

**Final B.Pharmacy**

Prospectus No. 2014147

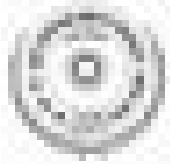
Semester-VII Examination - Winter-2013,

Semester-VIII Examination - Summer-2014

**संत गाडगे बाबा अमरावती विद्यापीठ**  
**SANT GADGE BABA AMRAVATI UNIVERSITY**

**आयुर्विज्ञान विद्याशाखा**  
**(FACULTY OF MEDICINE)**

PROSPECTUS OF  
THE DEGREE OF  
BACHELOR OF PHARMACY (FOUR YEAR &  
EIGHT SEMESTER DEGREE COURSE)  
SEMESTER-VII EXAMINATION, WINTER-2013  
SEMESTER-VIII EXAMINATION, SUMMER-2014



2013

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Published by  
**Dineshkumar Joshi**  
Registrar,  
Sant Gadge Baba  
Amravati University  
Amravati - 444 602

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**(Prospectus No.2014147)**

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**Syllabus prescribed for B.Pharm. Semester-VII  
(Implemented from the Academic Session 2013-14)**

**SEMESTER-VII**

Subject Code	Subject	Maximum Marks		Total Marks
		Theory	Practical	
7.1	Pharmaceutics-V	80	80	160
7.2	Medicinal Chemistry-III	80	80	160
7.3	Pharmacology-III	80	80	160
7.4	Pharmacognosy-V	80	80	160
7.5	Pharmaceutical Analysis-III	80	80	160
7.6	Pharmaceutical Jurisprudence	80	0	80
7.7	Seminar (One per each Student)	80	0	80
Total				960

**Subject code: T-7.1**

**Subject : Pharmaceutics – V**

**THEORY**

**45 Hours (3 hrs. /week)**

**SECTION-A**

**1. Capsules:**

Advantages and disadvantages of capsule dosage form, material for production of hard gelatin capsules, size of capsules and method of capsule filling. Soft gelatin capsule, capsule shell and capsule content, importance of base absorption, minim/gm factors in soft capsules, quality control, stability testing and storage of capsule dosage forms.

**2. Tablets**

a) Classification of different types of tablets, tablet excipients, granulation technology on large scale by various techniques, physics of tablet making, different types of tablet compression machinery and equipment employed, processing problems of tablets and evaluation of tablets.

b) **Coating of tablets:** Types of coating, film-forming materials, formulation of coating solution, equipments for coating, film defects and evaluation of coated tablets.

**SECTION-B**

**3. Parenteral products**

- Preformulation factors, routes of administration, water for injection, pyrogenicity, nonaqueous vehicles, isotonicity and methods of its adjustment.
- Formulation details, containers and closures and selection.
- Prefilling treatment, washing of containers and closures, preparation of solution and suspension, filling and closing of ampoules, vials, infusion fluids, lyophilisation and preparation of sterile powders, equipment for large-scale manufacture and evaluation of parenteral products.
- Aseptic Techniques: Source of contamination, methods of prevention, design of aseptic area, laminar flow bench services and maintenance.

**4. Packaging materials for pharmaceutical products:**

Packaging components, types, specifications and methods of evaluation, stability aspect of packaging, packaging equipments, factors influencing choice of containers, legal and other official requirements for containers, package testing.

**5. Good Manufacturing practices**

**Subject code: P-7.1**

**Subject : Pharmaceutics – V**

**PRACTICAL**

**45 Hours (3 hrs. /week)**

- Experiments to illustrate preparation stabilization, physical and biological evaluation of pharmaceutical products like powders, capsules, tablets, parenterals, etc.
- Coating of tablets - sugar coating and film coating.
- Evaluation of materials used in pharmaceutical packaging.
- Evaluation of packages- containers & closures.
- To study influence of pH, salt form & Pharmaceutical adjuvants on dissolution of drugs.

**BOOKS RECOMMENDED:**

- Ansel, H.C. Introduction to Pharmaceutical Dosage Forms, K M Varghese & Co., Mumbai, latest edition.
- Lachman L, Liberman H.A. & Kanig J.L., The Theory & Practice of Industrial Pharmacy, Lea & Febiger, Philadelphia.
- Beans, H.S., Beckett A.H. & Carless, Advances in Pharmaceutical Science
- Pharmaceutical dosage forms: Tablets volume 1 & 3 by Liberman and Lachman

5. Pharmaceutical dosage forms: Parenteral medications Vol-1, 2 by Liberman and Lachman.
6. Bentley's Textbook of Pharmaceutics.
7. Remington's Pharmaceutical Sciences (RPS).
8. Modern Pharmaceutics by Banker and Gilberts.
9. Hard Capsules by Ridgway. K. Pharmaceutical Press, London.
10. Aulton M.E., Pharmaceutics ó The Science of Dosage form Design, ELBS/Churchill Livingstone.
11. Avis K E, Lachman L and Lieberman H A, Marcel Dekker Inc. Pharmaceutical Dosage Forms; Parenteral Medications, Vols. 1 & 2, NY.
12. Bean H S, Beckett A H, and Carless A H Advances in Pharmaceutical Sciences, Vol 1-4 Academic Press, London.
13. Carter S J, Cooper and Gunn's Dispensing for Pharmaceutical Students, CBS Publishers, Delhi.
14. Carter S J, Cooper and Gunn's Tutorial Pharmacy CBS Publishers, Delhi.
15. Remington's, the science and Practice of Pharmacy, Mack Publishing Co. Easton, Pennsylvania.
16. Sagarin & Balsam M.S., Cosmetic Science and Technology, Vol-1-3. 2nd ed. John Wiley sons, NY.
17. Stoklosa MJ, Pharmaceutical calculation, Lea and Febiger, Philadelphia.
18. Thomssen S.G., Modern Cosmetics, Universal Publishing Corporation, Bombay.
19. Harry's Cosmeticology.

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**Subject code: T-7.2****Subject : Medicinal Chemistry-III****THEORY****45 Hours (3 hrs. /week)****Section A**

1. **History, development, classification, recent development, mode of action (biochemical and molecular basis wherever applicable), SAR, IUPAC and synthesis of drugs of following classes**

Cardiac diseases: antihypertensives, cardiotonics, antiarrhythmics, anticoagulants, antithrombotics, thrombolytics, antianginals, coronary vasodilators, Hypolipoproteinemic drugs, diuretics and antidiuretics.

