

Third B.Pharmacy Exam.2009
(Four Year Integrated Course)

Prospectus No.09146

संत गाडगे बाबा अमरावती विद्यापीठ

SANT GADGE BABA AMRAVATI UNIVERSITY
(FACULTY OF MEDICINE)

PROSPECTUS

OF
THE THIRD EXAMINATION FOR THE DEGREE OF
BACHELOR OF PHARMACY, 2009.
(FOUR YEAR INTEGRATED COURSE)



2008

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SYLLABUS PRESCRIBED FOR

B.PHARM THIRD YEAR

III.T.1

HOSPITAL PHARMACY

THEORY (50 hours)

1. **Introduction to hospitals and hospital pharmacy:** A Historical development.
2. **Chronological development of hospital pharmacy services in India :** Various committees and commissions that studied in aspects of hospital pharmacy services and their recommendations with respect to practice of pharmacy in our hospitals.
3. **Hospital Pharmacy :** Objectives and functions, organization, planning and administration of modern hospital pharmacy services, location, layout, personnel, qualifications, requirements, abilities and evaluation of hospital pharmacist, Work load and remuneration of hospital pharmacist.
4. **Hospital Drug Policy** - General considerations.
Pharmacy and therapeutic committee - Purpose, organization and functions.
Hospital formulary : Organization, formulary content, preparation and Distribution. Pharmacy Procedure manual preparation and publication.
Hospital committees - Infection control committee, Antibiotic policy committee, Research and ethics committee.
Role of hospital pharmacist in hospital committees and practice of Rational Drug Therapy, Drug exchange programme.
5. **Hospital Manufacturing :** Economical considerations and estimation of demand, lay out, raw materials, production planning, requirements, manpower requirements and quality assurance, manufacturing of (including repacking and prepacking) - Sterile products (small and large volume parenteral), non-sterile products, total parenteral nutrition, intravenous additives.
6. **Drug distribution :** Outpatient and Inpatient services, unit dose drug distribution systems, floor ward stock systems, satellite pharmacy services, central sterile services, bed side pharmacy.

7. **Radio pharmaceuticals :** Radio isotope committee, role of hospital pharmacist in isotope and non isotope pharmacy.
8. **Controlled drugs dispensing (narcotic Drugs) :** Procedures for dispensing and maintenance of records, disposal of expiry drugs.
9. **Sterilization techniques,** procedure, application of sterilization of surgical dressings, OT and other equipment used in hospital (Cotton, bandage, adhesive tapes, IV sets, B.G.set, ryles tubes, catheters and syringes).
10. **Pharmaceutical care** concept and its implementation.
11. **Application** of computers in hospital pharmacy.

Recommended Books :

- 1) Text Book of Hospital Pharmacy - by Merchant & Qadry
- 2) Hospital Pharmacy by Hassan

III.P-I

Hospital pharmacy

Practical (75 Hours)

1. Introduction to hospital pharmacy and its importance.
2. Identification and uses of surgical dressings, instruments, glasswares and other hospital.
3. Preparation of model layout and workflow patterns in the dispensary of a medium size hospital.
- 4,5. Manufacture and testing of non-sterile products used in hospital : Normal saline, Dextrose (5% and 20%), Dextrose and Normal Saline (DNS), Ringer Lactate Solution.
- 6-8. Manufacture and testing of non-sterile products used in hospital : Externals- powders, ointments, creams. Liquid orals - Syrups, elixirs.
9. Identification test for important raw materials used in the manufacture of sterile and non sterile products.
10. Preparation of total parenteral nutrition (group/demonstration experiment)

11. Evaluation (quality test) of surgical dressings, (cotton, gauge, bandage and adhesive tapes).
12. Sterilization of various types of surgical instruments and glasswares.
13. Handling and use of data processing equipment's/computer (demonstration)
14. Project report on nearby hospital pharmacy - its location, layout, working pattern, drug distribution system and maintenance of records.

Recommended Books :

- i) Hospital Pharmacy - by Hassan
- ii) Text Book of Hospital Pharmacy - by Merchant & Qadry

**III.T.2 INDUSTRIAL PHARMACY-I
THEORY (50 hours)**

1. Preformulation studies and formulation concepts.
2. Drug Regulatory affairs & NDA.
3. **Liquid dosage forms :** Introduction Types of additives used in formulations, vehicles, stabilizers, preservatives, suspending agents, emulsifying agents, solubilizers, colors, flavors, manufacturing, packaging and evaluation of clear liquids, suspension and emulsion.
4. **Semisolid dosage forms :** Types, mechanism of drug penetration, factors influencing penetration, semisolid bases and their selection; general formulations of semisolids and gels manufacturing procedure, evaluation and packaging.
5. **Pharmaceutical aerosols :** Various propellants and valves, general formulations. manufacturing, packaging and evaluation methods, pharmaceutical applications.
6. **Ophthalmic preparations :** Requirements, formulations, methods of preparation, containers, evaluation.

7. **Blood products and Glandular products :** Collection, processing and storage of Whole human blood, concentrated human RBCs, dried human plasma, human fibrinogen, human thrombin, human normal immunoglobulin, human fibrin-foam, plasma substitutes - ideal requirements, pvp, dextrans. Glandular products like Insulin, pancreatin, thyroid and adrenal products.
8. **Cosmetology and cosmetic preparations :** Fundamental of cosmetic science, structure and functions of skin and hair, formulation, packing and evaluation of the following class of cosmetics.
Hair products : Shampoos, Hair creams, Hair dyes.
Skin products : Moisturizing, cleansing, vanishing creams, Face powder,
Dentifrices products : Tooth paste, tooth powder.
Manicure products : Lipsticks, nail polish.
9. **Surgical products :** Primary wound dressing, absorbents, surgical cotton, surgical gauzes etc., bandages, adhesive tape, protective cellulose, hemostatics, offical dressings, absorbable and non-absorbable sutures, ligatures and catgut's, medical prosthetic and organ replacement materials.

