THIRD B.PHARM. EXAMINATION

(Inforce from June, 1980)

Pharm. O. 14 :

Every candidate for the admission to the Third B.Pharm. Examination shall be required to have passed the Second B.Pharm. Examination of this University, or of any other University recognised as equivalent thereto, or candidates eligible for keeping terms at the Third B.Pharm. Course according to Pharm. O. 13 will also be admitted to the above examination, provided he has completed the course of study as laid down in Pharm. R. 35.

Pharm. O. 15 :

A candidate who has failed to pass the Third B.Pharm. Examination may appear at the subsequent examination as an Ex-student without keeping any fresh terms.

Pharm. R. 31 :

The courses of study for the Third B.Pharm. Examination shall be of one year's duration, consisting of two terms.

Pharm. R. 32 :

There shall be an examination at the end of Third Year called the Third B.Pharm. Examination which shall be held twice a year in April and in October.

Pharm. R. 33 :

Candidates for the Third B.Pharm. Examination shall be examined after they have satisfactorily completed the prescribed courses of study and kept two terms for the purpose of an affiliated college in the following subjects :

Scheme of Examination

	Subject of Examination	*Total marks for theory including sessional*	*Total marks for practicals including sessional*
3.1	Biological Pharmaceuticals	100	100
3.2	Pharmaceutical Microbiology	100	100
3.3	Pharmaceutical Chemistry (Natural Products)	100	100
3.4	Pharmaceutical Biochemistry	100	100
3.5	Pharmacognosy	100	100
3.6	Pharmacology and Chemotherapy	100	100
3.7	Pharmaceutical Economics and Business Organisation.	100	—

N.B.—Each written and practical examination shall be of 3 hours' duration.

Pharm. R. 34 :

A regular record of both theoretical and practical class work and examination conducted at an affiliated college imparting for this course shall be maintained for each student and 30 per cent of the total marks for each subject in theory and 40 per cent of the total marks for each subject in practical shall be allotted for these records.

There shall not be less than three periodic examinations during the year and the aggregate of two entire performances shall form the basis for calculating the average for compultation of sessional marks. The average sessional marks thus calculated will be made available confidentially to all Examiners in theory and practicals in each subject at the commencement of the relevant examination.

Pharm. R. 35 :

The syllabus laid down for the Third B.Pharm. Examination is as under :

Subjects	*Theory periods each of 45 min. per week*	*Practicals each of 3 hours per week*
3.1. Biological Pharmaceuticals	3 (72)	1 (24)
3.2. Pharmaceutical Microbiology	3 (72)	1 (24)
3.3. Pharmaceutical Chemistry (Natural Products)	3 (72)	1 (24)
3.4. Pharmaceutical Biochemistry	3 (72)	1 (24)
3.5. Pharmacognosy	3 (72)	1 (24)
3.6. Pharmacolagy and Chemotherapy	3 (72)	1 (24)
3.7. Pharmaceutical Economics and Business Organisation.	3 (72)	—

N.B.—(*a*) 24 maximum working weeks in a year excluding examination.

(*b*) Figures in bracket indicate total lectures or practicals, necessary to complete the syllabus in the subject.

Detailed Syllabus :

(Figures in bracket in the detailed syllabus, mentioned below, indicate the number of lectures necessary to complete the topic of the syllabus.)

3.1. Biological Pharmaceuticals

1. Surgical dressings sutures and ligatures— (8)
Definitions, primary wound dressings, absorbents–surgical cotton, surgical gauzes etc., bandages, adhesive tape, protectives, cellulosic haemostats, official dressings, absorbable sutures–catgut and others, non–absorbable sutures, and others.

2. Immunological and prophylactic preparations (12)
Antigens, Immune system –humoral immunity –cellular immunity, privileged graft sites, graft host reaction, tolerance, immunogenetics, Immunity natural acquired hypersensitivity and other reactions, active immunization products–bacterial vaccines–toxoids–viral vaccines–rickettsial vaccines passive immunization products–antitoxins–antivenins–immune serums immune blood derivatives and other products related to immunity, diagnostic biologicals. control of products.