**Section B**

**History, development, classification, recent development, mode of action, SAR, IUPAC of following class and synthesis of drugs of following classes**

Local anaesthetics, Sedative-hypnotics, antiepileptics, antipsychotics, antianxiety agents, central nervous system stimulants and psychodelics, Steroids and related drugs, Immunomodulators.

**Subject code: P-7.2****Subject : Medicinal Chemistry –III****PRACTICAL****45 Hours (3 hrs. /week)**

- 1) Laboratory scale preparation by conventional / microwave synthesis of selected drugs from course content and characterization by melting point / boiling point / thin layer chromatography / ultra-violet spectroscopy / IR spectroscopy
- 2) Establishing the pharmaceutical standards of drug synthesized

**Books Recommended**

1. J. N. Delgado and W. A. R. Remers, Eds, Wilson and Giswold's Textbook of Organic, Medicinal and Pharmaceutical Chemistry, J. Lipponcott Co. Philadelphia.
2. W. C. Foye, Principles of Medicinal Chemistry, Lea & Febiger, Philadelphia.
3. H. E. Wolff, Ed. Burger's Medicinal Chemistry, John Wiley & Sons, New York Oxford University Press, Oxford.
4. Daniel Lednicer, Strategies for Organic Drug Synthesis & Design, John Wiley & sons, USA.
5. B. N. Ladu, H. G. Mandel & E. L. Way, Fundamental of Drug Metabolism & Disposition, William & Wilkins co., Baltimore.
6. I. L. Finar, Organic Chemistry, Vol. I & II, ELBS/ Longman, London.
7. Vogel's Text book of Practical Organic Chemistry, ELBS/ Longman, London
8. Mann & Saunder, Practical Organic Chemistry, Orient Longman, London.
9. Shriner, Hermann, Morrill, Curtin & Fuson, The Systematic Identification of Organic Compounds, John Wiley & Sons. USA.
10. R. M. Silverstein, G. Claytron Bassel's, T. C. Movvill, Spectrometric identification of Organic compounds, John Wiley & Sons, USA

**Subject code: T-7.3**

**Subject : Pharmacology-III**

**THEORY**

**45 Hours (3 hrs. /week)**

**SECTION-A**

1. **Immunopharmacology:** Pharmacology of immunosuppressants and stimulants.
2. **Drug Acting on Blood and Blood forming agent:** Coagulants and anti-coagulants, Haemopoietics, Thrombolytics and anti platelet, plasma expanders.
3. **Cardiovascular system:** Anti-hypertensive, Anti anginal and other anti-ischemic drugs, Anti arrhythmic drugs, Cardiac glycoside and Drugs used for therapy of Congestive Cardiac Failure, Drugs used in Hyperlipidemia.

**SECTION-B**

4. **Drug acting on Kidney:** Diuretics and Anti-diuretics.
5. **Gastro-Intestinal system:** Anti-Ulcer drugs and Antacids, Laxative and purgatives, Emetic and Anti emetics agents.
6. **Pharmacology of drugs acting on Nervous System:** General considerations (Introduction), Skeletal muscle relaxants, Local and general anesthetics, Pharmacology of Alcohol, Drugs used in Parkinsonism, Sedatives and hypnotics, CNS stimulants, Anti-Convulsants, Psychiatric disorders and their treatment (Antipsychotics, anxiolytics and antidepressants),.

**Subject code: P-7.3**

**Subject : Pharmacology-III**

**PRACTICAL**

**45 Hours (3 hrs. /week)**

**I] Various pharmacological techniques (In vitro) on isolated tissue preparation of animals**

1. To establish Dose Response Curve of suitable agonists using suitable animal tissue preparations. (Like uterus, vas deferens, ileum, colon, trachea, smooth muscle etc.)
2. To study the shift in D.R.C by Antagonists for above agonists-covering concept of reversible and irreversible antagonism.

**II] Pharmacological techniques (Invivo study)**

3. Antisecretory and ulceroprotective effect of cimetidine or other related drugs in pylorus ligated rats.
4. To study the effect of drugs on Grip strength in animals by Pole climbing/ simple rope tides method.

5. To determine the LD50 value of important drug/drugs given official in I.P.
6. To study the experimental models for diuretics.
7. To study the experimental models anxiolytic.

**III] Surgical techniques**

8. To study the various surgical techniques like adrenalectomy, ovariectomy, Pancrectomy etc.

**Note**

- Suitable animal preparation- Any experiment suitable to demonstrate the concept- It could be either in-vivo or in-vitro, The animal selected may be mice, rat, rabbit, guinea pig as admissible as per prevailing Government/CPCSEA guidelines. In case of in-vitro preparations- any tissue preparation from above animals or various tissues from goat may be obtained from slaughter house/ abattoir /butcher shop.
- Agonist- Any agonist that can exhibit activity using the given preparation as reported in standard books/journals may be selected e.g.-Adrenaline and other catecholamines, Acetyl Choline, Histamine, Serotonin, oxytocin etc.
- Antagonist- Any antagonist that can exhibit blocking activity of above mentioned agonists in the given preparation as reported in standard books/journals may be selected.

**Recommended Books**

1. Goodman Gilman, The Pharmacological basis of therapeutics. Mc-graw Hill New Delhi.
2. Foster R.W. Basic Pharmacology, Arnold, New Delhi.
3. Stahl S. M.. Essential Psychopharmacology Cambridge University Press New Delhi.
4. Dipiro J.L. Pharmacotherapy Handbook. Tata McGraw Hill New Delhi.
5. Official books - Indian Pharmacopoeia, British Pharmacopoeia, United States Pharmacopoeia.
6. Tripathi K.D. Essentials of medical Pharmacology Jaypee New Delhi.
7. Barar F.S.K. Essentials of Pharmacotherapeutics, S. Chand & Company Ltd. New Delhi.
8. Rang H.P., Dale M.M. et. al. Pharmacology. Churchill Livingstone, New Delhi.
9. Katzung B.G .Basic & Clinical Pharmacology Mc-graw Hill, New Delhi.
10. Lewisø Pharmacology. Churchill Livingstone London.

