. [10]

6. Write a note on NMR spectroscopy. [10]

7. What are the basic requirements of pharmaceutical quality control lab to get GLP compliance? [10]

Ans: Requirements are as:

a. Organizational structure	b. Staffing	c. Incoming sample
d. Testing	e. Analytical worksheets	f. Reagents
g. Retention samples	h. Specification repertory	i. Reference material
j. Instruments and their calibration		
k. Safety in drug control laboratories		
l. Evaluation of test results		

8. Write the scope of ISO 17025 and explain its quality system. [10]

[B. Pharmacy/Final Year/ Pharmaceutical Analysis and Quality Assurance II/2069]

1. Explain general principles of good practices in the production according to GMP guidelines including processing, operations of intermediate and bulk products. [8]

2. What is ISO certification? For what purposes an organization accreditates to ISO 9000? How is the ISO 9000 certificate registration process forwarded by the organization? [8]

3. Describe Mass Spectrophotometry with its instrumentation with a neat diagram. [8]

4. What is IR spectroscopy? Describe different types of molecular vibrations which leads to IR spectra for qualitative and quantitative purpose. How samples can be analyzed in IR spectroscopy? [8]

5. According to GLP, what are the components to be considered for testing and release for distribution and enlist the normal specifications for a product to be developed and recorded in an official document? [8]

6. Explain the terms 'Quality of design 'and 'Conformance to design' according to TQM philosophy. [5]

7. Give the difference between single beam and double beam spectrophotometer and describe double beam spectrophotometer with a diagram. [5]

8. Where ISO 17025 applies to and how does a laboratory get accredited to ISO 17025? [5]

9. Write any two methods by which samples can be analyzed in flame photometer. [5]

10. What is Emission spectra? What are its uses in pharmaceutical analysis? Write a note on electrodes used in emission spectroscopy. [5]

11. Describe in detail about instrumentation of NMR with a diagram. [5]

12. Short notes on:

a. X-ray diffraction technique [3]

b. Certificate of pharmaceutical product [3]

c. Quality manual according to ISO 17025 [4]

[B. Pharmacy/Final Year/ Pharmaceutical Analysis and Quality Assurance II/2070] [Regular Paper]

1. Define cGMP. Describe Validation with examples. Explain 5Qs that describes the activity of qualifying systems. [1+4+5=10]

2. What is the principle of IR spectroscopy? State the criteria for a compound to absorb IR radiation. How samples are analyzed in IR? [3+2+5=10]

3. What are the advantages of a double beam UV spectrophotometer over a single beam UV spectrophotometer? What are the conditions for a Beer's Law to be valid? How a UV spectrophotometer can be calibrated? [3+3+4=10]

4. Describe the principles of a classical NMR spectrophotometer with instrumentation. What types of information can we get from the NMR spectrum? [3+4+3=10]

5. How x- rays are produced? Describe the instrumentation of x-ray diffraction technique. State two applications of Flourimetry. [3+5+2=10]

6. Write the principles of Atomic Absorption Spectrophotometry. Explain the methods to analyze the samples in a Flame Photometer? [4+6=10]

7. State the advantages and disadvantages of Emission Spectroscopy. How does Emission Spectroscopy work? [3+3+4=10]

8. Define certificate of pharmaceutical product. What is purpose to obtain ISO 9000 and describe how ISO accreditation can be obtained? [3+3+4=10]

[B. Pharmacy/Final Year/ Pharmaceutical Analysis and Quality Assurance II/2070]
[Back Paper]

1. Discuss general principles of documentation. Explain different types of GMP [Good Manufacturing Practice] documentation. [4+6=10]
2. Describe the good practices for pharmaceutical control laboratories. [10]
3. Mention any three general uses of IR spectroscopy. Draw the schematic diagram of an IR spectroscopy and briefly explain its operation. [2+3+5=10]

4. Why is Atomic Mass Spectroscopy considered as a widely used method? Mention the components of Mass Spectrophotometer. [5+5=10]
5. Specify only the contents of Master Formula Record [MFR], Batch Manufacturing Record [BMR] and Batch Packaging Record [BPR.] [3.5+3.5+3=10]

