

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

M. Pharmacy (PHARMACOGNOSY)

COURSE STRUCTURE AND SYLLABUS
Effective from Academic Year 2017-18 Admitted Batch

I Year – I Semester

Category	Course Title	Int. marks	Ext. marks	L	P	C
Core Course I	Modern Pharmaceutical Analytical Techniques	25	75	4	--	4
Core Course II	Advanced Pharmacognosy- I	25	75	4	--	4
Core Course III	Phytochemistry	25	75	4	--	4
Core Elective I	1. Industrial Pharmacognostical Technology 2. Intellectual Property Rights	25	75	4	--	4
Open Elective I	1. Pharmacoepidemiology and Pharmacoconomics 2. Drug Regulatory Affairs 3. Pharmaceutical Validation 4. Pharmaceutical Formulation Technology 5. Pharmaceutical Management	25	75	4	--	4
Laboratory I	Modern Pharmaceutical Analytical Techniques Lab	25	75	--	6	3
Laboratory II	Phytochemistry Lab	25	75	--	6	3
Seminar I	Seminar	50	--	--	4	2
Total Credits				20	16	28

I Year – II Semester

Category	Course Title	Int. marks	Ext. marks	L	P	C
Core Course IV	Advanced Pharmacognosy – II	25	75	4	--	4
Core Course V	Indian System of Medicine	25	75	4	--	4
Core Course VI	Herbal Drug Technology	25	75	4	--	4
Core Elective II	1. Screening Methods in Pharmacology 2. Medicinal Plant Biotechnology	25	75	4	--	4
Open Elective II	1. Stability of Drugs and Dosage Forms 2. Nano Based Drug Delivery Systems 3. Biostatistics and Research Methodology 4. Entrepreneurship Management 5. Herbal & Cosmetics Analysis	25	75	4	--	4
Laboratory III	Advanced Pharmacognosy – II Lab	25	75	--	6	3
Laboratory IV	Herbal Drug Technology Lab	25	75	--	6	3
Seminar II	Seminar	50	--	--	4	2
Total Credits				20	16	28

II Year - I Semester

Course Title	Int. marks	Ext. marks	L	P	C
Comprehensive Viva-Voce	--	100	--	--	4
Project work Review I	50	--	--	24	12
Total Credits			--	24	16

II Year - II Semester

Course Title	Int. marks	Ext. marks	L	P	C
Project work Review II	50	--	--	8	4
Project Evaluation (Viva-Voce)	--	150	--	16	12
Total Credits			--	24	16

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
I Year – II Sem M. Pharm (Pharmacognosy)

ADVANCED PHRMACOGNOSY- II (Core course - IV)

Course Objectives: To know and understand the Adulteration and Deterioration that occurs in herbal/natural drugs and methods of detection of the same.

Course Outcome: Helps the students to know about common bitters, laxatives and the analytical profiles of some herbal drugs and herbal cosmetics used in everyday life.

UNIT I: Adulteration and Deterioration: Introduction, Types of Adulteration/ Substitution of Herbal drugs, Causes and Measures of Adulteration, Sampling Procedures, Determination of Foreign Matter, DNA Finger printing techniques in identification of drugs of natural origin, detection of heavy metals, pesticide residues, phytotoxin, microbial contamination in herbs and their formulations.

UNIT II: Analytical Profiles of herbal drugs: *Andrographis paniculata*, *Boswellia serata*, *Coleus forskholii*, *Curcuma longa*, *Embellica officinalis*, *Psoralea corylifolia*.

UNIT III:

Analytical Profiles of herbal drugs: *Centella asiatica*, *Bacopa monnieri*, *Commiphora mukul*, *Glycyrrhiza glabra*, *Phyllanthus amarus*, *Withania somnifera*

UNIT IV:

a) **Vegetable bitters:** Biological source, Chemical Nature and description of bitter principles, and of the following – *Chirata*, *Quassia*, *Calumba*, *Calamus*, *Cusparia*, *Serpentaria*

b) **Vegetable Laxatives:** Biological source, Chemical Nature and description of purgation actions and therapeutics of the following: *Senna*, *Cascara*, *Rubarb*, *Aloes*, *Isapgul*, *agar*, *castor oil*

UNIT V:

Herbal cosmetics: General method of preparation and evaluation of Herbal Cosmetics such as

a. Skin care products b. Hair care preparations with examples and claims for the various herbal materials used in them.

b. A brief account of following herbals or herb extracts or herbal products of cosmetic importance such as *Acacia* pods, *Aloe Vera*, *Almond oil*, *Neem*, *Henna*, *Liquorice*, *Olive oil*, *Sandal wood*, *tea tree oil* and *wheat germ oil* with special emphasis on their source, active principles and cosmetic properties.