11. Harvey R.A., Champe P.C. Lippincott's Illustrated Reviews- Pharmacology. Lippincott Williams & Wilkins, Pennsylvania.
12. Ghosh M.N. Fundamentals of Experimental pharmacology. Hilton & Company Kolkata.
13. Vogel G.H. Drug discovery and evaluation. Springer Germany.
14. Goyal R.K. Practicals in pharmacology. B.S. Shah Prakashan Ahmedabad.
15. Kulkarni S.K. Handbook of Experimental Pharmacology. Vallabh Prakashan. New Delhi.
16. Pillai, K. K. Experimental Pharmacology. CBS Publishers New Delhi.
17. Grover, J.K. Experiments in Pharmacy and Pharmacology Vol-II. CBS publishers New Delhi.
18. Perry W. L. M. Pharmacological Experiments on Isolated preparations. E.&S. Livingstone, London.
19. Kasture S.B. Text book of Experimental Pharmacology, Career Publication Nashik.
20. Official books - Indian Pharmacopoeia, British Pharmacopoeia, and United States Pharmacopoeia.
21. Related research papers from various journals.

**Subject code: T-7.4****Subject : Pharmacognocny-V****THEORY****45 Hours (3 hrs. /week)****SECTION-A**

1. Application of column, paper and thin layer chromatographic techniques for the isolation of phytopharmaceuticals. Application of chromatographic techniques in evaluation of herbal drugs with reference to withanolides, andrographolides, sennosides, gymnemic acid, medicagosides/ascoticoside, Ephedrine.
2. Isolation Techniques: General methods used for the isolation and characterization of alkaloids, lipids, glycosides, proteins, volatile oils, bioflavonoids, steroids, terpenoids and resins. Isolation, characterization and estimation of: Caffeine, Eugenol, Rutin, Solanine, Piperine, Tannic acid, Diosgenin, Hesperidine, Berberine, Calcium sennosides, Rutin, Glycyrrhizin, Menthol, Ephedrine, Quinine, Andrographolides, Guggul lipids and Katha industry in India.
3. Plant Biotechnology: Historical developments of plant tissue culture, types of cultures, nutritional requirements, growth & maintenance.

Callus, protoplast, hairy root and cell suspension culture. Production of secondary metabolites, viz. Shikonin and Taxol. Biotransformation, immobilization of cells and enzymes. Gene transfer in plants, application of plant biotechnology. Application of plant tissue culture in Pharmacognosy.

**SECTION-B**

4. Worldwide trade of crude drugs and volatile oils: Plants based industries and research institutes, Intellectual Property Rights with special reference to phytoconstituents. Regulation pertaining to trade drugs
5. Biological sources, preparation, identification tests and uses of the following enzymes: Diastase, Papain, Pepsin, Trypsin, Pancreatin.
6. Natural allergens and photosensitizing agents & fungal toxins
7. Overview of the plants used in management of Cancer, Diabetes, Inflammation, Liver disorder, Central nervous system, hypertension and AIDS.
8. WHO guidelines on good agricultural and collection practices (GACP) for medicinal plants

**Subject code: P-7.4****Subject : Pharmacognocny-V****PRACTICAL****45 Hours (3 hrs. /week)**

1. Macroscopical and microscopical evaluation including Quantitative microscopy.
2. Estimation of secondary metabolites like alkaloids, terpenoids and flavonoids by different methods.
4. Estimation of plant phytoconstituents using modern methods like UV and HPTLC.
5. Extraction and isolation of volatile oils.
6. Extraction and isolation of phytoconstituents (Minimum five).
7. Evaluation of crude drugs as per WHO guidelines.
8. Application of TLC and paper chromatography in phytochemical evaluation of crude drugs.
9. Isolation of known marker compounds by column chromatography (Demonstrative)
10. Systematic analysis of crude drugs from unknown origin.
11. Tissue culture - Preparation of culture media, selection and preparation of ex-plant, callus culture.
12. Chemical evaluation of powdered drugs & Enzymes.
13. Chromatographic studies of some herbal formulations.
14. Review of recent literatures appearing on Phytopharmaceuticals used as antiallergic, antimicrobials, anti-inflammatory, anticancer, antidiabetic, antihepatotoxic and immunomodulators.

**Recommended Books**

1. Kokate, C.K. Practical Pharmacognosy, Vallabh Prakashan, Delhi.
2. Wallis T.E. Analytical Microscopy, J&A Churchill Ltd, London.
3. Ganborg & Wetter, Plant Tissue Culture Methods, National Research Council of Canada,
4. Saskatchewan.
5. Clarke ECG, Isolation & Identification of drugs. The Pharmaceutical Press, London.
6. Trease, G.E. & Evans, W.C. Pharmacognosyö Bailliere Tindall East Bourne, U.K.
7. Tyler V.E. etal Pharmacognosy, Lea & Febiger Phjadelphia.
8. Wallis T.E. Text book of Pharmacognosyö J&A Churchill Ltd. London.
9. Qadry J.S., ö Pharmacognosyö B.S.Shah Prakashan.ö
10. Atal & Kapur, Cultivation & Utilization of Medicinal Plants, RRL, Jammu.
11. Stahl. E, Thin Layer Chromatography. A laboratory handbook, Springer Verlag, Berlin.
12. Street H.E. Tissue Culture & Plant Science, Academic Press, London.
13. Kokate, C.K. Gokhale AS, Gokhale SB, Cultivation of Medicinal Plants, Nirali Prakashan.
14. Mohammed Ali,ö Pharmacognosy & Plant Cultivationö.
15. Indian Pharmacopoeia.
16. The wealth of India (Raw material & Industrial products)
17. Compendium of Indian Medicinal Plants. Volume-1 to 9.
18. Cultivation & Utilization of Aromatic plants by Atal & Kapoor.
19. Indian Medicinal Plants by Kirtikar & Basu.
20. Photochemistry Prakrukun by Wanger.
21. Natural Products by Ikan R. Israel Uni. Press, Jarusalem,1969.
22. Ayurvedic Pharmacopoeia.
23. Indian Herbal Pharmacopoeia.
24. WHO guidelines for standardization.