**III.T.3. PHARMACEUTICAL BIOTECHNOLOGY
THEORY (75 hours)**

1. **Bacterial Cell :** Detailed study of the structure and functions of bacterial cell.
2. **Cell culture methods :** Comprehensive study of cell and organ culture methods.
3. **Replication of DNA :** Semi conservative replication, Meselson & stahl's Experiments, replication initiation, elongation and termination, enzymes and proteins involved in prokaryotic and eukaryotic replication.
4. **Transcription :** Initiation, elongation and termination, structure and role of RNA Polymerase in eukaryotes and prokaryotes.
5. **Translation :** Genetic code and it's significance, process of translation, initiation, elongation and termination, role of RNA and proteins involved in the process.

6. **Immunology and Immunological Preparations** : Principles, antigens and haptens, immune system, cellular humoral immunity, Immunological tolerance, antigenantibody reactions and their applications. Hypersensitivity, active and passive immunization; Vaccines-their preparation, Standardization and storage.
7. **Genetic Recombination** : Introduction to genes and gene therapy. Transformation, conjugation, transduction, protoplast fusion and genecloning and their applications. Development drugs produced by biotechnology such as Humatrope, HB erythroprotine.
8. **Antibiotics & other fermented products** : Historical development of antibiotics Antimicrobial spectrum and methods used for their standardization. Screening of soil for organisms producing antibiotics, fermenter its design, control of different parameters. Isolation of mutants factors influencing rate of mutation. Design of fermentation process. Isolation of fermentation products with special reference to penicillin, streptomycin, tetracycline and vitamin B 12.
9. **Microbial Transformation** : Introduction, types of reactions mediated by micro organisms, design of biotransformation processes, selection on organisms, biotransformation process and its improvements with special reference to steroids.
10. **Enzyme immobilization** : Techniques of immobilization of enzymes, factors affecting enzyme kinetics. Study of enzymes such as hyaluronidase, penicillimase, streptokinase and streptodornase, amylases and proteases etc. Immobilization of bacteria and plant cells.

Recommended Books : Refer enclosed list

III.P.2 Pharmaceutical Biotechnology Practical (75 Hours)

1. Isolation of pure culture of micro-organism from soil sample.
2. Preservation of bacterial strain.
3. Microbial limit test as per I.P. specifications.
4. Sterility testing of pharmaceutical products.

5. Microbial assay of antibiotics/vitamins/amino acids.
6. Preparation of a bacterial vaccine.
7. Demonstration of an experiment to illustrate the production of an antibiotic by fermentation.
8. Immobilization of enzymes and study of its activity.
9. Immobilization of whole cell and evaluation of their metabolic activity.
10. Experiments to illustrate microbial bio-transformation (Demonstration).

Recommended Books :

Refer enclosed list.

III.T.4 MEDICINAL CHEMISTRY-I THEORY (75 hours)

1. **Basic principles of medicinal Chemistry** : Physico-chemical aspects (optical, geometric and bioisosterism) of drug molecules and biological action. Drug-receptor interaction including transduction mechanism.
2. **Drug metabolism** : Phase I and phase II reactions, biological factors affecting drug metabolism, inducers and inhibitors of drug metabolism, significance of drug metabolism in medicinal chemistry, principles of prodrug design.
3. **Synthetic procedures of selected drugs, uses and mode of action (biochemical and molecular basis wherever applicable), structure activity relationship including physicochemical properties of the following classes of drugs :**
Sympathomimetic agents including biosynthesis and metabolism of adrenergic neurotransmitters, adrenoceptor blockers, cholinergic agents, cholinesterase inhibitors, anticholinergic agents including antispasmodics, ganglionic stimulants and blockers, neuromuscular blockers. Cardiac diseases :- antihypertensives; cardiotonics; antiarrhythmics; anticoagulants, antithrombotics, thrombolytics, antianginals, coronary vasodilators; Hypolipoproteinemic drugs, diuretics and

antidiuretics. Local anaesthetics, general anaesthetics; sedatives-hypnotics; antiepileptics; antipsychotics; antianxiety agents, central nervous system stimulants and psychodelics.

Recommended Books :

- 1) Principles of Medicinal Chemistry - by William O.Foye, T.L.Lemlee, D.A.Williams.
- 2) Wilson & Gisvold's Text books of Organic, Medicinal & Pharmaceutical chemistry.
- 3) Burger's Medicinal Chemistry by M.E. Wolfe.
- 4) Martindale - The extra Pharmacopoeia - 31st Edn. by James, E.T.Reynolds.
- 5) I.P.Ist & IInd Volume.
- 6) Principles of Medicinal Chemistry by S.S.Kadam, K.R.Mahadik & K.G.Bothra.