RECOMMENDED/ REFERENCE BOOKS:

1. Quality control of herbal drugs by P. K. Mukherjee
2. Phytochemical methods of chemical analysis by Harbone
3. Standardization of botanicals by V. Rajpal, Vol I & II
4. Herbal Drug industry by Chowdary
5. Herbal cosmetic technology by Pandeya
6. Plant Drug Analysis by Wagner H and Bladt S.
7. Text book of Pharmacognosy by C. K. Kokate, Purohit, Gokhale (1996), Nirali Prakashan, New Delhi.
8. Bioactive Natural products, Detection, Isolation, and Structural determination second edition by Steven M. Colegate and Russell J. Molyneux.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
I Year – II Sem M. Pharm (Pharmacognosy)

INDIAN SYSTEM OF MEDICINE (Core course - V)

Course Objectives: Exposure to principles and concepts of alternative systems of medicine like ayurveda, siddha, homeopathy and unani medicine. To acquire knowledge on the methods of preparation and use of formulations of various systems of medicines.

Course Outcome: Helps the students in understanding the influence of various alternative systems of medicine in the development of herbal drugs.

UNIT I

Introduction to various systems of Indigenous Medicine. Ayurvedic Pharmacopoeia of India-Format of API monographs for ayurvedic formulations. Principles and Concepts of Ayurveda, History and Development of Ayurvedic medicine. Introduction to different dosage forms and Preparation Methods of Ayurvedic medicines.

UNIT II

Definition and Method of preparation of following Ayurvedic formulations with their uses.

- a. Churnas : Triphala churna, Trikatu churna, Hing vashtak churna.
- b. Vati : Chandraprabhavati, Eladi vati, Lavangadi vati
- c. Taila: Bala taila, Bhringaraj taila, Shatabindu taila.
- d. Bhasma: Rasaka bhasma, Swarna bhasma, Loha bhasma

UNIT III

Definition and Method of preparation of following Ayurvedic formulations with their uses.

- a. Ghrita : Brahmi ghrita, Jhatyadi ghrita, Kshirashataphala ghrita
- b. Asavas/Arishtas: Chandan asava, Dashamoola arishta, Kumari asava,.
- c. Swaras : Amalaki Swaras, Nimbu Swaras, Tulsi Swaras
- d. Lehya : Vasavalehya, Kusumandavalehya, Cyavanaprasavalehya

UNIT IV

A brief History, Origin and development of Homeopathy. Fundamentals, concepts and Principles of Homeopathy. Introduction to different dosage forms and method of preparation of Homeopathic medicines.

UNIT V

Principles of Unani and Siddha systems of medicines, their merits and demerits. Introduction to different dosage forms and method of preparations of Unani medicines.

RECOMMENDED / REFERENCE BOOKS:

1. Ayurvedic formulary of India, Govt. of India
2. Homeopathic Pharmacopoeia
3. Unani Medical Systems
4. Pharmacopoeial standards for Ayurvedic formulations CCRAS, Delhi
5. Ayurvedic pharmacopoeia
6. Indian herbal pharmacopoeia vol. 1 & 2 RRL, IDMA
7. Standardization by Botanicals by V. Rajpal , Vol1 , Eastern Publishers New Delhi
8. Healing plants of peninsular India by Parrota CABI Publications.
9. Principles of integrated medicines by Mathur PR

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
I Year – II Sem M. Pharm (Pharmacognosy)

HERBAL DRUG TECHNOLOGY (Core course - VI)

Course Objectives: Helps the students in getting exposed to methods of extraction, preparation, and purification of herbal extracts. To acquire knowledge on the preparation and standardization of herbal preparation. They will expose to various research institutions of natural products.

Course Outcomes: Helps the students to understand the organization and research of natural products in herbal drugs industries

UNIT I

Herbal Extracts: Types of extracts, Extraction methods such as Maceration, Percolation, Super critical fluid extraction and Ultra-sonic extraction

Equipment for preparing herbal extracts: Process and equipments- Name of the equipment and its uses with merits and demerits in each of the following unit operations in the extraction process.