**Subject code: T-7.5****Subject : Pharmaceutical Analysis-III****THEORY****45 Hours (3 hrs. /week)****SECTION-A****1. Infrared Spectroscopy**

Introduction, range of IR radiation, Requirements of IR radiation, correct wavelength radiation electric dipole, theory of IR absorption spectroscopy, modes of vibration of atoms in polyatomic molecules, stretching and bending vibration (their types), interpretation of IR spectra, quantitative analysis, routine maintenance, Dispersive and FT-IR instruments, instrumentations- single beam, double beam

spectrophotometer, application to pharmaceuticals, limitations of IR spectrophotometry.

**2. Raman Spectroscopy**

Introduction, Excitation of Raman spectra, Difference between Raman and IR spectroscopy, Raman and Rayleigh scattering, Instrumentation, advantages and disadvantages, applications.

**3. Polarimetry**

Theory of optical activity, Polarization of light, measurement and production of polarized light, Specific and molecular rotation, Linear, Circular and elliptically polarized light, optical rotatory dispersion (ORD), Circular dichroism (CD), Cotton effect (CD), Applications of ORD and CD, Instrumentation, Polarimeter and Applications.

**SECTION-B****1. Refractometry**

Specific and Molar Refraction, Refractive index, Measurement of RI (Angle of Refraction), Snell's Law, Instrumentation and applications.

**2. Nephelometry and Turbidometry**

Introduction, Principle, Instrumentation, Application

**3. Electrochemical Methods**

Principles, Theory, Instrumentation and Applications of

**Conductometry, Potentiometry, Amperometry, Coulometry, Polarography, Pulse Polarography, Electrogravimetry.**

**4. Thermal Analysis**

Introduction, Principle, Definitions, Types, Instrumentation, Applications of

**Thermogravimetric Analysis (TGA)**

**Differential Thermal Analysis (DTA)**

**Differential Scanning Calorimetry (DSC)**

**Subject code: P-7.5****Subject : Pharmaceutical Analysis-III****PRACTICAL****45 Hours (3 hrs. /week)****List of Experiments :**

1. Calibration of conductometer and estimation of conductivity of distilled water.
2. Conductometric titrations
3. Calibration of pH meter and measurement of pH.
4. Potentiometric titrations
5. To determine the pKa value of tribasic acid by using pH meter.
6. Determination of refractive index by Abbe's Refractometer

7. Polarimetric analysis of some carbohydrates
8. Demonstration: To prepare sample in KBr pellet, record its IR spectrum and compare it qualitatively with reported IR in IP/BP
9. Identification of functional groups using IR analysis.

#### Recommended Books

1. D.A.Skoog, D.M.West, F.J.Holler, S.R.Crouch, Fundamentals of Analytical Chemistry, 8th edition, 2004, Thomson Asia Pvt. Ltd.
2. Kenneth A. Connors, A textbook of Pharmaceutical Analysis, 3rd edition, 2002, John Wiley & Sons, New York, USA.
3. F.W.Fifield, D.Kealey, Principles and Practice of Analytical Chemistry, 5th edition, 2000, Blackwell Science, Oxford, U.K.
4. Gary D. Christian, Analytical Chemistry, 6th edition, 2004, John Wiley & Sons, New York, USA.
5. R.A.Day, Jr, A.L.Underwood, Quantitative Analysis, 6th edition, 2001, Prentice Hall of India.
6. Practical Pharmaceutical Chemistry Vol. I & II 4th Edition 1986 6 A.H.Beckett & J.B.Stenlake 6 CBS Publishers, New Delhi.
7. A. R. Gennaro, Remington: The Science and Practice of Pharmacy Vol. I & II 20th Edition 2001 6 Lippincott, Williams & Wilkins, New York, USA.
8. The Indian Pharmacopoeia, Latest Edition, the Controller of Publications, Government of India, New Delhi
9. S.Ahuja, S.Scypinski, Handbook of Modern Pharmaceutical Analysis, 2001, Academic Press, New York, USA.
10. A.V.Kasture, K.R.Mahadik, S.G.Wadodkar, H.N.More, A Textbook of Pharmaceutical Analysis, Vol. I, 6th edition, 2002, Nirali Pprakashan, New Delhi.
11. D.C.Lee, M.L.Webb, Pharmaceutical Analysis, 2003, Blackwell Science, Oxford, U.K.
12. T.Higuchi, E.Brochmann-Hanssen, Pharmaceutical Analysis, 2002, CBS Publishers, New Delhi.
13. Lena Ohannesian, A.J.Streeter, Handbook of Pharmaceutical Analysis, 2002, Marcel Dekker, Inc. New York, USA.
14. P.Parimoo, Pharmaceutical Analysis, 2nd edition, 1991 CRC Press, New York.
15. The Indian Pharmacopoeia, Latest edition, the Controller of Publications, Government of India, New Delhi.
16. The British Pharmacopoeia.
17. The United State Pharmacopoeia.
18. J. Mendham, R.C.Denney, J.D.Barnes, M.Thomas, Vogel's Textbook of Quantitative Chemical Analysis, 6th edition, 2002, Pearson Education Asia Ltd.

19. D.A. Skoog, F.J. Holler, T.A. Neiman, Principles of Instrumental Analysis, 5th edition, 2003, Thomson Asia Pvt. Ltd.

**Subject code: T-7.6**

**Subject : Pharmaceutical Jurisprudence**

**THEORY**

**45 Hours (3 hrs. /week)**

#### SECTION-A

- 1) **History of pharmacy legislation in India :**  
Origin and nature of pharmaceutical legislation in India, reports of commissions,
- 2) **Study of the following with latest amendments:**
  - a) **Pharmaceutical 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.

#### SECTION-B

#### Business Management

- 1) **Concept of Management:**  
Administrative Management (Planning, Organizing, Staffing, Directing and Controlling), Entrepreneurship development, Operative Management (Personnel, Materials, Production, Financial, Marketing,



time/space, Margin/Morale). Principles of Management (Co-ordination, Communication, Motivation, Decision-making, Leadership, Innovation, Creativity, Delegation of authority/Responsibility, Record Keeping).

2) **Pharmaceutical Marketing:**

Function, buying, selling, transportation, storage, finance, feedback, information, channels of distribution, wholesale, retail, departmental stores, multi shop & mail order business.

3) **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, maintenance 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.

**Subject code: T - 7.7**

**Subject : Seminar**

**45 Hours (3 Hrs. /week)**

**Seminar (one per each student)**

The topic for the seminar shall be assigned to him/her by the faculty members of Seventh semester & topic should be decided from the syllabus of same semester, with immediate from the date of the commencement of the seventh semester.