III.P.3 Medicinal Chemistry-I Practical (75 Hours)

1. Synthesis of selected drugs from the course content.
2. Spectral analysis of the drugs synthesized.
3. Establishing the pharmacopocial standards of the drugs synthesized.
4. Identification and estimation of drug metabolite(s) from biological fluids (Two experiments)

Recommended Books :

1. Practical Organic Chemistry - by I.A.Vogel
2. Practical Organic Chemistry - by F.G.Mann & B.C.Saunders.

III-T.5 PHARMACOGNOSY-II THEORY (75 hours)

1. **Plant Biosynthesis** : Techniques employed in the elucidation of biosynthetic pathways, shikimic acid and isoprenoid pathways, biosynthesis of tropane, quinoline hopane, quindine, opium and indole alkaloids, biosynthesis of steroidal and anthraquinone glycosides.
2. **Glycosides** : Definition, general characters and classification. Definition, general properties, occurrence chemical nature, general methods of isolation, estimation and uses of : Cardiac

glycosides, Anthracene glycosides, Saponins, Cyanogenetic glycosides, flavonoids, lactones and bitter glycosides. Study of biological sources, cultivation, collection, commercial varieties, chemical constituents, substitutes, adulterants, uses diagnostic macroscopic and microscopic features and specific chemical tests of following groups of drugs containing glycosides:

Saponins - Liquorice, ginseng, dioscorea, sarsaparilla and senega

Cardioactive sterols : Digitalis, squill, stropanthus, and thevetia

Anthraquinone : Aloe, senna, rhubarb and cascara

Others: Psoralea, ammi majus, gentian, saffron, chirata, quassia, citrus bioflavonoids (Lemon and orange peel) Solanous species : Ashwagandha

3. **Alkaloids** : Definition, general properties, chemical tests, general methods of isolation of alkaloids, Sources, diagnostic characters, chemistry, uses, substitutes, adulterants and identification tests of Tropane: belladonna, hyoscyamus, datura, dubosia, coca and withania, Quinoline and isoquinoline : Cinchona, ipecac, opium, Indole : Ergot. rauwolfia, catharanthus, nux vomica and physostigma. Imidazole : Pilocarpus Alkaloidal amines : Ephedra and colchicum. Glycoalkaloid : Solanum species.
4. **Essential oils** : Introduction, definition, general properties, chemical nature, chemical tests and classification. General methods of isolation and analysis of volatile oils. Source, diagnostic characters, chemical constituents and uses of oils of - Mentha, coriander, cinnamon, cassia, lemon peel, orange peel. lemon grass. citronella, caraway, dill, spearmint, clove, fennel, nutmeg, eucalyptus, chenopodium, cardamom. valerian, musk palmarosa, gualtheria, sandalwood.
5. **Phytochemical screening of Natural products** - General methods used for the isolation and purification of natural products. Study of chromatographic techniques as applied to natural products. Evaluation of natural products. Physical, microscopic, chemical, spectroscopic and other newer techniques.
6. **The holistic concept** of drug administration in traditional system of medicine. Studies of traditional drugs, common vernacular names, botanical sources, morphology. chemical nature of chief constituents, pharmacology, categories and common uses and marketed formulations of following indigenous drugs - Amla, Kantkari, satavari, tylophora, bhilawa, kalijiri, bach, rasna,

7. **Bioassays and other assay designs involving biological systems :** Basic principles of bioassays, experimental models and statistical design employed in biological standardization of some official bio assays.
Radioimmunoassay : Principles of radioimmunoassay with special reference to insulin and digoxin.
Enzyme linked immunoassay (ELISA) : Principles and applications of ELISA.
8. **Toxicology :** Definition, scope, development and sub-disciplines of toxicology. spectrum of toxic effects and modifying factors of toxic effects, toxicity of pesticides, toxicity of heavy metals and heavy metal antagonists, general principles of treatment of poisoning and selective antidotes of commonly occurring poisoning.
9. **Drugs acting on Respiratory System :** Bronchodilators, antitussives, expectorants, stimulants.
10. **Drugs acting on endocrine system :** Thyroid And Antithyroid agents, Hypoglycemic agents, adreno cortocoids and its antagonists, oral contraceptives.

Recommended Books :

- i) Text book of Pharmacology - by FSK Barar.
- ii) Modern Pharmacology - by Craig C.R. & Stitzel R.R.
- iii) Essentials of Pharmacology - by Crossland J. & Thomson J.H.
- iv) The Pharmacological basis of Therapeutics - Goodman and Gilman.
- v) Pharmacology - by Rang M.P. & Dale M.M.
- vi) Basic and clinical Pharmacology - by Katzung B.G.

III.P.5

Pharmacology-II

Practical (75 Hours)

1. **Pharmacological techniques :** Examination of rat vaginal smears, surgical procedures of ovariectomy, adrenalectomy and cannulation of jugular vein. Study of inotropic and chronotropic effect of drugs on frog heart. Recording of ECG of an experimental animal, antiulceractivity of pylorus ligated rats. Experimental models to study the effect of diuretics, and anti-inflammatory agents. Study of cardiac output, digitalis & C.C.F. To study the effect of changes in Ionic composition of Ringer solution.

2. **Bioassays :** Bioassay designs using various isolated preparations (acetylcholine, histamine and oxytocin) and intact preparations (Vasopressin and insulin).
3. **Experimental toxicology :** Calculation of LD50 and therapeutic index using statistical approach.

