

CONTENTS

| | |
|----------------------|---|
| <i>Preface</i> | v |
|----------------------|---|

PART - I HOSPITAL PHARMACY

CHAPTER 1

Hospitals – an Introduction

| | |
|-------------------------------------|---|
| Definition | 3 |
| Classification | 3 |
| Size Basis..... | 3 |
| Ownership Basis | 4 |
| System of Treatment Basis | 5 |
| Specialization Basis | 5 |
| Organization | 6 |
| Administration | 7 |
| Functions..... | 7 |
| <i>Questions</i> | 8 |
| <i>Short Answer Questions</i> | 8 |
| <i>Long Answer Questions</i> | 8 |

CHAPTER 2

Hospital Pharmacy

| | |
|-------------------------------|----|
| Definition..... | 9 |
| Origin and Development..... | 9 |
| Organization | 10 |
| Functions..... | 11 |
| Manufacturing Section..... | 11 |
| Purchase Section..... | 12 |
| Quality Control Section | 12 |

| | |
|--|----|
| Stores Section | 12 |
| Dispensary | 13 |
| Central Sterile Supply Department..... | 13 |
| Clinical Pharmacy Services | 13 |
| Drug Information Services | 14 |
| Education and Training Services | 14 |
| Supportive Service..... | 14 |
| <i>Questions</i> | 15 |
| <i>Short Answer Questions</i> | 15 |
| <i>Long Answer Questions</i> | 15 |

CHAPTER 3

Pharmacy and Therapeutic Committee

| | |
|-------------------------------------|----|
| Introduction..... | 17 |
| Definition..... | 17 |
| Objectives | 17 |
| Organization | 18 |
| Primary Functions..... | 19 |
| <i>Questions</i> | 28 |
| <i>Short Answer Questions</i> | 28 |
| <i>Long Answer Questions</i> | 28 |

CHAPTER 4

Hospital Formulary

| | |
|--|----|
| Introduction..... | 29 |
| Objectives | 30 |
| Content..... | 30 |
| Section 1: Introduction (Policies and Procedures)..... | 30 |
| Section 2: List of Drugs..... | 31 |
| Section 3: Additional Information | 31 |
| Guiding Principles to Include or Exclude a Drug in the Formulary | 32 |
| Preparation of the Formulary | 32 |

| | |
|--|----|
| Format and Appearance | 33 |
| Distribution of Formulary | 34 |
| Advantages and Disadvantages of Hospital Formulary | 34 |
| <i>Questions</i> | 35 |
| <i>Short Answer Questions</i> | 35 |
| <i>Long Answer Questions</i> | 35 |

CHAPTER 5

Hospital Committees

| | |
|--|----|
| Introduction..... | 36 |
| Definition | 36 |
| Various Committees | 36 |
| Organization | 37 |
| Regular Members | 37 |
| Ad-hoc Members | 37 |
| Ex-officio Members..... | 37 |
| Functions and Responsibilities | 38 |
| Role of Pharmacists in Hospital Committees | 39 |
| <i>Questions</i> | 40 |
| <i>Short Answer Questions</i> | 40 |
| <i>Long Answer Questions</i> | 40 |

CHAPTER 6

Pharmacy Procedural Manual

| | |
|---|----|
| Introduction..... | 41 |
| Purpose and use | 41 |
| Preparing a Manual..... | 42 |
| Format of a Manual | 42 |
| Contents of a Manual..... | 42 |
| Some Example Policies and Procedures in the Manual..... | 43 |
| Publishing and Distributing a Manual | 44 |

| | |
|-------------------------------------|----|
| <i>Questions</i> | 45 |
| <i>Short Answer Questions</i> | 45 |
| <i>Long Answer Questions</i> | 45 |