**Evaluation of seminar shall be based on the communication, representation and skill in oral presentation.**

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**Sant Gadge Baba Amravati University, Amravati**

**B. Pharm Eight Semester Syllabus**

**SEMESTER-VIII**

Subject Code	Subject	Maximum Marks		Total Marks
		Theory	Practical	
8.1	Pharmaceutics-VI	80	80	160
8.2	Medicinal Chemistry-IV	80	80	160
8.3	Pharmaceutical Analysis-IV	80	80	160
8.4	Pharmacognocoy-VI	80	80	160
8.5	Clinical Pharmacotherapeutics	80	0	80
8.6	Communication Skill	80	0	80
		Total		800

**Subject code: 8.1**

**Subject : Pharmaceutics – VI**

**THEORY**

**45 Hours (3 hrs. /week)**

**SECTION-A**

**1. Prolonged Action Pharmaceuticals:**

Sustained release, Controlled release drug delivery systems: Benefits, limitations, oral products terminology, types and construction of products, evaluation, parenteral products, absorption and evaluation.

**2. Micro-encapsulation:**

Types of microcapsules, importance of micro encapsulation in pharmacy, microencapsulation by Co-acervation phase separation, multi-orifice centrifugation, spray drying, spray congealing, polymerization, air suspension technique, pan coating and other techniques. Evaluation of microcapsules.

**3. Novel Drug delivery systems:**

Transdermal drug delivery systems, Osmotic drug delivery systems, Liposomes, Nanospheres, Resealed Erythrocytes.

**SECTION-B****4. Design, development and process validation methods:**

Design, development and process validation methods for pharmaceutical operations involved in the production of pharmaceutical products with special reference to tablets and suspensions.

**5. Polymer science and application in formulation design.****6. Stabilization and stability testing protocol for various pharmaceutical products.****Subject code: P-8.1****Subject : Pharmaceutics – VI****PRACTICAL****45 Hours (3 hrs. /week)**

1. Formulation of oral S.R.Products & their evaluation by *in-vitro* dissolution profile.
2. Preparation and evaluation of microcapsules by employing various techniques.
3. Stability evaluation of various dosage forms and their expiration dating.
4. Any other experiments illustrative of the theory of syllabus.

**Books Recommended**

1. L. Lachman, H. A. Liberman, and J. L. Kanig: Theory and practices of Industrial Pharmacy, 3<sup>rd</sup> Edition, 1986.
2. M. E. Aulton: Pharmaceutics: The science of dosage form design, ELBS publisher, 1988.
3. Robinson and Lee: Controlled drug delivery: Fundamentals and applications, 2nd Edition, Marcel Dekker, Inc., 1987.
4. J.S Warbrick: Novel drug delivery systems, Vol. 14
5. G.S. Banker and C.T.Rhodes: Modern Pharmaceutics, 2nd Edition, Marcel Dekker, 1990.
6. Remington's Pharmaceutical Sciences, 18th Edition, Mack Publishing Company, 1990.
7. Cooper and Gunn's Tutorial Pharmacy, 6th Edition, CBS Publishers and Distributors, 1999.
8. N. K. Jain: Advances in controlled and novel drug delivery system, 1st Edition, CBS Publishers and Distributors, 2001.
9. A. Kydonieus: Treatise on controlled drug delivery, Marcel Dekker, Inc., 1991.

10. H. A. Liberman,, L. Lachman, and J. B. Schwartz: Pharmaceutical dosage forms: **Tablets**, Vol. 1,2 and 3, 2nd Edition Marcel Dekke r, 1989.
11. L. Krowczynski: Extended release dosage forms, CRC press, Inc., Boca Raton, 1987.
12. A. L. Brody and K. S. Marsh: Encyclopedia of packaging technology, 2nd Edition, John Wiley and Sons Inc., 1997.
13. P. P. Sharma: How to practice GMPs, 2nd Edition, Va ndana Publications, 1995.
14. J. Swarbrick, and J. C. Boylan: Encyclopedia of pharmaceutical Technology, Vol 1-18, Marcel Dekker, 1988.
15. World Health Organization's guidelines on good manufacturing practices and inspection (available at <http://www.who.int>)
16. "Controlled drug delivery" (available at NC State University's web sites <http://www5.bae.ncsu.edu>)
17. S. D. Bruck: Controlled drug delivery, Vol. I and II.
18. Ansel, H.C. "Introduction to Pharmaceutical Dosage Forms", K M Varghese & Co., Mumbai, latest edition.
19. Lachman L, Liberman H.A. & Kanig J.L., "The Theory & Practice of Industrial Pharmacy", Lea & Febiger, Philadelphia.
20. Beans, H.S., Beckett A.H. & Carless, "Advances in Pharmaceutical Science"
21. Pharmaceutical dosage forms: Tablets volume 1 ó 3 by Liberman and Lachman
22. Pharmaceutical dosage forms: Parenteral medications Vol-1, 2 by Liberman and Lachman.
23. Bentley's Textbook of Pharmaceutics.
24. Remington's Pharmaceutical Sciences (RPS).
25. Modern Pharmaceutics by Banker and Gilberts.
26. Hard Capsules by Ridgway. K. Pharmaceutical Press, London.
27. Aulton M.E., Pharmaceutics ó The Science of Dosage form Design, ELBS/Churchill Livingstone.

**Subject code: T-8.2****Subject : Medicinal Chemistry-IV****THEORY 45 Hours (3 hrs. /week)****SECTION-A****1. Principles of Drug Design****A) Drug Discovery**

- a) Historical Perspectives
- b) Drug Discovery strategies in Direct Drug Design (structure based) and indirect drug design
- c) Target selection and lead identification
  - i) Natural product sources
  - ii) Fermentation / Microbial sources
  - iii) Synthetic

**B) QSAR**

- a) Parameters- Lipophilicity, electronic, steric factors
- b) Quantitative models
  - i) Hansch Analysis
  - ii) FreeWilson Analysis
  - iii) Mixed approach
  - iv) Other QSAR approaches
- c) Application of Hansch and Free Wilson Analysis