Recommended Books :-

- 1) Handbook of experimental pharmacology - by S.K.Kulkarni
- 2) Fundamentals of experimental pharmacology - by M.N.Ghosh

III.T.7 Pharmaceutical Jurisprudence & Business Management (Theory 50 Hours)

- 1) **History of pharmacy legislation in India :** Origin and nature of pharmaceutical legislation in India, its scope and objectives, reports of commissions, new drug policy and future trends.
- 2) **Study of the following with latest amendments:**
 - a) **Pharmaceutical ethics** - Principles and significance of professional ethics, critical study of code of pharmaceutical ethics drafted by PCI regarding to pharmacist in relation to his job, to his trade and to medical profession.
 - b) **Pharmacy Act 1948** - Introduction, objectives, definitions, Education Regulations and approval, registration of pharmacists, central and state councils, amendments to the pharmacy Act.
 - c) **Drugs & Cosmetics Act 1940 and Rules 1945** - Introduction, definitions, general study of the schedules with special references to the C, C1, F, G, H, P & X, salient features of the storage and labeling conditions of drugs, administration, manufacture, sales and import of drugs, provision for ayurvedic, unani drugs and cosmetics, as amended to date.
 - d) **Medicinal & toilet preparations (Excise duties) Act 1955** - Objectives, background, definitions, manufacture and warehousing of alcohol preparations, procedures, offenses and penalties, as amended to date.
 - e) **Narcotic drugs and Psychotropic Substances Act 1985 and Rules** - Introduction, objectives, definitions, prohibited and controlled operations, enforcement, manufacture, cultivation of poppy plants, sales of opium, import and export of narcotics, as amended to date.

- f) **Drugs Price Control Order** - Objectives, definitions, schedules to the order, sales prices of bulk drugs, prices and price list MAPE calculations, as amended to date.
- g) **Patent Act** - Objectives, definitions, types of patents, procedure for patenting, secrecy of certain inventions, surrender and revocation of patents, as amended to date.
- 3) **A brief study with special reference to the main provisions :** Poison Act 1919. Drugs Magic Remedies (Objectionable Advertisements) Act 1954. Medical Termination of pregnancy Act 1970 and rules 1975. Prevention of cruelty to Animals Act 1960. States shops and Establishments Act and Rules. A.I.C.T.E. Act 1987. Factories Act 1948. Minimum wages Act 1948. Consumer protection Act w.r.t. pharmaceutical services.
- 4) **Concept of Management, administrative management** (Planning, organizing, staffing, directing and controlling), entrepreneurship development, operative management (Personnel), materials production, financial, marketing, time/space, margin/moral) Principles of management (Co-ordination, communication, motivation, decision making, leadership, innovation, creativity, delegation of authority/responsibility, record keeping). Identification of key points to give maximum thrust for development and perfection.
- 5) **Pharmaceutical Marketing :**
Function, buying, selling, transportation, storage, finance, feedback, information, channels of distribution, wholesale, retail, departmental stores, multi shop & mail order business.
- 6) **Salesmanship**
Principals of sales promotion, advertising, ethics of sale, merchandising, literature, detaling, Recruitment, treaning evaluation, compensation to the pharmacist.
- 7) **Market research :**
Recruitment, treaning evaluation, compensation to the pharmacist. Prerequisites : basic information services.
- 8) **Materials Management :** A brief exposure of the basic principles of materials management, purchase, stores and inventory control (Eligibility, effience evaluation, recruitment methodology, service conditions, termination, performance evaluation,Etc.)

9) **Production Management :**

A brief exposure of the different aspects of production management (visible & invisible inputs, methodology of activities, performance evaluation, techniques, process - flow, process know - how, maintainance management)

Recommended Books :

- 1) Drugs & Pharmacy Laws in India - by Bharati H.K.
- 2) A Text Book of Forensic Pharmacy - by Mittal B.M.
- 3) Professional Pharmacy - by Schroff M.L.
- 4) Principles of Pharmaceutical Marketing - by Smith.
- 5) Production Management & Control - by Baral Nikhil.
- 6) Promotion Management - by Hegde, Copper & Balchandran.
- 7) Manufacturing Management -by Moore F.G.
- 8) Theory & Practice of Industrial Pharmacy - by Leon Lachman.
- 9) Original Laws Published by Govt.of India.

Also refer additional recommended book list enclosed, at the end of syllabus.

ADDITIONAL BOOKS RECOMMENDED

IT IS UNDER STOOD THAT THE TEACHER WOULD FOLLOW AND RECOMMEND LATEST EDITION OF THE BOOK, HENCE THE SPECIFIC EDITION AND YEARS OF PUBLICATION ARE OMITTED.

1. Pharmaceutics (including Pharmaceutical Microbiology and Pharmaceutical Biotechnology)

- 01) A Owunwone, Handbook of Radiopharmaceuticals, Narosa Publishing House, New Delhi.
- 02) A Pecile and A Resigno Pharmacokinetics, Plenum Press, NY.
- 03) Aiba Suichi, Humphrey and Millis, Biochemical Engineering, University of Tokyo Press.
- 04) Allwodd M C and Fell J T, Textbook of Hospital Pharmacy, Blackwell Scientific Publications, Oxford.
- 05) Ansel H.C., Introduction to Pharmaceutical Dosage Forms, K M Varghese & Co., Bombay.
- 06) Aulton M E Pharmaceutics - The Science of Dosage Form Design, ELBS/Churchill Livingstone.
- 07) Avis K E, Lachman L and Lieberman H A, Marcel Dekker Inc. Pharmaceutical Dosage Forms; Parenteral Medications, Vols. 1 & 2, NY.
- 08) Badger W L and Banchemo J T, Introduction to Chemical Engineering McGraw Hill International Book Co., London.
- 09) Banker G S and Rhode C T Modern Pharmaceutics, Marcel Dekker Inc., NY.
- 10) Bean H S, Beckett A H, and Carless A H Advances in Pharmaceutical Sciences, Vol 1-4 Academic Press, London.
- 11) Bergey's Manual of Determinative bacteriology.
- 12) Bharati H K, Drugs and Pharmacy Laws in India, Sadhana Mandir, Indore.
- 13) Bolton Sanford, Pharmaceutical Statistics, Marcel Dekker Inc NY.
- 14) British National Formulary, No.25 Pub jointly by British Medical Association and Royal Pharmaceutical Society of Great Britain.
- 15) British Pharmacopoeia, Her Majesty's Stationery Office, University Press, Cambridge.
- 16) Brock T D, Madigen M T Biology of Micro-organism Prentice Hall, New Jersey USA.