6. Explain Total Quality Management [TQM] in terms of quality design and conformance to design. [10]
7. Describe ISO certification. Where does ISO 9000 implement? Describe ISO certification registration process. [2+4+4=10]
8. Write the working principle of X-ray diffraction technique with instrumentation. [5+5=10]

[B. Pharmacy/Final Year/ Pharmaceutical Analysis and Quality Assurance II/2071]
1. Define Mass spectrophotometer and illustrate its principle and instrumentation. [2+2+6=10]

2. Define spin-spin coupling, coupling constant, spin-spin splitting and chemical shift. Describe how flame photometer works. [1+1+1+1+6=10]

3. What is validation? Describe types of validation including process validation and equipment validation according to GMP. [2+8=10]

4. State twenty elements of ISO 9000 quality system model. How can a Nepalese entrepreneur register in ISO certification? [7+3=10]

5. Write the principle of X-ray diffraction technique. List the testing specifications established for each sample for testing according to GLP. [3+7=10]

6. What is quality manual according to ISO 17025? Explain the scope and major components of ISO 17025. [3+7=10]

7. Write the principle behind IR spectroscopy. What is TQM movement and the Deming's philosophy focusing toward quality of design and its conformance? [3+1+1+5=10]

8. What are the uses of emission spectroscopy? Explain the principle and the main components of Emission spectroscopy including sample handling. [3+7=10]

[B. Pharmacy/Final Year/ Pharmaceutical Analysis and Quality Assurance II/2072]

1. Define the term 'Quality Audit' and 'Quality Policy' and their importance according to WHO GMP documentation. What are the main objectives of quality assurance in Pharma industry? [3+3+6=10]

2. Describe the structure of flame and its significance. Write the principle and instrumentation of flame photometry with a neat diagram. [4+6=10]

3. Define the following terms: ISO 9000, ISO 9001, ISO 9002, ISO 9003 and Validation. Write the importance of ISO certification. Describe how atomic absorption spectrometry works? [5+2+3=10]

4. Explain the principle and procedure to conduct radioimmunoassay. Write a note on USFDA guidelines. [7+3=10]

5. Describe the theory, application and the main components of mass spectroscopy in detail in a neat diagram. [10]

6. Explain Beer's Lambert's law. How absorbance can be controlled in UV visible spectrophotometer? Illustrate the term 'Quality of design' according to TQM movement. [5+2+3=10]

7. Define GLP. Write down its objectives, scope and basic principles. [3+7=10]

8. What is ISO 17025? Write down its benefits, scopes and technical requirements to obtain ISO 17025 certification. [2+4+4=10]

[B. Pharmacy/Final Year/ Pharmaceutical Analysis and Quality Assurance II/2073]

1. Write down the principle, instrumentation and application of IR spectrophotometry. How samples are analyzed in IR spectrophotometry? [10]

2. Do you mint certificate of ISO 17025 operates in accordance with ISO 9001. Give reason to support your answer. Write the technical requirements for a laboratory to comply ISO 17025. [10]

3. What do you understand by 'Inbuilt quality' requirements to comply GMP guidelines? [10]

4. Describe the theory, principle, instrumentation and pharmaceutical application of X-ray diffraction technique. [10]

5. Define certificate of pharmaceutical product [CPP]. What is the purpose and process to obtain ISO certification? How the industries acquire WHO GMP certificate in Nepal? [10]

6. "The prime objective of TQM is to improve customer satisfaction". Justify the statement with appropriate examples and elements of TQM. [10]

7. Explain the working principle, instrumentation, application and events that occurs in double beam UV visible spectrophotometry with a neat diagram. [10]

8. What are the differences between AAS and AES? Describe how Emission Spectroscopy works with principle and main components with a neat diagram. [10]

[B. Pharmacy/Final Year/ Pharmaceutical Analysis and Quality Assurance II/2074]