3. Biologicals obtained by fermentation— (24)
Fermentation–general requirements–media–equipments–sterilization–process–extraction, etc. Detailed producton of selected antibiotics (4), vitamins (2), acids (2) solvents (2) enzymes and immobilised enzymes (3), microbiological transformations (4), aminoacids (2), by fermentation.

4. Glandular products— (8)
Preparation of extracts or isolation of pure substances for the preparation of dosage forms from : Pituitary, adrenal, pancrea, thyroid, parathroid, ovary, liver stomach etc.

5. Crude drug extracts— (8)
Principles and methods of preparation of dry–soft–liquid extracts of the I. P. from fresh or dry plant drugs.

6. Allergenic extracts— (4)
Types of allergens, preparation of extracts, testing and standardization of extracts, general preparations.

7 Blood products and plasma substitutes— (8)
Collection, processing and storage of : whole human blood concentrated human R. B. C., dried human plasma, human plasma protein fraction, dried human serum, human fibrinogen, human thrombin, human normal immunoglobulin, human fibrin foam; plasma substitutes–ideal requirements—PVS –Dextran etc., control of blood products as per I. P.

3.1. Biological Pharmaceuticals Practicals

Experiments designed in the preparation and standardization of surgical dressings, sutures and ligatures, different immunological products, preparation, extraction and standardization of different products of fermentation, preparation and testing of glandular products, allergenic extracts and crude drugs extracts and other experiments to illustrate the topics covered in theory.

Books recommended

1. Remington's 'Pharmaceutical Sciences'—Hoover.
2. 'Tutorial Pharmacy'—Carter.
3. 'Surgical Dressings, Ligatures and Sutures'—Fish and Dawson.
4. 'Immunological and Blood Products'—Dawson and Milne.
5. 'Industrial Microbiology'—Rose.
6. 'Industrial Microbiology'—Prescott and Dunn.

3.2. Pharmaceutical Microbiology.

1. Introduction to the science of microbiology— (4)
   Ancient theories concerning the origin of life, contribution of great scientists to this science.
2. Microscopy— (4)
   Microscopes, their magnification, resolution, illumination and filters, working of different types of microscopes, micrometry.
3. Classification of microbes and their taxonomy—
   Protozoa, fungi, actinomycetes, bacteria, ricketssia, spirochaetes and viruses.
4. Nutrition, cultivation isolation and identification of bacteria, actinomycetes, fungi viruses, etc. (6)
5. Microbial genetics and variation. (4)
6. Bacterial enzymes. (2)
7. Control of microbes by physical and chemical methods. (6)
8. Disinfection, factors influencing disinfection, dynamics of disinfection, disinfectants and antiseptics and their evaluation. (5)
9. Sterilisation, different methods. evaluation of sterilisation methods. (10)
10. Sterility testing of all Pharmaceutical products. (3)

11. Microbial attack and host defence, Virulance and pathogeniaty, Primary and specific defensive mechanisms of body, infection and its transmission, interferons. (4)

12. Microbial standardisation of antibiotics, Vitamins, Amino acids. (8)

13. Systematic studies of few selected organism. (8)

3.2. Pharmaceutical Microbiology Practicals.

Experiments devised to prepare various types of culture media, sub-culturing of common aerobic and anaerobic bacteria, fungus and yeast, various staining methods, various methods of isolation and identification of microbes, sterilizing techniques and evaluation of sterilizing techniques, evaluation of antiseptics and disinfectants, testing the sterility of Pharmaceutical products as per I. P. requirements, evaluation of potency of antibiotics and vitamins etc., and others to illustrate the topics included in theory.

Books recommended

1. 'Text-book of Microbiology'—Forbisher.
2. 'Laboratory Manual of Bacteriology'—Salle.
3. 'Tutorial Pharmacy'—Carter.