- a. Size reduction
- b. Extraction
- c. Filtration
- d. Evaporation/Distillation
- e. Drying of extracts

UNIT II

Definition, classification of natural excipients: Sources, Chemical nature, Description parameters
Pharmaceutical uses and storage conditions of following Natural excipients

Binding agents, disintegrating agents, diluents, emulsifying agents:

Acacia, Tragacanth, Alginates, CMC, Gelatin, Pectin, Lactose, Starches, Talc,

Ointment bases, suppository bases and Hardening agents: Beeswax, Cocoa butter, Lanolin, Hard paraffin

UNIT III

Methods of preparation and Evaluation of Herbal Tablets, Capsules, Ointments and other dosage forms. Study of any three formulations under each category with respect to their formulas and claims for various herbs used in them

UNIT IV

- a) Definitions of Functional foods, Nutraceuticals and Dietary supplements. Classification of Nutraceuticals, Health problems and diseases that can be prevented or cured by Nutraceuticals i.e. weight control, diabetes, cancer etc.
- b) Source, Name of marker compounds and their chemical nature, Medicinal uses and health benefits of following used as nutraceuticals like Spirulina, Soyabean, Ginseng, Garlic, Bracoli, Ginko, Flaxseeds, Black cohosh.

UNIT V

a) Natural colorants: Biological Source, coloring principles, chemical nature and usage of the following Annato, Cochineal, Caramel, Henna, Indigo, Madder, Saffron , Turmeric

b) Natural sweeteners: i) Definition of nutritive and non nutritive sweeteners, qualities of an ideal sweetner and sweetness potency.

ii) Biological source, chemical nature, extraction details and usage of the following: Steviosides, Glycyrrhizin, Rebaudioside

RECOMMENDED/ REFERENCE BOOKS:

1. Textbook of Pharmacognosy by G. E. Trease, W. C. Evans, ELBS
2. Textbook of HPTLC by P. D. Seth.
3. Herbal Perfumes and cosmetics by Panda
4. Pharmacognosy by V. E Tyler, L R Brandy and JE Robbers (KM Varghese & co., Mumbai)
5. Natural Excipients by R. S Gaud, Surana.
6. Herbal Drug industry by RD Chowdary
7. Herbal Drug Technology by SS Agarwal
8. Pharmacognosy and Phytochemistry by VD Rangari.
9. Indian Pharmacopoeia
10. Dietetics by Sri Lakshmi
11. Pharmaceutical Dosage forms - Tablets (Vol I, II and III) by Lieberman, Lachman and Schwartz.
12. Pharmaceutical Dosage forms - Capsules (Vol I, II and III) by Avis, Lieberman and Lachman.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
I Year – II Sem M. Pharm (Pharmacognosy)

SCREENING METHODS IN PHARMACOLOGY (Core Elective - II)

Course Objective:

The students are going to study about various techniques for screening of drugs for various pharmacological activities and guide lines for handling animals and human and animal ethics for screening of drugs.

Course Outcome: The expected outcomes are students will know how to handle animals and know about various techniques for screening of drugs for different pharmacological activities, guidelines and regulations for screening new drug molecules on animals.

UNIT I

Care Handling and breeding techniques of laboratory animals, Regulations for laboratory animals, CPCSEA guidelines, alternatives to animal studies, Good laboratory Practices.

UNIT II

Bioassays: Basic principles of Biological standardization: Methods used in the bio-assay of Rabbits Vaccine, Oxytocin, Tetanus Antitoxin and Diphtheria Vaccine. Test for pyrogens.

UNIT III

Toxicity tests: OECD guidelines, determination of LD50, acute, sub-acute and chronic toxicity studies.

UNIT IV

Organization of screening for the Pharmacological activity of new substances with emphasis on the evaluation of cardiac and anti-diabetic activities.

UNIT V

Organization of screening for the Pharmacological activity of new substances with emphasis on the evaluation of psychopharmacological, anti-inflammatory and analgesic activities.

TEXT BOOKS:

1. Screening methods in Pharmacology, Vol.-1&2 by Robert .A. Turner and Peter Hebborn.
2. Drug discovery and evaluation by H. G. Vogel and W. H. Vogel, Springer-Verlag, Berlin Heidelberg.
3. Handbook of experimental pharmacology by S. K. Kulkarni, Vallabh Prakashan, Delhi.