CHAPTER 7

Budget of Hospital Pharmacy

| | |
|--|----|
| Introduction..... | 46 |
| Definition..... | 46 |
| Aim or Objectives of a Budget | 46 |
| Factors Affecting Budget..... | 47 |
| Requirement (or) Characters of a Budget..... | 48 |
| Divisions of a Budget | 48 |
| Government Hospital Budgets (The Process)..... | 50 |
| <i>Questions</i> | 51 |
| <i>Short Answer Questions</i> | 51 |
| <i>Long Answer Questions</i> | 51 |

CHAPTER 8

Manufacturing in Hospitals

| | |
|---|----|
| Introduction..... | 52 |
| Advantages or Need for Manufacture in Hospitals..... | 52 |
| Problems in Starting Manufacturing in Hospitals..... | 53 |
| Policy | 53 |
| Cost Analysis..... | 54 |
| Estimation of Demand | 55 |
| Manufacturing..... | 55 |
| Manufacture of Sterile and Non-sterile Preparations | 58 |
| Methods of Analysis..... | 64 |
| <i>Questions</i> | 65 |
| <i>Short Answers Questions</i> | 65 |
| <i>Long Answers Questions</i> | 65 |

CHAPTER 9

Total Parenteral Nutrition and Intravenous Admixture

| | |
|--|----|
| Introduction..... | 66 |
| Total Parenteral Nutrition | 66 |
| Composition of TPN..... | 67 |
| Advantages of TPN and its Handling | 68 |
| Formulation Problems..... | 69 |
| IV Admixtures | 70 |
| Suitability of Pharmacists | 70 |
| Purpose and uses of IV Admixture Service by Pharmacists..... | 70 |
| Preparation Area | 71 |
| Mixing of Additional Drugs | 71 |
| Parenteral Incompatibility..... | 72 |
| Quality Control | 72 |
| <i>Questions</i> | 73 |
| <i>Short Answer Questions</i> | 73 |
| <i>Long Answer Questions</i> | 73 |

CHAPTER 10

Pre-Packing and Repacking in Hospitals

| | |
|--|----|
| Introduction..... | 74 |
| Factors to be Considered..... | 74 |
| Pre-Packing Operations | 77 |
| Advantages and Disadvantages of the Pre-packing..... | 77 |
| Re-packing..... | 78 |
| Recent Trends | 78 |
| <i>Questions</i> | 78 |
| <i>Short Answer Questions</i> | 78 |
| <i>Long Answers Questions</i> | 78 |

CHAPTER 11

Purchase and Inventory Control

| | |
|--------------------------------------|----|
| Introduction..... | 79 |
| Purchase..... | 79 |
| Control on Purchases..... | 82 |
| Inventory Control..... | 83 |
| Inventory Levels..... | 83 |
| Control of Inventory..... | 84 |
| <i>Questions</i> | 86 |
| <i>Short Answers Questions</i> | 86 |
| <i>Long Answers Questions</i> | 86 |

CHAPTER 12

Organization and Management of Drug Store

| | |
|---|----|
| Introduction..... | 87 |
| Importance of Store Keeping..... | 87 |
| Types of Stores..... | 87 |
| Organization of Drug Store..... | 88 |
| Types of Materials Stored..... | 89 |
| Store Room Arrangement..... | 90 |
| Category wise Storage of Inventory..... | 90 |
| Storage of Drugs..... | 91 |
| Markings on the Inventory..... | 92 |
| Storage Conditions..... | 93 |
| <i>Questions</i> | 94 |
| <i>Short Answer Questions</i> | 94 |
| <i>Long Answer Questions</i> | 94 |

CHAPTER 13

Drugs Distribution System

| | |
|---|-----|
| Introduction..... | 95 |
| Distribution to Outpatients | 95 |
| Dispensing to Inpatients | 96 |
| Other Systems of Dispensing to Inpatients | 99 |
| Charging of Prescribed Drug | 101 |
| Pricing Policy..... | 102 |
| Dispensing of Narcotics or Controlled Substances..... | 102 |
| Hospital Procedure for Dispensing Narcotics..... | 103 |
| <i>Questions</i> | 104 |
| <i>Short Answer Questions</i> | 104 |
| <i>Long Answer Questions</i> | 104 |