3.3. Pharmaceutical Chemistry (Natural Products).

1. Carbohydrates and glycosides. (10)

Definition and classification of :

(*a*) *Monosaccharides :*

Examples of monosaccharide, configuration of monosaccharides, Determination of the size of sugar rings of glucose and fructose;

(*b*) Disaccharides and polysaccharides; Introduction and general chemistry with examples, classifications and uses of glycosides.

2. Polycylic aromatic hydrocarbans and heterocyclic compounds. (15)

With one and two hetero atoms and their derivatives of pharmaceutical importance :

Chemistry of : diphenyl methane; triphenyl methane, triphenyl methane chloride, naphthalene, anthracene, phenanthrene, acridines, furan, pyrrole, thiophen, indole, pyrazole, Imdazoles, oxazone, thiazole, pyridine, quinoline, isoquinoline, pyrans, pyrones, diazines.

3. Purine— (7)
Introduction and chemistry of uric acid, purine and xanthine bases alongwith derivatives.

4. Terpenes— (8)
Classification, isoprine rule, isolation and general methods for determining structure, chemistry of citral, ionones, terpineol, carvones.

5 Amino acids and proteins— (6)
Classification of amino acids, general chemistry, classification of proteins, general nature and relationship to amino acids.

6. Alkaloids— (8)
Methods of extraction and determination of structure of plant alkaloids, quantitative determination of groups, degradations, applications of the above principles to the determination of structures of ephendrine, adrenaline, coniine, nicotine and atropine.

7. Fats, oils and waxes— (7)
General classification and their chemistry.

8. Stereo chemistry—
Walden inversions, stereo-chemistry of diphenly, allenes, spirans, confirmations of cyclophexane and decaline.

9. Nucleic acid— (4)
Elementary knowledge of nucleic acid.

3.3. Pharmaceutical Chemistry (Natural Products) Practicals

Experiments devised for estimation of glucose, sucrose, and different functional groups, saponification value, codine value, acid value, ester value of the oils, aldehydes and ketones in volatile oils, spotting of medicinal compounds, preparation of six synthetic organic compounds which includes name reactions, assay of two crude drugs, fractional distillation of two liquids using fractionating column and other to illustrate the topics included in theory.

Books recommended

1. 'Organic Chemistry', Vol. II—Finar.
2. 'An Introduction to the Chemistry of Heterocylic Compounds'—Acheson.
3. 'Organic Chemistry'—Breweter & McEwen.

3.4. Pharmaceutical Biochemistry :

1. Introduction— (2)
   History, scope and biochemistry with reference to general microbial and human metabolism.
2. Biochemical morphology of cell. (2)
3. Physicochemical phenomena and transport through membrane. (2)
4. Carbohydrate constituents of cell, and carbohydrate metabolism. (12)
5. Biological oxidation energy. production and utilisation. (2)
6. Amino acids, peptides and proteins metabolism, protein structure and biological functions. (12)
7. Enzymes. (5)
8. Conzymes and vitamins. (4)
9. Purines and purine metabolism, genes and genetic control of protein synthesis, gene mutations. (5)
10. Fats and steroids end their metabolism. (6)
11. Hormones and metabolic control. (5)
12. Mineral metabolism. (4)
13. Nutrition, caloric value and essential food components. (2)
14. Abnormal metabolism and genetic deffects. (2)
15. Metabolism of foreign organic matter. (2)
16. Biochemistry of specifilised tissues, blood, urine and other body fluids. (4)

3.4 Pharmaceutical Biolchemistry Practicals

Experiments devised for identifying carbohydrates and proteins, constituents of urine, egg white, milk, bile, bread, cheese, potato etc., analysing gastric fluid, acidity and ammonia, phosphate, chloride, glucose, etc. in urine, estimation of calcium, sugar, urea, creatinine, cholesteral, bilirubin, phosphorous, etc. in blood and other experiments to illustrate the topics covered in theory

Books recommended

1. 'Review of Physiological Chemistry'—Harper.
2. 'Text-book of Biochemistry'—Rangnath Rao.
3. 'Introduction to Modern Biochemistry'—Karlson and Doering.
4. 'Biochemistry'—Orton and Nauhans.
5. 'Biochemistry for Medical Student'—Thorpe.
6. 'Text-book of Biochemistry'—Harrow and Mezure.