**SECTION-B****2. A) Enzymes Peptides in drug design****B) Molecular modeling in drug analysis**

Introduction to molecular modeling: Concept and methods

- a) Molecular mechanics- Force fields ( Potential energy function )
- b) Energy minimization methods- steepest, descent, conjugate, gradient, Newton method ( Non-mathematical )
- c) Conformational analysis
  - i) Systematic search
  - ii) Monte carlo simulations
  - iii) Molecular dynamic simulations

**C) Ligand design based on 3D structure of receptor / enzyme.**

3. Concept and brief introduction to gene therapy , nucleotidomimetics. (antisense oligonucleotides)
4. Concept and brief introduction to genetic engineering in medicinal chemistry

**Subject code: P-8.2****Subject : Medicinal Chemistry –IV****PRACTICAL 45 Hours (3 hrs. /week)**

- 1) Workshop on modeling molecular structure with suitable method
- 2) Laboratory scale preparation by conventional / microwave synthesis of selected drugs from course content and characterization by melting point / boiling point / thin layer chromatography / ultra-violet spectroscopy / IR spectroscopy
- 3) Establishing the pharmaceutical standards of drug synthesized
- 4) Determination of partition coefficient, dissociation constant and molar refractivity of compounds for QSAR analysis

**Books Recommended**

1. Fundamentals of Medicinal Chemistry ó Gareth Thomas, John Wiley & Sons.
2. A Textbook of Drug Design and Development edited by Povl Krogsgaard.
3. Computer ó Aided Drug Design Edited by Thomas J. Perum. C. L. Propst
4. Advanced Computer Assisted Techniques in Drug Discovery by Han Vande Waterbeemd.
5. A Guidebook on Molecular Modeling and Drug Design by Cohen.

**Subject code: T-8.3****Subject : Pharmaceutical Analysis-IV****THEORY 45 Hours (3 hrs. /week)****SECTION-A****1. Quality Assurance**

**Statistics & Statistical quality control:** Statistics in Q.C., definition of terms, normal distribution, *t*-test, *f*-test, linear regression, correlation coefficient. Methods of statistical analysis as applied to sampling and interpretation of results, regression lines, sampling procedures. GMP, CGMP, GLP, TQM, quality review and quality documentation. Introduction to various agencies imparting quality standards, ISO 9000, WHO etc. Regulatory control, regulatory drug analysis and interpretation of analytical data.

Validation, quality audit: quality of equipments, validation of equipments and validation of analytical procedure. ICH guidelines (need in particular).

## 2. Chromatography

Terminology, retention time and retention volume, adjusted retention volume, specific retention volume, relative retention volume, height equivalent to theoretical plate (HETP), rate and plate theory, resolution, partition coefficient, classification of chromatography methods.

### a) Planer Chromatography

- i. **Paper Chromatography:** Theory, development techniques and applications.
- ii. **Thin-Layer Chromatography:** Theory, selection of adsorbent, preparation of plates, spotting, development of chromatogram, detection of components, and application.
- iii. **HPTLC:** Introduction, theory and applications.

b) **Column Chromatography:** Theory, column packing techniques, efficiency of column, Van-Deemter equation in detail, capacity factor, & other performance parameter.

- i. **Gas Chromatography:** Introduction, carrier gases, columns, injection system, detectors, thermal conductivity detectors (TCD), electron capture detectors (ECD), thermo-ionic detectors (TID), flame ionization detectors (FID), nitrogen-phosphorus detectors (NPD), photo-ionization detector (PID), head space analysis, applications, programmed temperature gas chromatography (PTGC), gas chromatography-mass spectroscopy (GCMS).
- ii. **HPLC:** Instrumentation, pumps (reciprocating pumps, displacement & pneumatic pumps), mobile phase reservoirs, solvent temperature systems, isocratic elution, gradient elution, injection system. Detectors: photometric detectors (single wavelength, multi wavelength, variable wavelength, diode array, fluorescence detector), RI detector, electrochemical detector), Columns, Introduction to LC-MS & UPLC.

## SECTION-B

### 1. Nuclear Magnetic Resonance Spectroscopy (NMR)

Introduction to NMR, basic principle involved, instrumentation, chemical shift, factors affecting chemical shift, spin-spin coupling, coupling constant, applications, quantitative analysis.

2. **Electron Spin Resonance (ESR)** Introduction, Principal involved, Application.

### 3. Mass Spectroscopy

Principle and Theory, Ion sources, Types of ions & peaks fragmentation patterns, instrumentation, applications, introduction to Mass spectroscopy- mass spectroscopy (MS-MS).

### 4. X-ray Diffraction

Laue Photographic method, Bragg's X-ray spectrophotometry, Rotating crystal methods, powder method.

### 5. Radioimmunoassays

Principle & Application

**Subject code: P-8.3**

**Subject : Pharmaceutical Analysis-IV**

**PRACTICAL**

**45 Hours (3 hrs. /week)**

### List of Experiments :

1. UV spectrophotometric estimations of drug and from their formulations
2. To perform experiments on paper, thin layer and column chromatography.
3. Complete analysis of APIs/Excipients as per I.P.
4. To perform evaluation test of glass container.
5. To determine water vapor transmission of polyethylene bottles.
6. HPLC (Demonstration only)
7. GC (Demonstration only)

### Recommended Books

1. D.A.Skoog, D.M.West, F.J.Holler, S.R.Crouch, Fundamentals of Analytical Chemistry, 8th edition, 2004, Thomson Asia Pvt. Ltd.
2. Kenneth A. Connors, A textbook of Pharmaceutical Analysis, 3rd edition, 2002, John Wiley & Sons, New York, USA.
3. F.W.Fifield, D.Kealey, Principles and Practice of Analytical Chemistry, 5th edition, 2000, Blackwell Science, Oxford, U.K.