1. Define WHO GMP? Write about its purpose, scope, quality audit and sanitation hygiene aspects. [1+2+2+2.5+2.5=10]

2. Explain the working principle, instrumentation, main components and pharmaceutical applications of AAS with a neat diagram. [2+5+2+1=10]

3. Define ISO. Describe ISO 9000 quality system model, the scope, purpose, process to obtain and its importance in pharmaceutical companies. [1+2+2+3+2=10]

4. Describe the working principle, instrumentation, main components and uses of IR spectroscopy with a neat diagram. [2+5+2+1=10]

5. Write a note on USFDA guidelines. Write about the basic principle, procedure to conduct radio immunoassay and its uses. [3+2+4+1=10]

6. What is ISO 17025? Write down its scope and technical requirements to obtain ISO 17025 certification. [1+2+7=10]

7. Illustrate Beer's Lambert's law. Write about UV double beam spectrophotometer with a neat diagram. [5+4+1=10]

8. Write detail about Good Laboratory Practice [GLP]. [10]

[B. Pharmacy/Final Year/ Pharmaceutical Analysis and Quality Assurance II/2075]

1. Write a short note on USFDA guidelines. Define Beer-Lambert's Law. How UV visible spectrophotometer can be calibrated and operated with any suitable drug product. [2+2+6]

2. Define radioimmunoassay with its principle. Write in detail about Flame photometry including its principle, instrumentation with a neat diagram. [3+2+4+1]

3. Explain principle of Mass spectrophotometer, instrumentation and pharmaceutical applications with a neat diagram. [2+5+2+1]

4. What is ISO? Write its background, importance in pharmaceuticals and how ISO certification can be obtained? [1+2+3+4]

5. Write down the principle of IR spectroscopy, instrumentation and how samples can be analyzed in IR spectrophotometer. [2+5+3]

6. Define WHO documentation. Write the general principles of it. Write about WHO GMP quality control requirements that should be maintained according to GMP. [1+4.5+4.5]

7. Write a brief note on following: [4+4+4+4]

a. GLP- Basic requirement and its technical importance

b. TQM- Basic concept and quality of conformance

c. Basic principle and pharmaceutical importance of Atomic absorption spectroscopy

d. Basic concept of GMP Validation and instrument validation

[B. Pharmacy/Final Year/Pharmaceutical Engineering and Drawing/2061]
Attempt any FIVE from 1 to 6 questions while 7 and 8 are compulsory.

1. What are the various equipment for measuring fluid flow? Explain the working principle of any one of them. [10]

2. Highlight the main points which are most essentially considered while designing a pharmaceutical manufacturing plant. [10]

3. Name the major drying equipment used in pharmaceutical industries. Mention the advantages of Fluid Bed Dryer over the other dryers. [10]

4. What is the most preferred material used for fabrication of pharmaceutical machineries. What are the various advantages and disadvantages of steel as material for fabrication of pharmaceutical equipment? [10]

5. What do you understand by size reduction? Mention different techniques of size reduction. [10]

6. What are the major wastages of pharmaceutical industries? Briefly discuss about the methods of treatment of solid wastes. [10]

7. Write short note on any THREE: [15]

a. Dehumidification
b. Heat transfer by conduction
c. Bernoulli's equation
d. Standard Screen Analysis

8. Write short note on any THREE: [15]

a. Colloid Mill
b. Tray Drier
c. Azotropic distillation
d. Rotameter

[B. Pharmacy/Final Year/Pharmaceutical Engineering and Drawing/2062]
Attempt any FIVE from 1 to 6 questions while 7 and 8 are compulsory.

1. How will you select a site for the construction for Pharmaceutical Industry? Explain about the major pollutants coming out of the Pharmaceutical Industries. [10]

2. Explain different types of extraction methods. [10]

3. What is evaporation and explain briefly about Pan Evaporation. [10]

4. Name the different types of crystallizers. Explain different types of crystallizers and limitations of 'Crystallization by cooling'. [10]

5. Elaborate on different factors affecting screening (Size separation). [10]

6. What are the different mechanisms of mixing? Mention the different equipments used for Fluid mixing. [10]

7. Write short note on any THREE: [15]

a. High shear mixing equipments
b. Liquid-liquid extraction
c. Water demineralization by reverse osmosis technique
d. Super saturation

8. Write short note on any THREE: [15]

a. Venturimeter
b. HEPA Filter
c. Heat exchange
d. Dimensional analysis

[B. Pharmacy/Final Year/Pharmaceutical Engineering and Drawing/2063]
Attempt any FIVE from 1 to 6 questions while 7 and 8 are compulsory.