REFERENCE BOOKS:

1. ICH of technical requirements for registration of pharmaceuticals for human use, ICH harmonized tripartite guidelines - Guidelines for good clinical practice, E6, May 1996.
2. Good clinical practice - Guidelines for Clinical trials on pharmaceutical products in India, Central drug standard control organization, New Delhi, Minister of Health- 2001.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
I Year – II Sem M. Pharm (Pharmacognosy)
MEDICINAL PLANT BIOTECHNOLOGY (Core Elective - II)

Course Objective: The topics are designed to help the students to get exposed to various techniques of plant tissue culture. Use the biotechnological techniques for obtaining and improving the Quality of natural products/medicinal plants

Course Outcome: Students will gain the knowledge about various strategies of plant tissue culture and students will gain knowledge about various secondary metabolites produced by plant tissue culture

UNIT I

Introduction to Plant biotechnology: Historical perspectives, prospects for development of plant biotechnology as a source of medicinal agents. Laboratory Organization, Sterilization techniques (Aseptic transfer) Concepts of Totipotency, Nutritional requirements, Media preparation, Explant preparation, Establishment of Aseptic cultures. Biotechnological applications of Plant Tissue culture in pharmacy and allied fields.

UNIT II

Different tissue culture techniques: Types and techniques of plant tissue culture, Organogenesis and embryogenesis, Protoplast fusion, synthetic seed and monoclonal variation, Micro propagation of medicinal and aromatic plants.

UNIT III

Immobilization techniques & Secondary Metabolite Production: Immobilization techniques of plant cell and its application, Precursors and elicitors on production of secondary metabolites, Cryopreservation of germ plasm.

UNIT IV

Biotransformation and Tran genesis: Biotransformation of Plant Cell Culture and its importance in secondary metabolite production. Bioreactors for pilot and large scale cultures of plant cells and retention of biosynthetic potential in cell culture. Transgenic technology- Hairy root multiple shoot cultures and their applications.

UNIT V

Secondary metabolism in tissue cultures with emphasis on production of medicinal agents- Production of Secondary metabolites from callus culture and suspension culture with emphasis on production of biomedicinals like- Ajmalicine, Artemicin, Shikonin, Carotenoids and Rosemarinic acid.

REFERENCES:

1. Pharmacognosy and Pharmacobiotechnology by Ashutoshkar
2. Introduction to plant tissue culture by M.K.Razadam
3. Plant Tissue Culture by Bhojwani
4. Medicinal Plant Biotechnolgy by ciddi veeresham
5. Molecular Biology and Biotechnology by J. M. Walker and E.D.Gingo
6. Advanced methods in Plant breeding and Biotechnology by David R Mirray
7. Biotechnology by Purohit and Mathur, Agro-Bio, 3rd revised edition.
8. Biotechnological applications to tissue culture by Shargool, Peter D, Shargoal, CKC Press.
9. Pharmacognosy by Varo E. Tyler, Lynn R. Brady and James E. Robbertt, That Tjen, NG
10. Plant tissue culture by Street
11. Medicinal plant biotechnology by Ciddi Veeresham
12. Pharmaceuticals biotechnology by S.P. Vyas & V.K.Dixit

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
I Year – II Sem M. Pharm (Pharmacognosy)

STABILITY OF DRUGS AND DOSAGE FORMS (Open elective – II)

Course Objective: These topics are designed impart a specialized knowledge to preserve the properties of drugs and dosage forms during manufacture storage and shelf life. The understanding of properties and evaluation of stability during storage, by solution and solid state against several factors of degradation

Course Outcome: The students should describe the evaluation of stability of solutions, solids, and formulations against adverse conditions. The students should be able to suggest the measures to retain stability and storage conditions for retaining the efficacy of the products.

UNIT - I

Drug decomposition mechanisms:

1. Hydrolysis and acyltransfers: Nature of reaction, structure and utility, stabilization of Pharmaceutical examples.
2. Oxidation: Nature of oxidation, kinetics of oxidation, oxidation pathways of pharmaceutical, Interest Inhibition of oxidation
3. Photolysis: Energetics of photolysis, kinetics photolysis, photolytic reactions of pharmaceutical interest, prevention of photolytic reactions.