- 17) Carter S J, Cooper and Gunn's Dispensing for Pharmaceutical Students, CBS Publishers, Delhi.
- 18) Carter S J, Cooper and Gunn's Tutorial Pharmacy CBS Publishers, Delhi.
- 19) Carstensen J T, Drug Stability, Marcel Dekker Inc. NY.
- 20) Chittion HM and Witcofski RL, Nuclear Pharmacy, Lea and Febiger, Philadelphia.
- 21) Connors K A, Amidon G L and Stella V J, Chemical Stability of Pharmaceuticals, John Wiley & Sons NY.
- 22) Davis, Dulbetco, Eisen Microbiology.
- 23) Dittert LW Sprowl's American Pharmacy, J & B Lippincott Co, Philadelphia.
- 24) C G Brown, Unit operations (Indian Ed) Asia Publishing House, Bombay.
- 25) Giladi M & Perrier D, Pharmacokinetics, marcel Dekker Inc NY.
- 26) Remington's, the science and Practice of Pharmacy, Mack Publishing Co. Easton, Pemsybrania.
- 27) Hassan Willman E, Hospital Pharmacy, Lea & Febiger, Philadelphia.
- 28) Hoover J.E. Dispensing of Medication, ed Mack Publishing Co., Easton PA.
- 29) Hugo and Russel, Pharmaceutical Microbiology; Blackwell Scientific Publication, Oxford.
- 30) Jellinek JS, Formulation and Function of Cosmetics, John Wiley & Sons, NY.
- 31) Jain N K A Text Book of Forensic Pharmacy, Vallabh Prakashan, Delhi.
- 32) Juliano R L, Drug Delivery Systems, Oxford University Press, Oxford.
- 33) KacChensney J C Packaging of Cosmetics and Toiletries, Newness - Butterworth, London.
- 34) Kielslich K, Ed Biotechnology Vol 6a, Verleg Chemie, Switzerland.
- 35) Lachman L, Lieberman H A and Kanig J L, The Theory and Practice of Industrial Pharmacy, Lea & Febiger, Philadelphia.
- 36) Lea & Fibiger, "Milo Gibaldi, Biopharmaceutics & Clinical Pharmacokinetics", Philadelphia.
- 37) Lea & Fibiger, Pharmaceutical Dosage, Forms and Drug Delivery Systems, Philadelphia.
- 38) Lewin Benjamin, Gene V Microbiology.

- 39) Liberman H A, Rieger M M and Banker G S, "Pharmaceutical Dosage Forms; Dispensing Systems", Vols.1 & 2, Marcel Dekker Inc., NY.
- 40) Liberman H A, Lachman L & Schwartz J B Pharmaceutical Dosage Forms : Tablets.", Vols.1-3, Marcel Dekker Inc., NY.
- 41) Loftus B T and Nash Robert, Pharmaceutical Process Validation, Marcel Dekker Inc., NY.
- 42) MaCabe W L and Smith J C, Unit Operations of Chemical Engineering McGraw Hill International Book Co., London.
- 43) Martin A N, Arthur Cammarata, James Swarbrick, Physical Pharmacy, K M Verghese & Co., Bombay.
- 44) Martin E.W. Dispensing of Medication, Mack Publishing Co., Eastern PA.
- 45) Martindale : The Extra Pharmacopoeia, ed J E F Reynolds, The Pharmaceutical Press, London.
- 46) Merchant H.S and Qadry J.S, Text Book of Hospital Pharmacy, B.S. Shah Prakashan, Ahmedabad.
- 47) Mittal B.M. A Text Book of Forensic Pharmacy, National Book Depot, Calcutta.
- 48) Notari R E, Biopharmaceutics and Pharmacokinetics - an Introduction Marcel Dekker Inc NY.
- 49) Parry R H & Chilton C H Chemical Engineers Handbook, McGraw Kogakusha Ltd.
- 50) Pepler, Microbial Technology, Vol I & II.
- 51) Pharmacopoeia of India, published by the Controller of Publications, Delhi, 1st ed - 1966 - 1985 4th ed-1996.
- 52) Prescott L M, Jarely G P, Klein D A, Microbiology, WmC Borown Publishers, Oxford.
- 53) Prescott and Dunn, Industrial Microbiology, McGraw Hill Book Company Inc.
- 54) Rawlins EA Bentley's Textbook of Pharmaceutics ELBS Bacilliere Tindall.
- 55) Ridgway K Hard Capsules, The Pharmaceutical Press, London.
- 56) Ritschel W A, Handbook of Basic Pharmacokinetics, Drug Intelligence Publications, Hamilton.
- 57) Robinson JR & Lee Vincent, Controlled Drug Delivery : Fundamentals & Applications, Marcel Dekker Inc., NY.
- 58) Rowland M, and Tozer T.N., Clinical Pharmacokinetics, Lea & Febiger, NY.
- 59) Sagarin & balsam M S Cosmetic Science and Technology, Vol 1-3, 2nd ed John Wiley & Sons, NY.
- 60) Salle A J, Fundamental Principles of bacteriology.