1. Derive the equation for determination of power requirement based on Bernoulli's theorem. [10]

2. Describe about the factors affecting screening during size separation. [10]

3. What do you mean by size reduction in pharmaceutical process? List down the equipment used for size reduction. Mention the working principle of any one of them. [10]

4. Describe the working principle of Swenson - Walker crystallizer. Mention the advantages of this crystallizer over other crystallizers. [10]

5. Describe the working principle of liquid-liquid extraction. Mention the advantages and disadvantages of centrifugal extraction. [10]

6. What is mixing? List down the equipment used for Batch mixing of Liquids. Explain the working principle of colloidal Mill. [10]

7. Write short note on any THREE: [15]

a. Solid-liquid extraction
b. Crystal habits
c. Water demineralization by reverse osmosis technique
d. Advantages of Fluid Bed Dryer [FBD]

8. Write short note on any THREE: [15]

a. Advantages of Wet Grinding
b. HEPA Filter
c. Rota meter
d. Distillation method for miscible liquid system

[B. Pharmacy/Final Year/Pharmaceutical Engineering and Drawing/2064]
Attempt any FIVE from 1 to 6 questions while 7 and 8 are compulsory.

1. Explain about the most important support system which are to be considered while designing a pharmaceutical manufacturing plant. [10]

2. What are the methods used for distillation of miscible liquid diagram of Fractional Distillation Unit? [10]

3. What are the equipments used for Batch Drying Operational in Pharmaceutical Industries? Mention the advantages and disadvantages of Fluidized Bed Drier [FBD]? [10]

4. How will you select the material of construction for pharmaceutical machines? Explain the mode of operation and advantages of Rota meter. [10]

5. List down the major flow meters which are based on Pressure Differential Principle. Explain the mode of operation of Colloidal Mill. [10]

6. How will you classify the equipment for fluid mixing? Explain the working principle of any one of them. [10]

7. Write short note on any THREE: [15]

a. Ultrasonic homogenizer
b. Heat transfer by conduction
c. Dimensionless numbers
d. Importance of HEPA Filter in HVAC System

8. Write short note on any THREE: [15]

a. Propeller Type A Agitator
b. Triple Roller Mill
c. Factors influencing the Liquid-liquid extraction
d. Solid waste management of pharmaceutical industries

[B. Pharmacy/Final Year/Pharmaceutical Engineering and Drawing/2066]
Attempt any FIVE from 1 to 6 questions while 7 and 8 are compulsory.

1. State and explain Fourier's law of Heat Transfer through a metal by equation. [10]
2. State Bernoulli's theorem and derive Bernoulli's equation with the help of labeled diagram. [10]
3. Describe the construction and working principle of a Silverson Mixer-Emulsifier with the help of a neat diagram. [10]
4. What are the filter aids? Name the filter aids commonly used in pharmaceutical formulation activities. [10]
5. Describe construction and working principle of Distillation Apparatus for preparation of distilled water. [10]
6. Explain the steps of crystallization of solutes from a solution. [10]

7. Write short note on any THREE: [15]
a. Construction of Tubular Heat Exchanger
b. Write Hagen-Poiseuille's equation and write its importance.
c. Explain theory of Drying.
d. Name the different types of Valve used to control the rate of flow of fluids in a pipeline.

8. Write short note on any THREE: [15]
a. Illustrate construction of Fluid Energy Mill.
b. Mention specification of standard sieves as per IP.
c. Use of propellers for liquid mixing
d. Differences between Drying and Evaporation.