CHAPTER 14

Central Sterile Supply Department

| | |
|---|-----|
| Introduction..... | 105 |
| Developments in Sterile Services | 106 |
| Objectives of CSSD | 106 |
| Types of Materials for Sterilization | 107 |
| Packing of Materials Prior to Sterilization | 107 |
| Packing of Individual Articles for Sterilization..... | 108 |
| Methods of Packing | 109 |
| Loading the Sterilizer | 109 |
| Sterilization Equipments..... | 109 |
| Supply of Sterile Materials | 110 |
| <i>Questions</i> | 110 |
| <i>Short Answer Questions</i> | 110 |
| <i>Long Answer Questions</i> | 110 |

CHAPTER 15

Hospital Accessories

| | |
|--|-----|
| Introduction..... | 111 |
| Surgical Instruments | 111 |
| Medical Equipments | 112 |
| Surgical Instruments and Equipments | 112 |
| Health Accessories..... | 117 |
| Medical Gases..... | 118 |
| Cylinders and Accessories | 119 |
| Colour Codes of Cylinders | 120 |
| Safe use and Care of Medical Gas Cylinders | 121 |
| <i>Questions</i> | 121 |
| <i>Short Answer Questions</i> | 121 |
| <i>Long Answer Questions</i> | 122 |

CHAPTER 16

Nuclear Pharmacy

| | |
|---|-----|
| Need for Nuclear Pharmacy..... | 123 |
| Role of Atomic Energy Commission..... | 123 |
| Ordering Procedure..... | 123 |
| Conditions of Sale..... | 124 |
| Radio Isotope Committee | 125 |
| Role of Pharmacist in Isotope Pharmacy | 125 |
| Purchase and Storage..... | 126 |
| Quality of Radio Pharmaceuticals | 126 |
| Dispensing of Radio Pharmaceuticals | 126 |
| Responsibility of Pharmacists and others in using Radio Isotopes..... | 127 |
| <i>Questions</i> | 128 |
| <i>Short Answer Questions</i> | 128 |
| <i>Long Answer Questions</i> | 128 |

CHAPTER 17

Records and Reports

| | |
|--|-----|
| Introduction..... | 129 |
| Prescription Filing | 129 |
| Drug Profile | 129 |
| Patient Medication Profile | 130 |
| Uses of Patient Medication Profile | 132 |
| Records on Cases of ADR | 132 |
| <i>Questions</i> | 133 |
| <i>Short Answer Questions</i> | 133 |
| <i>Long Answer Questions</i> | 133 |

PART - II

CLINICAL PHARMACY

CHAPTER 18

Clinical Pharmacy

| | |
|--|-----|
| Introduction..... | 137 |
| Need / Concept of Clinical Pharmacy..... | 137 |
| Definition | 139 |
| Basis of Clinical Pharmacy..... | 139 |
| Functions of Clinical Pharmacist..... | 139 |
| Routine and General Functions | 140 |
| Specific Functions..... | 142 |
| Questions | 144 |
| <i>Short Answer Questions</i> | 144 |
| <i>Long Answer Questions</i> | 144 |

CHAPTER 19

Importance of Communication in Clinical Pharmacy

| | |
|--|-----|
| Introduction..... | 145 |
| Aim and Process of Communication | 145 |

| | |
|---|-----|
| Successful Communication..... | 146 |
| Communication during Drug Administration or Dispensing..... | 146 |
| Communication during Medication History Interview..... | 147 |
| Communication during Monitoring of Therapy | 148 |
| Communication during Patient Counselling..... | 148 |
| Communication during General Practice..... | 148 |
| Types of Communication..... | 148 |
| Conclusion | 149 |
| <i>Questions</i> | 149 |
| <i>Short Answer Questions</i> | 149 |
| <i>Long Answer Questions</i> | 149 |