- 61) Schroff M L, Professional Pharmacy, Five Star Enterprises, Calcutta.
- 62) Shotton E and Ridgaway K, Physical Pharmaceutics Oxford University Press, London.
- 63) Standury PF & Whitaker A. Principles of Fermentation Technology Pergamon Press, Oxford.
- 64) Stanier R Y, Ingraham, General Microbiology, Wheellis and Painter.
- 65) Stoklosa MJ, Pharmaceutical Calculation, Lea & Febiger, Philadelphia.
- 66) Sykes G, Disinfection and sterilization, II ed.
- 67) The Merck Index, Mark & Co., Inc NJ.
- 68) The British Pharmaceutical Codex, The Pharmaceutical Press, London.
- 69) The United States Pharmacopoeia, The United States Pharmacopoeial Convention, Mack Pub.Co, Easton.PA.
- 70) Thomssen S G, Modern Cosmetics, Universal Publishing Corporation, Bombay.
- 71) Turco S and King R E, Sterile Dosage Forms Lea and Febiger, Philadelphia.
- 72) Wanger J G, Fundamentals of Clinical Pharmacokinetics, Drug Intelligence Publications, Hamilton.
- 73) Wagner J G, Pharmacokinetics for the Pharmaceutical Scientist, Technomic Publishing AG Basel, Switzerland.
- 74) Ward OP Fermentation Technology, Principles, Processes & Products Open University Press, Milton Keynes, UK.
- 75) Winter ME, Basic Clinical Pharmacokinetics, Applied Therapeutics, Inc San Fransisco.
- 76) Welling Peter G and Tse Francis L S, Pharmacokinetics, Marcel Dekke Inc., NY.
- 77) Welling S H, IV, Good Manufacturing Practices for Pharmaceuticals Marcel Dekker Inc NY.
- 78) Zatz Joel L, Pharmaceutical Calculations, John Wiley & Sons, NY.

II. PHARMACOGNOSY :

- 01) Atal C K and Kapur B M, Cultivation and utilization of Medicinal plants, RRL, Jammu.
- 02) Barz W., Reinhard E and Zenk M H, Plant Tissue Culture and Its Biotechnological Application, Springer, Berlin.
- 03) Brain K R and Turner T D the Practical Evaluation of Phytopharmaceuticals, Wright - Scientecnica, Bristol.
- 04) Chadha K L and Gupta R Advances in Horticulture - Vol.

- II- Medicinal and Aromatic Plants, Malhotra Publishing House, New Delhi.
- 05) Chopra R.N., Nayar S L and Chopra, I C, Glossary of Indian Medicinal Plants, C S I R, New Delhi.
 - 06) Clarke ECG, Isolation and Identification of Drugs, The Pharmaceutical Press, London.
 - 07) De Mayo P, The Chemistry of Natural Products, 2-3, Interscience, New York.
 - 08) Export Potential of Selected Medicinal Plants, prepared by Basic Chemicals, Pharmaceuticals and Cosmetic Export Promotion Council, Bombay, and other reports.
 - 09) Fahn A, Plant Anatomy, 3rd Ed., Pergamon Press, Oxford.
 - 10) Faulkner D J and Fenical W H, Marine Natural Products Chemistry (NATO Conference Series 4), Plenum Press, New York.
 - 11) Gamborg O L and Wetter L R, Plant Tissue Culture Methods, National Research Council of Canada, Saskatchewan.
 - 12) Gibbs R Darneley, Chemotaxonomy of Flowering Plants, 4 Volumes, McGill University Press.
 - 13) Guenther, E, The Essential Oils - 4 D Van Norstand Co Inc., New York.
 - 14) Harbone J B, Biochemistry of Phenolic Compounds, Academic Press, New York.
 - 15) Harbone JB, Phytochemical Methods, Chapman and Hall, International Edition, London.
 - 16) Henry T A, The Plant Alkaloids, McGraw Hill, New York.
 - 17) Kokate C K, Practical Pharmacognosy, Vallabh Prakashan, Delhi.
 - 18) Kokate C K, Purohit A P and Gokhale S B, Pharmacognosy (Degree) Nirali Prakashan, Pune.
 - 19) Manitto P, The Biosynthesis of Natural Products, Ellis Horwood, Chichester.
 - 20) Manske R H F, The Alkaloids, Academic Press, New York.
 - 21) Martindale, The Extra Pharmacopoeia, Pharmaceutical Society of Great Britain, London.
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ENVIRONMENTAL STUDIES**Total Marks : 100****PART-A****SHORT ANSWER PATTERN****25 Marks****1. The Multidisciplinary nature of environmental studies**

- . Definition, scope and importance.
- . Need for public awareness.

(2 lecture hours)

2. Social Issues and the Environment

- . From Unsustainable to Sustainable development
- . Urban problems related to energy
- . Water conservation, rain water harvesting, watershed management
- . Resettlement and rehabilitation of people; its problems and concerns. Case studies.
- . Environmental ethics : Issues and possible solutions.
- . Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case studies.
- . Wasteland reclamation.
- . Consumerism and waste products.
- . Environment Protection Act.
- . Air (Prevention and Control of Pollution) Act.
- . Water (Prevention and Control of Pollution) Act.
- . Wildlife Protection Act.
- . Forest Conservation Act.
- . Issues involved in enforcement of environmental legislation.
- . Public awareness.

(7 lecture hours)

3. Human Population and the Environment

- . Population growth, variation among nations.
- . Population explosion - Family Welfare Programme.
- . Environment and human health.
- . Human Rights.
- . Value Education.
- . HIV / AIDS.
- . Women and Child Welfare.
- . Role of Information Technology in Environment and human health.
- . Case Studies.

(6 lecture hours)

PART-B**ESSAY TYPE WITH INBUILT CHOICE****50 Marks****4. Natural resources :**

- . **Renewable and non-renewable resources :**
 - . Natural resources and associated problems.
 - Forest resources : Use and over exploitation, deforestation, case

studies. Timber extraction, mining, dams and their effects on forests and tribal people.