[B. Pharmacy/Final Year/Pharmaceutical Engineering and Drawing/2067]
1. Discuss the Mier's super saturation theory of crystallization. Enlist its limitations. [10]
2. Explain the concept of film and overall heat transfer coefficient in forced convection. Derive relevant mathematical equations. [10]
3. Explain theory of evaporation with emphasis on material balance & energy balance. [10]
4. Explain theory of filtration with emphasis on Kozeny- Carman equation. [10]
5. Describe the principle of centrifugation. Derive the equation for calculating centrifugal effect. [10]
6. Classify the methods of measurement of rate of flow of fluid. Explain the working principle of anyone equipment following hydrodynamic methods. [10]

7. Write short note on any TWO: [10]
a. State Rittinger's theory of comminution and explain how input energy for comminution is dissipated to different forms of energy.
b. Classify the equipment use for solid mixing.
c. List the factors influencing filtration.

8. Write short note on any TWO: [10]
a. List down the important criteria while selecting a site for establishing Pharmaceutical Industry.
b. List methods of dehumidification followed in pharmaceutical industries.
c. Describe different modes of motion in size separation

[B. Pharmacy/Final Year/Pharmaceutical Engineering and Drawing/2068]

1. Explain operation principle of Mixer settler extraction system used for liquid extraction process with the help of neat schematic diagram. [10]
2. State Bernoulli's theorem and derive Bernoulli's equation with the help of labeled diagram. [10]
3. Describe the features or components of HVAC system. [10]

4. Explain design of Packed Tower commonly used in gas adsorption. [10]
5. Explain construction and working steps of Freeze Dryer with the help of schematic diagram. [10]
6. With the help of neat diagram explain the concept of film and overall heat transfer coefficient in forced convection. [10]

7. a. What is clean room? Classify clean room as per Federal Standard 209E. [5]
b. Elaborate on Theory of Centrifugation. [5]
c. Explain theory of Evaporation. [5]
d. Describe Grifith Theory of Comminution. [5]

[B. Pharmacy/Final Year/Pharmaceutical Engineering and Drawing/2069]

1. Describe theory of centrifugation. Derive equation for calculating centrifugal effect. [10]
2. Explain principles and application of molecular distillation. [10]
3. Explain theory of evaporation with emphasis on material balance & energy balance. [10]
4. State Rittinger's theory of comminution and explain how input energy for comminution is dissipated to different forms of energy. [10]
5. Explain Theory of Filtration with help of Kozeny- Carman Equation. [10]

6. a. List the important criteria while selecting a site for establishing Pharmaceutical Industry. [5]
b. Name different types of propellers used for liquid mixing. [5]
c. Describe the uses of Cyclone Separator for size separation. [5]

7. a. Mention different steps of crystallization. [5]
b. Mention specifications of Standard sieves as per IP. [5]
c. Describe usefulness of steel as Material of Plant Construction. [5]

[B. Pharmacy/Final Year/Pharmaceutical Engineering and Drawing/2070]

1. State Bernoulli's theorem and derive Bernoulli's equation with the help of labeled diagram. [10]
2. Explain design of Packed Tower commonly used in gas adsorption. [10]
3. State and explain Fourier's law of Heat Transfer through a metal wall by conduction with the help of equation. [10]
4. Discuss the Miers super saturation theory of crystallization. What are the limitations of the Miers theory? [10]
5. Explain operation principle of Mixer settler extraction system used for liquid extraction process with the help of neat schematic diagram. [10]

6. a. Describe the features or components of HVAC system. [5]
b. Explain operating procedure of Rotameter with the help of a neat diagram. [5]
c. Difference between drying and evaporation. [5]

7. a. What is humidity chart? Write its uses in pharmaceutical field. [5]
b. What are the factors influencing rate of filtration? [5]
c. List down the equipment used in solid-solid mixing. Briefly explain about the operating procedure of any one of them. [5]

[B. Pharmacy/Final Year/Pharmaceutical Engineering and Drawing/2071]

1. Explain continuous counter-current decantation systems with examples and uses. [8]
2. With the help of equation explain Fourier's law of heat transfer through an aluminium wall. [10]