UNIT - II

Solid state chemical decomposition: Kinetic of solids state decomposition, Pharmaceutical examples of solid state decomposition, Pure drugs, drug excipient and drug-drug interaction in solid state, methods of stabilization.

Physical stability testing of dosage forms:

1. Solids – tablets, capsules, powder and granules
2. Disperse systems
3. Microbial decomposition
4. Over-view, physical stability of novel drug carriers, liposomes, niosomes, nano-particles.

UNIT - III

Identification and quantitative determination of preservatives, Antioxidants, colouring materials, emulsifiers, and stabilizers in Pharmaceutical formulation.

Analysis of drugs from biological samples including, selection of biological sample, extraction of drugs by various methods as LLE, SPE and Membrane filtration. Factors affecting extraction of drugs.

UNIT - IV

General method of analysis to determine the quality of raw materials used in cosmetic industry. .. Indian Standard Specifications (ISI) laid down for sampling and testing of various cosmetics in finished form by the Bureau of Indian Standards.

UNIT - V

Methods of analysis to determine the quality of cosmetics in the finished forms such as Hair care products, Skin care products, Baby care products, Dental products, Personal hygiene products, Colour cosmetics, Ethnic products, Colour makeup preparation, Lipsticks, Hair setting lotions and Eye shadows. Toxicity testing in cosmetics and Safety and Legislation of Cosmetic products.

Stability studies: Concept of stability studies.

- a) cGMP& ICH guidelines for Accelerated stability Testing.
- b) Interaction of containers & closure Compatibility Testing.

REFERENCE BOOKS:

1. Comprehensive Pharmacy Review 5th Edition by Leon Shargel, Alan H. Mutnick, Paul F. Souney, Larry N. Sawnsen – 2004.
2. H. Beckett and J. B. Stenlake Practical Pharmaceutical Chemistry, Part I and Part II, 4th Edition. 3. G. H. Jeffery, J. Basset, J. Mendham, R. C. Denny (Rev. by) Vogels Text Book of Quantitative Chemical Analysis, 5th Edition 1989, ELBS.
3. The Controller of Publications; New Delhi, Govt. of India, Indian Pharmacopoeia, Vol. I and Vol. II - 2010.
4. J. B. Wilkinson and R. J. Moore: Herry's Cosmeticology; Longman Scientific and Technical Publishers, Singapore.
5. P. D. Sethi; Quantitative Analysis of Drugs in Pharmaceutical Formulations, 3rd Edition - 1997,
6. Classification of cosmetics raw materials and adjuncts IS 3958 of Indian Standards Institution (BIS).
7. Cosmetic and toilet goods – methods of sampling IS 3958 of Indian Standards Institution (BIS).
8. Methods of sampling and test for various cosmetics as laid down by Bureau of Indian Standards.
9. Drug stability: Principles and practices by Jens T. Carstensen
10. Stability Testing of Drug Products by W. Grimm. 12. Stability of Drugs and Dosage Forms by Yoshioka and Stella.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
I Year – II Sem M. Pharm (Pharmacognosy)

NANO BASED DRUG DELIVERY SYSTEMS (Open Elective – II)

Course Objective - To develop expertise regarding suitability and evaluation of nanomaterials, able to apply the properties to the fabrication of nanopharmaceutical, evaluate the intensity of dosage forms and availability for targeting and controlled delivery.

Course Outcomes – The students should be able to select the right kind of materials, able to develop nano formulations with appropriate technologies, evaluate the product related test and for identified diseases

UNIT I – Introduction to Nanotechnology

- Definition of nanotechnology
- History of nanotechnology
- Unique properties of nanomaterials
- Role of size and size distribution of nanoparticles properties, classification.

UNIT II – Synthesis of Nanomaterials

- a) Physical, chemical and biological Methods
- b) Methods for synthesis of
 - Gold nanoparticles
 - Magnetic nanoparticles
 - Polymeric nanoparticles
 - Self – assembly structures such as liposomes, micelles, aquasomes and nanoemulsions

UNIT III – Biomedical applications of Nanotechnology

- a) Nanotechnology products used for in vitro diagnostics
- b) Improvements to medical or molecular imaging using nanotechnology
- c) Targeted nanomaterials for diagnostic and therapeutic purpose

UNIT IV

Design of nanomaterials for drug delivery, pulmonary and nasal drug delivery, nanomaterials for cancer therapy and cardiovascular diseases. Localized drug delivery systems.