3.5 Pharmacognosy :

1. Systematic study of crude drugs including English and Indian names. synonyms synonyms official definition, biological and geographical sources, history, salient aspects of cultivation. collection. macroscopic and microscopic/charecters and general aspects of storage, varieties, sensory characters, chemical constituents, chemical and microchemical tests, uses. adulteration and evaluation of the drugs included in 2, 3, 4 mentioned below :

2. Drugs containing alkaloids– (30)

   (*a*) Alkaloids with pyridine—piperidine ring : lobelia, conium, nicotina, areca.

   (*b*) Tropane alkaloids : Belladonna, hyoscyamus, stramonium. Indian daturas, withania, duboisial. mandarkae and coca.

   (*c*) Quinoline Alkaloids, Cinchona, Acronicia, Camptotheica.

   (*d*) Isoquinoline alkaloids, opium, ipecac, curare.

   (*e*) Indole alkaloids, Nux-vomica ergot, rauwolfia, catharanthus, veratrum, aconite, Ololiuqui, peyote, mescal buttons psilocybe, fly agaric.

   (*f*) Alkaloidal amines : ephedra. colchicum (seed & corn).

3. Drugs containing resins : Nature, occurence properties, chemistry, isolation of— (18)

   (*a*) Balsams : benzoin (Sumatra and Siam), tolu balsam, peru balsams, storax.

   (*b*) Acid resin : colophony.

   (*c*) Gum resins : asafoetida, myrrh.

   (*d*) Convolvulaceae resins : jalap, Brazilian jalap, ipomoea, turpeth (black and white), kaladana.

   (*e*) Resins (general); colocynth, ginger, turmeric, Java turmeric, capsicum, cannabis, podophyllum, vidang.

4. Studies of fibres– (8)

   (*a*) Vegetable fibres; cellulose and cellulose derivatives (cotton, oxidised, cotton, methyl cellulose, sodium carboxy methyl celluslose, cellulose wadding), jute, hemp, flax.

   (*b*) Animal fibres; wool silk.

   (*c*) Synthetic fibres : viscose rayon, nylon, terelene, polythene.

5. General Pharmacognosy : From plant to drugs – (16)

(*a*) Advantages and disadvantages of obtaining drugs from cultivated and wild plants.

(*b*) Variability of drug constituents (exogenous and endogenous factors). altitude, temperature rainfall, light, oxygen of air, velocity of wind, propagation by seed and vegetative means, selection, mutation. hybridisation and polyploidy.

(*c*) Collection : season, time collection, age.

(*d*) Treatment subsequent to collection and desirable and undesirable changes after collection--drying, hazards (infestation with spores of micro-organism and eggs and steps to prevent the same), deterioration by non-living factors and by living organisms, like moisture, bacteria, mould, mites, beattes, moth steps to be taken to prevent deteriorations.

(*e*) Evaluation-identity, purity and quality, organoleptic, microscopic, chemical, physical and biological evaluations.