3. State Rittinger's theory of comminution and explain how input energy for comminution is dissipated to different forms of energy. [10]
4. Explain the steps of crystallization of solutes from a solution. [8]

5. Suggest different ways to control industrial pollution. [10]
6. Explain why stainless steel is widely used in the construction of pharmaceutical industry? [8]

7. Define and give the application of the following: [3×4=12]
a. Fluidized Bed Dryer
b. HEPA filter
c. Pitot tube

8. Name different types of valves used to control the rate of flow of fluids in a pipeline. [7]
9. Explain design of Packed Tower commonly used in gas adsorption. [7]

[B. Pharmacy/Final Year/Pharmaceutical Engineering and Drawing/ Regular Paper /2072]

1. Explain the construction and working steps of freeze dryer with the help of schematic diagram. [10]
2. State Bernoulli's theorem and derive Bernoulli's equation with the help of labeled diagram. [10]
3. Discuss the Mier's super-saturation theory of crystallization. What are the limitations of Mier's theory? [10]
4. Explain the concept of film and overall heat transfer coefficient in forced convection. Derive the relevant mathematical equations. [10]
5. Describe construction and working principle of equipment used for fractional distillation. [10]
6. "Humidity chart is the important tool to monitor efficiency of HVAC system" justify. [5]
7. Explain the theory of filtration with the help of Kozeny-Carman equation. [5]
8. Explain theory of evaporation with emphasis on material balance and energy balance. [5]

9. Write short notes on: [5×3=15]
a) Suitable mixing equipment for mixing semisolid
b) Specification of standard sieves as per IP
c) Theory of centrifugation

[B. Pharmacy/Final Year/Pharmaceutical Engineering and Drawing/ Back Paper /2072]

1. What are the different modes of size reduction? Explain the principle, construction and working of Colloidal Mill. [10]
2. What factors influence the filtration process? What are filter aids? Mention the objectives and advantages of using it in the process of filtration. [10]
3. Describe Griffith theory of comminution and theory of centrifugation. [10]

4. What are the different equipments used in drying process? Explain the principle, working, advantages and disadvantages of Fluidized bed dryer. [10]
5. Explain operation principle of Mixer settler extraction system used for liquid extraction process with the help of neat diagram. [10]

6. Explain the design of Packed Tower commonly used in gas adsorption. [10]

7. Write short notes on: [5×4=20]
a) Plant layout
b) Importance of stainless steel in pharmaceutical industry
c) Fourier's law of Heat Transfer
d) Use of cyclone separator for size separation

[B. Pharmacy/Final Year/Pharmaceutical Engineering and Drawing/2073]

1. State Bernoulli's theorem and derive Bernoulli's equation with the help of neat label diagram. [10]
2. State Rittinger's theory of comminution and explain how input energy for comminution is dissipated to different forms of energy. [10]
3. Explain construction and working of Freeze Dryer with the help of schematic diagram. [10]
4. Describe the features (Components) of HVAC system. [10]

5. a. Name different types of propellers used for liquid mixing. [5]
   b. Describe the principle and working of cyclone separator for size separation. [5]

6. a. What is clean room? Classify clean room as Per Federal Standard 209E. [5]
   b. Elaborate theory of Centrifugation. [5]

7. a. Explain the theory of Evaporation. [5]
   b. List the important criteria while selecting a site for establishing pharmaceutical industry. [5]

8. a. Mention specification of standard sieves as per IP. [5]
   b. Describe usefulness of steel as material of plant construction. [5]

[B. Pharmacy/Final Year/Pharmaceutical Engineering and Drawing/2074]

1. Describe rectification process in detail. Add note on rectifying columns. [6+4=10]
2. Explain theory of drying. Write principle, construction, working and uses of Freeze dryer. [4+6=10]
3. Derive Bernoulli's equation. Deduce relevant equations for calculating flow rate by using Orifice meter. [5+5=10]
4. Write Kozeny-Carman Equation with its limitations. Explain principles, construction, working and uses of filter press. [3+7=10]
5. Explain in detail about the concept of surface and overall heat transfer coefficients in forced convection with neat diagram. [10]