- Water resources : Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems.
- Mineral resources : Use and exploitation, environmental effects of extracting and using mineral resources, case studies.
- Food resources : World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer - pesticide problems, water logging, salinity, case studies.
- Energy resources : Growing energy needs, renewable and non renewable energy sources, use of alternate energy sources, Case studies.
- Land resources : Land as a resource, land degradation, man induced landslides, soil erosion and desertification.
- . Role of an individual in conservation of natural resources.
- . Equitable use of resources for sustainable lifestyles.

(8 lecture hours)

5. Ecosystems

- . Concept of an ecosystem.
- . Structure and function of an ecosystem.
- . Producers, consumers and decomposers.
- . Energy flow in the ecosystem.
- . Ecological succession.
- . Food chains, food webs and ecological pyramids.
- . Introduction, types, characteristic features, structure and function of the following ecosystem :-
 - Forest ecosystem
 - Grassland ecosystem
 - Desert ecosystem
 - Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)

(6 lecture hours)

6. Biodiversity and its conservation

- . Introduction - Definition : genetic, species and ecosystem diversity.
- . Biogeographical classification of India.
- . Value of biodiversity : consumptive use, productive use, social, ethical, aesthetic and option values.
- . Biodiversity at global, National and local levels.
- . India as a mega-diversity nation.
- . Hot-spots of biodiversity.
- . Threats to biodiversity : habitat loss, poaching of wildlife, man-wildlife conflicts.
- . Endangered and endemic species of India.
 - . Conservation of biodiversity : In-situ and Ex-situ conservation of biodiversity.

(8 lecture hours)

7. Environmental Pollution

- . Definition
 - . Causes, effects and control measures of :-
 - Air pollution
 - Water pollution
 - Soil pollution
 - Marine pollution
 - Noise pollution
 - Thermal pollution
 - Nuclear hazards
 - . Solid Waste Management : Causes, effects and control measures of
 - . Role of an individual in prevention of pollution.
 - . Pollution case studies.
 - . Diaster management : floods, earthquake, cyclone and landslides.
- (8 lecture hours)

PART-C**ESSAY ON FIELD WORK****25 Marks****8. Field work**

- . Visit to a local area to document environmental assets - river / forest / grass land / hill / mountain
 - . Visit to a local polluted site - Urban / Rural / Industrial / Agricultural
 - . Study of common plants, insects, birds.
 - . Study of simple ecosystems - pond, river, hill slopes, etc.
- (5 lecture hours)

- (Notes : i) Contents of the syllabys mentioned under paras 1 to 8 shall be for teaching for the examination based on Annual Pattern.
- ii) Contents of the syllabys mentioned under paras 1 to 4 shall be for teaching to the Semester commencing first, and
- iii) Contents of the syllabys mentioned under paras 5 to 8 shall be for teaching to the Semester commencing later.

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(M) Magazine**(R) Reference****(TB) Textbook**

SANT GADGE BABA AMRAVATI UNIVERSITY, AMRAVATI
*** ORDINANCE NO. 42 OF 2005**

Examination in Environmental Studies leading to Bachelor Degree, Ordinance, 2005

Whereas it is expedient to frame an Ordinance relating to Examination in Environmental Studies leading to Bachelor Degree level, hereinafter appearing, the Management Council is hereby pleased to make the following Ordinance.

1. This Ordinance may be called "Examination in Environmental Studies leading to Bachelor Degree, Ordinance, 2005."
2. This Ordinance shall come into force from the Academic session 2005-06.
3. In this Ordinance and in other ordinances relating to the examination, unless there is anything repugnant in the subject or context :-
 - (i) "Academic session" means a session commencing on such date and ending with such date of the year following as may be appointed by the Management Council.
 - (ii) "Admission to an examination" means the issuance of an admission card to a candidate in token of his having complied with all the conditions laid down in the relevant ordinance, by a competent officer of the University.
 - (iii) "Applicant" means a person who has submitted an application to the University in the form prescribed for admission to an examination.
 - (iv) "Candidate" means a person who has been admitted to an examination by the University.
 - (v) "Regular Candidate" means an applicant who has applied for admission to a University examination through an affiliated college, Department or Institute in which he/she has prosecuted a regular course of study.
 - (vi) "Examinee" means a person who presents himself/herself for an examination to which he/she has been admitted.
 - (vii) "Examination" means an examination prescribed by the University under the relevant Ordinance.
 - (viii) "External Candidate" means a candidate who is allowed to take a University examination in accordance with the provision of Original Ordinance No. 151.

- (ix) "Non-Collegiate Candidate" means a candidate who is not a collegiate candidate.
 - (x) An "Ex-student" is a person who having once been admitted to an examination of this University, is again required to take the same examination by reason of his failure or absence thereat and shall include a student who may have joined a college, Department or Institute again in the same class.
 - (xi) "Bachelor Degree Examination" means an examination leading to Bachelor Degree of the University.
 - (xii) "Previous Year" means a year following by final year of Bachelor Degree.
4. Save as otherwise specifically provided, the conditions prescribed for admission to the examination under this Ordinance shall apply to all persons who wish to take the examination to the Degrees of the University mentioned in para 5 below.
 5. The conditions prescribed for admission to examination under this Ordinance shall apply to following degrees of the University :-
 - 1) Bachelor of Arts
 - 2) Bachelor of Performing Arts
 - 3) Bachelor of Fine Arts
 - 4) Bachelor of Mass Communication
 - 5) Bachelor of Social Work
 - 6) Bachelor of Commerce
 - 7) Bachelor of Business Administration
 - 8) Bachelor of Science
 - 9) Bachelor of Computer Science
 - 10) Bachelor of Computer Applications
 - 11) Bachelor of Pharmacy
 - 12) Bachelor of Science (Home Science)
 - 13) Bachelor of Technology (Cosmetics)
 - 14) Bachelor of Engineering
 - 15) Bachelor of Engineering (Part Time) (Civil)
 - 16) Bachelor of Textile
 - 17) Bachelor of Technology (Chemical Technology)
 - 18) Bachelor of Technology (Chemical Engg.)
 - 19) Bachelor of Architecture, and
 - 20) Bachelor of Laws (Five Year Course)
 6. i) Environmental Studies shall be a compulsory subject for a previous year examination of the following Bachelor Degrees of the University,
 - 1) Bachelor of Arts