CHAPTER 20

Medication History Interview

| | |
|---|-----|
| Introduction..... | 150 |
| Difference between Interview and Counselling..... | 150 |
| Pre-Requirements for an Interview | 150 |
| How to Conduct a useful Interview? | 151 |
| Role of Body Language | 152 |
| Closing an Interview | 152 |
| Conclusion | 153 |
| <i>Questions</i> | 153 |
| <i>Short Answer Questions</i> | 153 |
| <i>Long Answer Questions</i> | 153 |

CHAPTER 21

Rational Drug Therapy

| | |
|--|-----|
| Safe and Rational use of Drugs..... | 154 |
| Prescribing Appropriately | 154 |
| Irrational Prescribing | 154 |
| Reasons or Factors behind Irrational use of Drugs..... | 155 |
| Results of Irrational use of Drugs..... | 156 |
| Remedy for the Problem..... | 156 |

| | |
|--------------------------------------|-----|
| <i>Questions</i> | 157 |
| <i>Short Answers Questions</i> | 157 |
| <i>Long Answer Questions</i> | 157 |

CHAPTER 22

Pharmacotherapy

| | |
|--|-----|
| Definition | 158 |
| Basic Concepts | 158 |
| Patient Specific Pharmacotherapy | 159 |
| Pharmacotherapy Education | 159 |
| Pharmacotherapy and Public | 159 |
| Generic and Branded Drugs | 160 |
| Generic Drugs | 160 |
| Branded Drugs | 161 |
| Disadvantages of Brand name | 162 |
| Questions | 164 |
| <i>Short Answer Questions</i> | 164 |
| <i>Long Answer Questions</i> | 164 |

CHAPTER 23

Paediatric Pharmacy

| | |
|--|-----|
| Introduction | 165 |
| Factors affecting use of Drugs in Children | 166 |
| Pharmacokinetics in Paediatrics | 166 |
| Absorption of Drugs | 166 |
| Distribution of Drugs | 167 |
| Metabolism of Drugs | 168 |
| Elimination of Drugs | 168 |
| Dosage in Children | 169 |
| Therapeutic Drug Monitoring (TDM) | 169 |
| Noncompliance | 170 |
| Medication Errors and ADR | 170 |

| | |
|-------------------------------------|-----|
| Questions | 171 |
| <i>Short Answer Questions</i> | 171 |
| <i>Long Answer Questions</i> | 171 |

CHAPTER 24

Geriatric Pharmacy

| | |
|--|-----|
| Introduction..... | 172 |
| Pharmacokinetics in Geriatrics | 172 |
| Absorption | 172 |
| Distribution..... | 173 |
| Metabolism | 173 |
| Excretion..... | 173 |
| Pharmacodynamics in Geriatrics | 173 |
| Geriatric Diseases | 174 |
| Anemia..... | 174 |
| Arthritis..... | 174 |
| Cerebro/cardiovascular Diseases | 174 |
| Constipation..... | 175 |
| Dementia..... | 175 |
| Gastric Ulcer..... | 175 |
| Hypertension..... | 175 |
| Osteoporosis | 176 |
| Urinary Incontinence | 176 |
| General Precautions in Geriatric Treatment | 176 |
| Conclusion | 177 |
| <i>Questions</i> | 178 |
| <i>Short Answer Questions</i> | 178 |
| <i>Long Answer Questions</i> | 178 |

CHAPTER 25

Use of Drugs in Pregnancy and Lactation

| | |
|---------------------------------------|-----|
| Introduction..... | 179 |
| Lack of Literature and Research | 179 |

| | |
|---|-----|
| Effects of Drugs during Pregnancy..... | 180 |
| Teratogens | 180 |
| Conditions Commonly Treated During Pregnancy..... | 181 |
| Drugs in Lactation | 182 |
| Factors to be Considered..... | 182 |
| Drugs to be Avoided..... | 182 |
| Safe use of Drugs in Lactation..... | 183 |
| Conclusion | 183 |
| <i>Questions</i> | 184 |
| <i>Short Answer Questions</i> | 184 |
| <i>Long Answer Questions</i> | 184 |