6. Explain the principle, construction and working of Multiple Effect Evaporator. Also discuss its economy. [6+2=8]
7. Write a note on utility of glass, plastics and stainless steel in pharmaceutical industry. [5]
8. Discuss the factors that may influence the selection of Milling Equipment. [5]

9. Write short note on any THREE: [4×3=12]
a. Planetary Mixer
b. Continuous Centrifuge
c. Working of air condenser
d. Plant layout in pharmaceutical industry

1. Define drying. Discuss the principle, construction and working of a fluidized bed dryer along with a neat labeled diagram. [2+8]

2. Discuss Fourier's law of heat transfer. Derive an equation (expression) for compound resistances in series considering a flat wall constructed for a series of layers of different thickness. [3+7]

3. Enlist the various modes of stress applied in size reduction. Discuss the principle, construction and working of a colloid mill with a neat labeled diagram. [2+8]

4. Describe the mechanism of liquid-liquid mixing. Describe the different types of devices used for liquid-liquid mixing. [3+7]

5. Define heat exchanger. Describe the principle, construction and working of a tubular heater. [2+8]

6. Define size separation. Mention any five applications of size separation in pharmaceutical industries. Describe the specifications for standardization of sieves. [2+3+5]

7. State Bernoulli's theorem. Describe the principle, construction and working of a venturimeter with the help of a neat labelled diagram. [2+8]

8. Write a short note on: [5+5]
a. HVAC system
b. Steel as a material of construction

[B. Pharmacy/Final Year/Ayurvedic Pharmacy/2061]

1. Describe the Rasa [Taste] with its types and Pancha-Bhautic composition with examples. [10]

2. Describe Veerya and its types with function. [10]

3. Describe Pancha-Vidha Kashaya Kalpana and its types with definition. [10]

4. Write short notes on Purification and Detoxification [10]

[B. Pharmacy/Final Year/Ayurvedic Pharmacy/2062]

1. Write the name of Rasa with their panchabhautic composition and side effects if used in excess amount. [10]

2. Write the Pancha-Vidha Kalpana with their preparation method. [10]

3. Write about measurements in Ayurveda and their relation with metric system with example. [10]

4. Write short notes on Purification and Detoxification [5+5=10]

[B. Pharmacy/Final Year/Ayurvedic Pharmacy/2063]

1. Write Pancha-Vidha kalpana and their importance. [10]

2. Write the determination of Rasa type and their effect after excessive use. [10]

3. Write about the Ayurveda and their importance in modern era. [10]

4. Write short notes on *Purification, Prabhavan* and *Detoxification*. [4+3+3=10]

[B. Pharmacy/Final Year/Ayurvedic Pharmacy/2064]

1. Write the name of Rasas with their Panchabhautic composition. [5]

2. What would be the side effects of Rasas if used in excess amount? [5]

3. What is Pancha-Vidha Kalpana? How many types do you know and define them. [5]

4. Describe the methods of preparation of Pancha-Vidha Kalpana. [5]

5. What is Veerya and write its function. [10]

6. Write short notes on: [5+5=10]

a. Ayurvedic measurement system

b. Trifala

[B. Pharmacy/Final Year/Ayurvedic Pharmacy/2065]

1. Write the Panchabhautic composition of Rasas and describe the action of Rasas with harmful effect of excess use of Rasas. [10]

2. Write the measurements of weights according to according to Ayurveda and describe the Magadha Mana. [10]

3. Describe the routes of drug administration according to Ayurveda with examples? [10]

4. Write the importance of Ayurveda in Nepal and its benefits. [10]

[B. Pharmacy/Final Year/Ayurvedic Pharmacy/2066]

1. What is the Ayurvedic drug? Write the source of Ayurvedic drugs with examples? [10]

2. Describe the Pancha-Vidha Kashaya kalpana. [10]

3. Write the types and definition of Rasas with Panchabhautic compositions. [10]

4. Write short notes on *Detoxification* and *Shilageet*. [5+5=10]

[B. Pharmacy/Final Year/Ayurvedic Pharmacy/2067]