3.5 Phamacognosy Practicals

1. Identification through morphological and sensory characters of the drugs included in the theory.
2. Detailed study under morphology and microscopy of whole and powdered drugs and chemical tests (powder of underlined drugs).
   Rauwolfia (R. serpentina & R. canescens comparative), *nuxvomica, ergot, gpecac, vasaka, datura* (comparative of different varieties), *belladama leaves, hyosyamus leaves,* belladonna root, aswagandha root, ephedra, *cinchona* bark, *capsicum,* podophyllum, ginger.
3. T.L.C. study of the alkaloidal extract of the following drugs :
   Ergot, datura, ipecac, cinchona, nuxvomica, vasaka and rauwolfia,
4. Identification of unorgadised drugs by macroscopic characters and chemical tests—
   Asafoctida, murrh, baisam-tolu, benzoin.
5. Study of surgical fibres by morphological and microscopical characters and chemical tests :
   Cotton, Wool, Silk, Jute, Nylon, Rayon.

6. Lycepodium spore method–determination of starch in ginger or potato.

7. Quantitative microscopy—

Measurement of microscopic elements, cinchona fibres, starch grain of ginger.

Stomatal index, pallisade ratio and vein islet number of different species of datura leaves.

Determination of sclerenchyamatous cells per mm. of cardamom seed.

Books recommended

1. 'Pharmacognosy —Tyler, Brady and Robber.
2. 'Text-book of Pharmacognosy'—Trease and Evans.
3. 'Text-book of Pharmacognosy'—Shah and Quadry.
4. 'Anatomy of Crude Drugs'—Iyenger and Nayak.
5. 'Pharmacognosy' (powdered drug)—Iyenger.

3.6 Pharmacology and Chemotherapy.

1. General information— (2)

Introduction to Pharamacology and its role in Pharmacy.

2. Techniques of drug administration : (3)

(*a*) Review of factors modyfying drug action,
(*b*) Route of administration,
(*c*) Dosage calculations.

3. Pharmacodynamics :

The dose–effect relationship : (3)
(*a*) Dose–response curve,
(*b*) Potency, efficacy, affinity,
(*c*) Biological variations,
(*d*) Selectivity.

4. Mechanism of Drug Action : (8)

(*a*) Structure activity relationship,
(*b*) Drug–receptor, interaction,
(*c*) Classification of receptor and drug effects,
(*d*) Introduction to various theories of drug action.

5. The absorption, distribution and elimination of drugs : (8)
   (*a*) Drug absorption,
   (*b*) Drug distribution :
      (*i*) Apparent volume of distribution,
      (*ii*) The binding of drug to plasma protein,
      (*iii*) The passage of drugs across biological membranes,
      (*iv*) Passage of drugs into Central Nervous System and placenta.
   (*c*) Drug elimination :
      (*i*) Renal excretion of drugs,
      (*ii*) Biliary excretion,
      (*iii*) Extra corporeal dialysis.

6. Drug Metabolism : (6)
   (*a*) Method of studying drug metabolism,
   (*b*) Chemical pathways of drug metabolism,
   (*c*) Factors affecting stimulation and depression of drug metabolism.

7. Drug Resistance : (2)
   (*a*) Origin of acquired drug resistance,
   (*b*) Biochemical mechanism of drug resistance.

8. Drug tolerance and physical dependence : (4)
   (*a*) Tolerance by indirect mechanism,
   (*b*) Tolerance at the cellular site.

9. Chemotherapy of the parasitic diseases : (12)
   (*a*) Drugs used in the treatment of helminthosis,
   (*b*) Drugs used in the treatment of malaria,
   (*c*) Drugs used in the treatment of amoebiasis and ptotozoel infection.

10. Chemotherapy of microbial diseases : (14)
   (*a*) Sulfonamides,
   (*b*) Pencillins, cephalosporins, streptomycin, tetracyclines, chloramphenicol,
   (*c*) Drugs in tuberculosis and leprosy,
   (*d*) Miscellaneous antibacterial, antifungal and antiviral drugs.

11. Chemotherapy of neoplastic drugs (10)
    (*a*) Alkylating agents,
    (*b*) Antimetabolites,
    (*c*) Antiproliferative agents.