CHAPTER 26

Pharmacogenetics

| | |
|---|-----|
| Introduction..... | 185 |
| Definition..... | 185 |
| Inherited Factors that Affects Drug's Action..... | 186 |
| Advantages of Pharmacogenetics | 188 |
| Therapeutic Aspects of Pharmacogenetics | 189 |
| Problems of Pharmacogenetics..... | 189 |
| Conclusion..... | 190 |
| <i>Questions</i> | 190 |
| <i>Short Answer Questions</i> | 190 |
| <i>Long Answer Questions</i> | 190 |

CHAPTER 27

Patient Compliance

| | |
|---|-----|
| Introduction..... | 191 |
| Definition..... | 191 |
| Evidence of Non-Compliance..... | 191 |
| Methods of Assessing Non-compliance | 192 |

| | |
|-------------------------------------|-----|
| Reasons for Non-compliance..... | 193 |
| Results of Non-compliance..... | 194 |
| Remedy for Non-compliance..... | 195 |
| Conclusion | 196 |
| <i>Questions</i> | 196 |
| <i>Short Answer Questions</i> | 196 |
| <i>Long Answer Questions</i> | 196 |

CHAPTER 28

Drug Therapy Review and Therapeutic Drug Monitoring

| | |
|---|-----|
| Definition..... | 197 |
| Purpose of Drug Therapy Review (DTR)..... | 197 |
| Scope of DTR | 197 |
| Duties Involved in DTR..... | 198 |
| Medication Chart Review | 199 |
| Model Mediation Chart | 201 |
| Therapeutic Drug Monitoring..... | 202 |
| Drugs suitable for TDM..... | 202 |
| Development of TDM Services | 203 |
| Problems in TDM | 204 |
| <i>Questions</i> | 205 |
| <i>Short Answer Questions</i> | 205 |
| <i>Long Answer Questions</i> | 206 |

CHAPTER 29

Patient Data Analysis

| | |
|---|-----|
| Patient Data..... | 207 |
| Need for Analysis of Data | 207 |
| Biochemical Data for Electrolytes | 208 |
| Haematology Data | 208 |
| Liver Function Tests | 211 |
| Renal Function Tests | 213 |

| | |
|---|-----|
| Pulmonary Function Tests | 214 |
| Pulmonary Function Tests Including Spirometry | 215 |
| Interpretation of Pulmonary Function Tests | 215 |
| Tests for Infectious Diseases | 215 |
| <i>Questions</i> | 217 |
| <i>Short Answer Questions</i> | 217 |
| <i>Long Answer Questions</i> | 217 |

CHAPTER 30

Individualization of Dose and Pharmacist Intervention

| | |
|--|-----|
| Need for Individualization of Dose | 218 |
| Parameters useful in Individualization of Dose | 219 |
| Alteration of the Pharmacokinetic Parameters in the individual Patient which require attention and Intervention by Pharmacist | 222 |
| Bioavailability | 222 |
| Protein Binding | 223 |
| Volume of Distribution | 223 |
| Clearance | 224 |
| Half life | 224 |
| Pharmacodynamic Parameters | 224 |
| Pharmacist's Intervention | 225 |
| <i>Questions</i> | 225 |
| <i>Short Answer Questions</i> | 225 |
| <i>Long Answer Questions</i> | 225 |

CHAPTER 31

Adverse Drug Reactions

| | |
|--------------------------------|-----|
| Introduction | 226 |
| Reasons for ADR | 226 |
| Reducing ADR | 227 |
| Classification | 227 |
| Methods of Detecting ADR | 230 |

| | |
|--|-----|
| Management of Adverse Drug Reactions | 231 |
| <i>Questions</i> | 232 |
| <i>Short Answer Questions</i> | 232 |
| <i>Long Answer Questions</i> | 232 |