4. Gary D. Christian, Analytical Chemistry, 6th edition, 2004, John Wiley & Sons, New York, USA.
5. R.A.Day, Jr, A.L.Underwood, Quantitative Analysis, 6th edition, 2001, Prentice Hall of India.
6. Practical Pharmaceutical Chemistry Vol. I & II 4th Edition 1986 A.H.Beckett & J.B.Stenlake 1986 CBS Publishers, New Delhi.
7. A. R. Gennaro, Remington: The Science and Practice of Pharmacy Vol. I & II 20<sup>th</sup> Edition 2001 1986 Lippincott, Williams & Wilkins, New York, USA.
8. The Indian Pharmacopoeia, Latest Edition, the Controller of Publications, Government of India, New Delhi
9. S.Ahuja, S.Scypinski, Handbook of Modern Pharmaceutical Analysis, 2001, Academic Press, New York, USA.
10. A.V.Kasture, K.R.Mahadik, S.G.Wadodkar, H.N.More, A Textbook of Pharmaceutical Analysis, Vol. I, 6th edition, 2002, Nirali Pprakashan, New Delhi.
11. D.C.Lee, M.L.Webb, Pharmaceutical Analysis, 2003, Blackwell Science, Oxford, U.K.
12. T.Higuchi, E.Brochmann-Hanssen, Pharmaceutical Analysis, 2002, CBS Publishers, New Delhi.
13. Lena Ohannesian, A.J.Streeter, Handbook of Pharmaceutical Analysis, 2002, Marcel Dekker, Inc. New York, USA.
14. P.Parimoo, Pharmaceutical Analysis, 2nd edition, 1991 CRC Press, New York.
15. The Indian Pharmacopoeia, Latest edition, the Controller of Publications, Government of India, New Delhi.
16. The British Pharmacopoeia.
17. The United State Pharmacopoeia.
18. J. Mendham, R.C.Denney, J.D.Barnes, M.Thomas, Vogel's Textbook of Quantitative Chemical Analysis, 6th edition, 2002, Pearson Education Asia Ltd.
19. D.A. Skoog, F.J. Holler, T.A. Neiman, Principles of Instrumental Analysis, 5th edition, 2003, Thomson Asia Pvt. Ltd.
20. P. A. Sewell and B. Clarke, Chromatographic Separation, AOCL, Wiley.
21. S. Lindsay, High Performance Liquid Chromatography, Analytical Chemistry by Open Learning (ACOL), Wiley.
22. J. E. Willett, Gas Chromatography, Wiley.
23. Veronika Meyers, Practical High Performance Liquid Chromatography

**Subject code: T-8.4**

**Subject : Pharmacognocny-VI**

**THEORY**

**45 Hours (3 hrs. /week)**

**SECTION-A**

1. Quality control and Standardization of herbal drugs: Importance of standardization of raw materials, extracts and formulations with examples, WHO guidelines for assessment of crude drugs, extracts and medicines. Study of different methods used for standardization of crude drugs and analytical techniques with special reference to newer industrial methods with suitable examples (TLC, HPTLC and HPLC) for determination of chromatographic markers, spectroscopic techniques and assay methods. Standardization of extracts, study of standardization of crude drugs including quantitative microscopy of : Punarnava, Aswagandha, Kalmegh, Brahmi, Phyllanthus, Tinospora cardifolia and ashoka. Determination of heavy metals in herbal preparation and alcohol contents in Aristas and Asavas.
2. Herbal formulations: Alternative system of medicine, Principles involved in Ayurveda, Sidha, Unani, Chinese and Homeopathic system of medicines. Preparation of Ayurvedic formulations like Aristas, Asava, Ghutika, Tailia, Churna, Avaleha, Ghrita and Bhasms; Unani formulations like Majoons, Safoofs.
3. Herbal cosmetics: Introduction and concept of herbal cosmetics in preparation of- Shampoos (Soapnut), conditioners (Amla, Henna, Hibiscus, Tea), hair darkeners (Amla, Henna), skin care (Aloe, turmeric).
4. Nutraceuticals, Herbs as health foods.

**SECTION-B**

5. Utilization and Industrial Production of Phytoconstituents such as Calcium, Sennosides, Diosgenin, Solasodine, Podophyllotoxin, quinine, ephedrine, Cardiac glycosides, andrographolides, phyllanthin, withanolides.
6. Role of Medicinal and Aromatic Plants in National Economy: Phytopharmaceuticals of commercial significance. A brief account of Plant based Industries & Institutions involved in work on Medicinal & Aromatic plants in India. Utilization & Production of Poppy, Ergot, Cinchona, Ipecac, Tropane Alkaloids, Vinca, Aloes, Senna, Ispaghula, Digitalis, Dioscora & Solanum khasianum.
7. A brief introduction to Plant bitters and sweeteners.
8. General methods of screening natural products for the following Biological activities- a) Anti-inflammatory Activity. b) Hypoglycemic.

- c) Diuretic. d) Cardiac Activity. e) Hepato protective Activity, f) Anticancer agents.
9. Introduction of WHO guidelines on GMP of Herbal medicines.

**Subject code: P-8.4**

**Subject : Pharmacognosy-VI**

**PRACTICAL**

**45 Hours (3 hrs. /week)**

1. Macroscopical and microscopical evaluation including Quantitative microscopy.
2. Estimation of secondary metabolites like alkaloids, terpenoids and flavonoids by different methods.
4. Estimation of plant phytoconstituents using modern methods like UV and HPTLC.
5. Extraction and isolation of volatile oils.
6. Extraction and isolation of phytoconstituents (Minimum five).
7. Evaluation of crude drugs as per WHO guidelines.
8. Application of TLC and paper chromatography in phytochemical evaluation of crude drugs.
9. Isolation of known marker compounds by column chromatography (Demonstrative)
10. Systematic analysis of crude drugs from unknown origin.
11. Tissue culture - Preparation of culture media, selection and preparation of ex-plant, callus culture.
12. Chemical evaluation of powdered drugs & Enzymes.
13. Chromatographic studies of some herbal formulations.
14. Review of recent literatures appearing on Phytopharmaceuticals used as antiallergic, antimicrobials, anti-inflammatory, anticancer, antidiabetic, antihepatotoxic and immunomodulators.

**Recommended Books**

1. Kokate, C.K. Practical Pharmacognosy, Vallabh Prakashan, Delhi.
2. Wallis T.E. Analytical Microscopy, J&A Churchill Ltd, London.
3. Ganborg & Wetter, Plant Tissue Culture Methods, National Research Council of Canada, Saskatchewan.
4. Clarke ECG, Isolation & Identification of drugs. The Pharmaceutical Press, London.
5. Trease, G.E. & Evans, W.C. Pharmacognosy Bailliere Tindall East Bourne, U.K.