3.6 Pharmacology and Chemotherapy Practicals.

General principles, the effect of route of administration on the action of drugs, combined action of drugs, therapeutic index, dose-response curves of various agorists, comparison of activity of various agonists, estimation of dose-ratios and affinity constants, effect of drugs on the neuromuscular junction, to study the spasmogenic and spasmolytic activities of various drugs, effects of various electrolytes on different preparations, effect of temperature on the various responses of the agonists on smooth muscle preparation, drug-interaction, potentiation of barbiturates by chlorpromazine, interaction between monoamine, oxidase inhibitors and other agents, nalorphine antagonism of morphine, protective effect of antihistaminic agents against histamine, analgesics and antipyretics testing methods.

Books recommended

1. 'Pharmacological Basis of Therapeutics'—Goodman and Gillman.
2. 'Medical Pharmacology'—Goth.
3. 'Pharmacology'—Gaddum.
4. 'Principles of Drug Action' Goldstein, Aronow and Kalaman,
5. 'Drug Treatment'—Avery.
6. 'Clinical Pharmacology'—Laurence.
7. 'Toxicology : The basic science of Poisons'—Casarett and Doull.
8. 'Introduction to General Toxicology'—Ariens, Simonis and Offermeier.
9. 'Drug Interaction'—Hansten.
10. 'Drug Dilemmas'—Shah A. and Shah N.

3.7 Pharmaceutical Economics and Business Organisation.

1. Economics : General principles of economics, basic terms of economics, Laws of demand & supply, pricing process under perfect competition and monopoly, laws of returns, factors of production and their remuneration, money-its functions and forms, credit. (18)

2. Management through accounting-objects and systems of accounts keeping, Journal, ledger posting, subsidiary books columner & petty cash book, preparation of trial balance and final accounts, banking transactions, bank reconcilliation statement, cheques, bills of exchange, promissory note, drafts, etc. cost accounting. (18)

3. Office organisation—Principles of office organization, business correspondence, types of letters, writing business letters, drafting of circulars, filing-various systems of filing, copying duplicating, etc. modern office equipments.

4. Business organization : Forms of business organisations soletradership, partnership, joint stock company and others, naming the establishment, financing-long term, short term, mid-term finance, types of shares and debentures, agencies financing the business and industries. (18)

Books recommended

1. 'An Introduction to Economic Theory'—Sen and Das
2. 'An Introduction to Economic Theory'—Agarwal
3. 'Double Entry Book Keeping'—Grewal
4. 'Business Organisation'—Davar
5. 'Essentials of Business Organisation'—Bahel.

Pharm. R. 36 :

To pass an examination, candidates must obtain at least 40% of the marks in theory (including sessional) and practicals (including sessional) separately of each subject and in addition must obtain at least 50% of the total marks assigned to the whole Third B.Pharm. Examination. No class shall be awarded to the successful candidates at the Third B.Pharm. Examination.

Pharm. R. 37 :

A candidate who has secured 50% of the total marks in any subject including sessional) at the Third B.Pharm. Examination may, at his option be exempted from appearing in that subject at subsequent examination, provided he has passed in all heads of passing in the subject. Candidate will be declared to have passed the whole Third B Pharm. Examination when he has passed in all the remaining subjects and has obtained the aggregate of 50% marks in the remaining subjects.

For the purpose of determining whether a candidate has obtained 50 per cent of the total marks in the aggregate, the marks obtained by him in a subject or subjects on the previous occasions entitling him to claim exemption in the subject at a subsequent appearance would be carried forward if he claims exemption in a subject or subjects.

Candidates passing the examination in this manner by compartments will not be eligible for a prize or scholarship to be awarded at the examination.

Pharm. O. 15 :

A candidate who passes in all heads of passing but three and secures 50% of the total marks assigned to the whole Third B.Pharm. Examination as mentioned in Pharm. R. 33 will be allowed to keep terms and appear at the Third B.Pharm. Examination after keeping two terms but will not be declared to have passed the Fourth B.Pharm. Examination unless he has passed in these subjects of the Third B.Pharm. held either in previous or in the same examination season.