CHAPTER 32

Drug Interactions and Drug Induced Diseases

| | |
|--|-----|
| Introduction..... | 233 |
| Reasons for Drug Interactions | 233 |
| Problems in Detecting Drug Interactions..... | 234 |
| Uses of Drug Interaction Reports | 234 |
| Classification of Drug Interactions | 235 |
| Drug Interaction Examples | 237 |
| Drug Induced Diseases | 239 |
| <i>Questions</i> | 240 |
| <i>Short Answer Questions</i> | 240 |
| <i>Long Answer Questions</i> | 240 |

CHAPTER 33

Patient Counselling

| | |
|--|-----|
| Introduction..... | 241 |
| Need for Counselling and Privacy | 241 |
| Classification | 242 |
| Suitable Person to give Counselling | 242 |
| Selection of Patients for Counselling..... | 242 |
| Scope of Counselling..... | 243 |
| Effect or uses of Counselling..... | 243 |
| <i>Questions</i> | 244 |
| <i>Short Answer Questions</i> | 244 |
| <i>Long Answer Questions</i> | 244 |

CHAPTER 34

Drug Information Center and Role of Pharmacists in Education and Training

| | |
|--|-----|
| Introduction..... | 245 |
| Need for Drug Information Centers..... | 245 |
| Suitable Person to be In charge of DIC | 246 |
| Sources of Information | 246 |
| Computerized Services | 247 |
| Establishing Drug Information Center | 249 |
| Functions of Drug Information Center..... | 249 |
| Role of Hospital Pharmacist in Education and Training..... | 251 |
| <i>Questions</i> | 253 |
| Short Answer Questions | 253 |
| Long Answer Questions | 253 |

CHAPTER 35

Poison Information Center and Treatment of Poison Cases

| | |
|---|-----|
| Importance of PIC..... | 254 |
| Sources of Poison | 254 |
| Information about Poisons | 254 |
| Storage of Information..... | 255 |
| Providing Information..... | 256 |
| Treatment of Poison Cases | 256 |
| Classification | 257 |
| General Treatment of Poison Cases..... | 258 |
| Removal of Unabsorbed Poison | 258 |
| Excretion of Absorbed Poison | 259 |
| Treating General Symptoms of the Patient..... | 259 |
| Maintaining Patient's General Health Conditions | 259 |

| | |
|---|-----|
| Treatment of Specific Poisonings and Antidotes..... | 260 |
| Physical Antidotes | 260 |
| Chemical Antidotes | 260 |
| Physiological Antidotes | 260 |
| Universal Antidotes | 260 |
| <i>Questions</i> | 261 |
| <i>Short Answer Questions</i> | 261 |
| <i>Long Answer Questions</i> | 262 |

CHAPTER 36

Clinical Trials

| | |
|--|-----|
| Introduction..... | 263 |
| Reasons for Conducting Clinical Trials..... | 263 |
| Phase of Clinical Trials..... | 264 |
| Phase I..... | 264 |
| Phase II | 264 |
| Phase III..... | 264 |
| Phase IV..... | 265 |
| Guidelines Governing Clinical Trials and Good Clinical Practice (GCP)..... | 265 |
| Prerequisite for the study | 265 |
| Responsibilities..... | 266 |
| Record Keeping and Data Handling | 266 |
| Quality Assurance..... | 266 |
| Statistics..... | 266 |
| Special Concerns | 266 |
| Ethics in Clinical Research | 267 |
| <i>Questions</i> | 268 |
| <i>Short Answer Questions</i> | 268 |
| <i>Long Answer Questions</i> | 268 |
| <i>Appendix-I</i> | 269 |
| <i>Reference Books</i> | 279 |