6. Tyler V.E. et al Pharmacognosy, Lea & Febiger Philadelphia.
7. Wallis T.E. Text book of Pharmacognosy J&A Churchill Ltd. London.
8. Qadry J.S., Pharmacognosy B.S.Shah Prakashan.
9. Atal & Kapur, Cultivation & Utilization of Medicinal Plants, RRL, Jammu.
10. Stahl. E, Thin Layer Chromatography. A laboratory handbook, Springer Verlag, Berlin.
11. Street H.E. Tissue Culture & Plant Science, Academic Press, London.
12. Kokate, C.K. Gokhale AS, Gokhale SB, Cultivation of Medicinal Plants, Nirali Prakashan.
13. Clarke ECG, Isolation & Identification of drugs. The Pharmaceutical Press, London.
14. Mohammed Ali, Pharmacognosy & Plant Cultivation.
15. Indian Pharmacopoeia.
16. Indian Herbal Pharmacopoeia.
17. The wealth of India (Raw material & Industrial products)
18. Compendium of Indian Medicinal Plants. Volume-1 to 9.
19. Cultivation & Utilization of Aromatic plants by Atal & Kapoor.
20. Indian Medicinal Plants by Kirtikar & Basu.
21. Photochemistry Pracruckun by Wanger.
22. Natural Products by Ikan R. Israel Uni. Press, Jarusalem, 1969.
23. Ayurvedic Pharmacopoeia.
24. WHO guidelines for standardization.

**Subject code: T-8.5**

**Subject : Clinical Pharmacotherapeutics**

**THEORY**

**45 Hours (3 hrs. /week)**

**SECTION-A**

1. **Cardiovascular System:** Hypertension, Congestive cardiac failure, Ischemic heart disease, Arrhythmias, Hyperlipidemias.
2. **Respiratory system:** Asthma, Chronic obstructive airways diseases.
3. **Haematological diseases:** Anemia, drug induced haematological diseases.
4. **Gastrointestinal system:** Peptic ulcer diseases, inflammatory bowel diseases, hepatitis, jaundice & cirrhosis, diarrhoea & constipation, drug induced liver diseases.
5. **Renal System:** Acute and Chronic renal failure, Drug induced renal diseases.

**SECTION-B**

6. **Endocrine system:** Thyroid disease, Oral contraceptives, Diabetes.
7. **Neuro-psychiatric disorders:** Schizophrenia, depression, anxiety, sleep disorders, drug induced psychosis.
8. **Infectious diseases:** Respiratory tract infections, urinary tract infections, tuberculosis, leprosy, malaria, helmenthiasis, HIV and opportunistic infections, fungal infections.
9. **Toxicology:** General principles of Acute, Sub acute and chronic toxicity. Poison, Types and Classification and General treatment of Poisoning. Signs, Symptoms and treatment of acute and chronic poisoning due to barbiturates, alcohol, Morphine, Insecticide, Snake bite, Heavy metals (Lead, Arsenic, Mercury).

**Recommended Books :**

1. Bennett P.N, Brown M.J. Clinical Pharmacology Churchill living stone New Delhi.
2. Melmon & Morrelliø Clinical Pharmacology. Mc-Graw Hill. New Delhi.
3. Craig C.R, Stitzel R.E. Modern Pharmacology with Clinical application, Lippincott Williams & Wilkins, New York.
4. Raymond J.M. Niesink, John de vries. Hollinger M.A. Toxicology- Principle and applications, CRC, Florida
5. Klaassen C.D, Casarett & Doullø. Toxicology. The basic science of poison Mc-Graw Hill, New Delhi.
6. Remingtonø Pharmaceutical Science and practice pharmacy. Lippincott Williams and Wilkins, New Delhi.
7. Katzung B.G Basic & Clinical Pharmacology. Mc-Graw Hill, New Delhi.
8. Clinical Pharmacy & Therapeutics- Eric T Hefindal. Williams & Wilkins Publications.
9. Eric T. Herfindel, Dick. R. Gourley. Textbook of therapeutics, Drug & disease management.
10. Parrtharathi G, Hansen Kavin Nytor & Nahata Milap C. A Textbook of Clinical Practice: Essential Concepts & skills, Orient Longman.
11. Roger walker, Clive Edwards, Clinical Pharmacy & therapeutics, 3rd International Edition, Churchill Livingstone.
12. Grahame-Smith D.G & Aronson J.K. Oxford textbook of clinical Pharmacology and drug therapy. Oxford University press London.

**Subject code: T-8.6****Subject : Communication skill****THEORY****45 Hours (3 hrs. /week)****SECTION –A****COMPREHENSION OVERAN UNSEEN PASSAGE****Comprehension –A word study:-**

Synonym,antonym,meanings,matching words,adjectives,adverbs,prefix and correct forms of commonly misspelled words, understanding of given passage.

**Comprehension –B word study:-**

Simple and compound sentences, types of conjunctions, singular and plural, tenses and their effect on verb forms. Use of not only but also, if clause, since, may, can, could, would, too etc.

Active and passive forms, negative and interrogative, punctuatuation and capitalization.

**PRINCIPLES OF COMMUNICATIONS**

Theoretical background ó importance of communications, its process, model of communication, its process, model of communication its components and barriers

**SECTION –B****PRINCIPLES OF COMMUNICATIONS**

Verbal communication, its significance, types of written communication and its style organizations of text (Titles summaries, headings .sequencing, signaling, cueing etc.)Important text factors (length of paragraph, sentences, words, clarification and text difficulty).Evaluation of written communication for its effectively and subject content.

**ASPECTS OF PROFESSIONAL COMMUNICATION:-**

Specific formats for written communication like óbusiness correspondence, format reports, technical proposals, research papers and articles, advertising and graphics. Format for day - to - day communication like applications,notices,minutes,quotations,orders, enquiries etc.

Types of graphics and pictorial devices.

Oral communication - face to face communication, group discussion and personal interviews.

Methodology of conduction of meeting, seminars, symposia, conference and workshop .

**BOOKS RECOMMENDED:**

- 1) Krishna Mohan, Meera Banerjee: Developing communication skills, MacMillan India Limited.
- 2) Chrissie Wright (Editor): Handbook of practical communication skills, Jaico Publishing House.
- 3) Curriculum Development Centre ,TTTI WR ,Bhopal : A Course in Technical English,Somaiya Publication Pvt.Ltd.
- 4) F.Frank Candlin : General English for Technical Students, University of London Press Ltd.
- 5) Norman Lewis : Word Power Made Easy
- 6) <http://www.teachingenglish.org.uk>

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