1. Explain the Rasas, its types and action on Doshas. [10]

2. Write the Panch-Vidha Kashaya Kalpana and its strength according to preparation. [10]

3. Define the Magadha Mana (posology) and its importance in Ayurveda. [10]

4. What are the sources of drugs according to Ayurveda with examples? [10]

[B. Pharmacy/Final Year/Ayurvedic Pharmacy/2068]

1. Write the Pancha-Bhautic composition and normal actions when Rasas are used. [10]

2. Being a pharmacist, elaborate the present status and the future prospects of Ayurveda focusing on its research aspects. [10]

3. How many types of Kashaya Kalpana do you know? Describe each of them with example. [10]

4. Write the route of drug administration in Ayurveda. [10]

[B. Pharmacy/Final Year/Ayurvedic Pharmacy/2069]

1. Describe veerya, its types and action with examples. [10]

2. List the types of Gunas. Describe Gurvadi gunas and its action with examples. [10]

3. What do you mean by Mana? Describe it according to Ayurveda. [10]

4. What is the importance of Ayurvedic Pharmacy in modern drug industries? Describe briefly. [10]

[B. Pharmacy/Final Year/Ayurvedic Pharmacy/2070]

1. Write the names of Rasas, their Pancha-Bhautic composition, Dosha-karma and diseases due to over intake of Rasas. [10]

2. What are the measurements described in Ayurveda? Give the details of weight in Magadha Mana. [10]

3. Describe the route and time of drug administration in Ayurveda. [10]

4. Describe the Pancha-Vidha kashaya kalpana with example. [10]

[B. Pharmacy/Final Year/Ayurvedic Pharmacy/2071]

1. Explain Rasas, their Pancha-Bhautic composition, their indications and contraindications. [10]

2. Write Magadha Mana and their uses in context of Nepal. [10]

3. Write route and time of drug administration in Ayurveda. [10]

4. Describe purification and detoxification of Ayurvedic drugs with example. [10]

[B. Pharmacy/Final Year/Ayurvedic Pharmacy/2072]

1. Describe Veerya, its types and action with examples. [10]

2. Define the Magadh Man (posology) and its importance in Ayurveda. [10]

3. Being a pharmacist, elaborate the present status and the future prospects of Ayurveda focusing on its research aspects. [10]

4. Explain the route of drug administration in Ayurveda. [10]

[B. Pharmacy/Final Year/Ayurvedic Pharmacy/2073]

1. What do you mean by posology in Ayurveda? How would you define measurement in Ayurveda and their relation to metric system? [10]

2. Define quality control and GMP of Ayurvedic products with examples. Explain in brief. [10]

3. Describe the following medicines uses and dose:

a. Dasamula kwath [4]

b. Triphala churna [3]

c. Chandra prabha vati [3]

4. What are the main sources of Ayurvedic drugs? Explain legal aspects of Ayurvedic drug. [10]

[B. Pharmacy/Final Year/Ayurvedic Pharmacy/2074]

1. What is Bhaisajya kalpana? Mention different types of dosage forms of ayurvedic medicines with examples. [2+8=10]

2. Discuss different methods of treatment of Ayurveda with special references to Panchakarma. [10]

3. Discuss various issues and challenges on empowering ayurvedic system of medicine. [5]

4. Mention the route of administration according to Ayurveda with examples. [5]

5. Write short note on any TWO: [5+5=10]

a. Prakriti

b. Five pillars of drug action

c. Shatkriyakala

[B. Pharmacy/Final Year/Ayurvedic Pharmacy/2075]

1. Define and classify Bhaisajya Kalpana. Discuss various Ayurvedic dosage forms with examples of marketed products. [2+8]

2. Describe the panchamahabhautic composition, physical, psychological and adverse effects of Rasas. [10]

3. Describe Rasapanchaka in Ayurveda along with their significance. [10]

4. Write short notes on: [5+5=10]

a. Charaka Samhita

b. Panchakarma