- 2) Bachelor of Performing Arts
 - 3) Bachelor of Fine Arts
 - 4) Bachelor of Mass Communication
 - 5) Bachelor of Social Work
 - 6) Bachelor of Commerce
 - 7) Bachelor of Business Administration
 - 8) Bachelor of Science
 - 9) Bachelor of Computer Science
 - 10) Bachelor of Computer Applications
 - 11) Bachelor of Pharmacy
 - 12) Bachelor of Science (Home Science)
 - 13) Bachelor of Technology (Cosmetics)
 - 14) Bachelor of Engineering (Part Time) (Civil)
- ii) Environmental Studies shall be a compulsory subject for IIIrd & IVth Semester of the following Bachelor Degrees of the University,
- 1) Bachelor of Engineering
 - 2) Bachelor of Textile
 - 3) Bachelor of Technology (Chemical Technology)
 - 4) Bachelor of Technology (Chemical Engineering)
 - 5) Bachelor of Architecture, and
- iii) Environmental Studies shall be a compulsory subject for Vth & VIth Semester of the Degree of Bachelor of Laws (Five Year Course)
- iv) Students admitted to Second Year/Third Year/IVth Semester/ VIth Semester of various degree examination courses in different Faculties in the academic session 2005-06 thereafter shall have to appear for examination in the subject Environmental Studies.
7. The main examination leading to Environmental Studies shall be held in Summer and supplementary examination in Winter every year, at such places and on such dates as may be appointed by Board of Examinations.
Explanation:- Examination shall be conducted on the basis of one common question paper for all Bachelor Degree Examination courses irrespective of annual or semester pattern.
8. Scope of the subject for annual pattern examination and or semester pattern examination shall be as provided under the syllabus.
9. Common question paper for all courses covered under this Ordinance alongwith answer books shall be supplied by the University to the Colleges, Departments and Institutes for conducting the examination of the subject.
10. Valuation of the answer books relating to this subject shall be done at

College/Department/Institution level only. Remuneration for valuation of answer books shall not be paid by the University.

Provided that prescribed evaluation fee for evaluation of each answer book/s of an external examinees appeared from the examination centre shall be paid to each examination centre.

11. It shall be obligatory on the part of the College/Department/Institute to submit candidate wise following information to the University on or before the date as may be prescribed by the University :-

Sr. No.	Grade/Category	Marks secured
1.	“A”	- 60 and above
2.	“B”	- 45 to 59
3.	“C”	- 35 to 44
4.	“D”	- 25 to 34
5.	“Fail”	- 24 and below
6.	“Absent”	

12. For the purposes of teaching, learning and examination, the Committee consisting of three teachers shall be appointed by the Principal/ Head of the Department/Head of the Institution under his/her Chairmanship/ Chairpersonship. While appointing three teachers on the said committee, the Principal shall take care that the teachers to be appointed on the committee, if necessary, shall be from different faculty.
13. i) Duration of theory examination of this subject shall be three hour.
ii) For all Bachelor Degree examinations, common question paper of 100 marks shall be provided by the University.
iii) Distribution of these 100 marks shall be as follows :-
- | | | |
|---|---|----------|
| a) Part-A, Short Answer Pattern | - | 25 Marks |
| b) Part-B, Essay type with inbuilt choice | - | 50 Marks |
| c) Part-C, Essay on Field Work | - | 25 Marks |
14. Medium of instruction shall be English or Marathi or Hindi. Question paper shall be supplied in English and Marathi and Hindi. A candidate shall have option to write answers in English or Marathi or Hindi.
15. Examination for the subject Environmental Studies shall be compulsory for external candidates appearing as a fresh candidate at Winter and/or summer examination.
16. For teaching of the subject, there shall be atleast two hour per week.

For teaching the subject to the regular candidates, a full time approved teacher of the University and or a person having Postgraduate Degree in any faculty with second class shall be considered eligible.

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17. For teaching of the subject, additional fee to be charged to regular candidate shall be as prescribed by the University.
18. Every College/ University Teaching Department shall charge additional fee of Rs. 100/- to every Student of the subject Environmental studies. Out of this Rs. 100/-, the College/University Teaching Department shall have to pay Rs. 25/- to the University as an examination fee of each candidate for the subject environmental studies.
19. The Grade secured by an examinee in the examination of this subject shall not be considered for providing the facility of A.T.K.T. in next higher class.
20. The provisions of Ordinance No. 18/2001 shall not be applicable for securing a grade or higher grade in the examination of this subject.
21. Result of the Final Year of the respective Degree shall not be declared of an examinee unless he/she secures any one of the grade in the examination of subject.
- Provided an examinee admitted to Five Year LL.B. course desiring not to continue his/her education beyond Sixth Semester of the said course shall have to secure any one of the grade in the examination of the subject otherwise his/her result of Sixth Semester for awarding B.A. degree shall not be declared.
22. Certificate shall be issued, to the successful examinees in the subject Environmental Studies, after the examination.

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