UNIT V

Characterization including the principles, size reduction, analysis of nanoparticles, size, PDI, size separation, stability, methods of analysis regarding integrity and release of drugs

RECOMMENDED BOOKS:

1. Nanomedicine and Nanoproducts: Applications, Disposition and Toxicology in the Human body, Eiki Igarashi, CRC press. 2015
2. Nanotechnology and Drug Delivery Volume one and two: Nanoplatforms in Drug Delivery, Jose L. Arias, CRC press
3. Nano: The Essentials: Understanding Nanoscience and Nanotechnology, T.Pradeep, Tata McGraw-Hill Publishing Company Limited, New Delhi, 2008.
4. Nanocrystals: Synthesis, Properties and Applications, C. N. R. Rao, P. J. Thomas and G.U. Kulakarni, Springer (2007)
5. Nanostructures and Nanomaterials: Synthesis, Properties and Application, Guozhong Gao, Imperial College Press(2004)

6. Nanochemistry: A Classical Approach to Nanomaterials – Royal Society for Chemistry, Cambridge, UK (2005)
7. Nanocomposite science and technology, pulickel M. Ajayan, Linda S. Schadler, paul V. Braun, Wiley-VCH Verlag, Weiheim (2003)
8. Nanoscale materials in chemistry, Edited by Kenneth J. Klabunde, John Wiley & Sons, 2009
9. Nanoparticles as Drug carriers, Vladimir P Torchiling, Imperial College Press, USA, 2006

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
I Year – II Sem M. Pharm (Pharmacognosy)

BIostatISTICS AND RESEARCH METHODOLOGY (Open Elective – II)

Course Objective: The student shall know the introduction, scope of biostatistics and Research work, calculation and present of the data. It also informs the students, how the present research work writing and correlating.

Course Outcome: The student will be known the Biostatistics arrangement, presentation, and formation of tables and charts. They also know the correlation and regression & application of different methods, analysis of data and also learn how to write dissertation, thesis and Research paper.

UNIT I

Introduction and scope of biostatistics: Use of statistics in Pharmacy. Population and Sample collection. Stages of research, types of data and methods of data collections. Data arrangement and presentation, formation of table and charts.

UNIT II

Measures of central tendency: computation of means, median and mode from grouped and ungrouped data.

Measure of dispersion: computation of variance, standard deviation, standard error and their coefficients.

UNIT III

Measures of Correlation and Regression: Experimental designing, planning of an experiment, replication, and randomization. Probit analysis.

Probability rules: Binomial, Poisson and Normal distribution.

Hypothesis testing: Student 't' test, Chi square test, Analysis of Variance (ANOVA): 1-way, 2-way, 3-ways

UNIT IV

Developing a research question, Resources for research question,

Literature Review: Traditional Qualitative Review,

Meta-Analysis—A Quantitative Review

Preparation of Research Proposal

Variables—Definition of Variable, Types of variables (Dependent and Independent variables, Confounded variables), Measurement of variables, Types of measurement scales and their comparison. Reliability and Validity of Measurements.

UNIT V

The research report paper writing/ thesis writing

Different parts of the research paper

1. Title-Title of project with authors' name
2. Abstract – Statement of the problem, Background list in brief and purpose and scope
3. Key words
4. Methodology- subject, apparatus, instrumentation and procedure
5. Results – tables, graphs figure and statistical presentation
6. Discussion support or non-support of hypothesis, practical and theoretical implications
7. Conclusion

8. Acknowledgements
9. References
10. Errata
11. Importance of Spell check for entire projects
12. Uses of footnotes

TEXT BOOKS:

1. Deepak Chawla Neena Sondhi, Research Methodology Concepts and Cases, Vikas books publishers
2. Donald H. McBurney -Theresa L. White "Research Methods" (Cengage learning India Pvt. Ltd)

REFERENCE BOOKS:

1. Remington"s Pharmaceutical Sciences
2. Theory & Practice of Industrial Pharmacy by Lachman
3. Statistics for business and economics 3rd edition by Vikas books publications
4. Biostatistics & Computer applications by G N Rao and N K Tiwari
5. Sokal, R.R. and Rohlf, F.J. 1987. An Introduction to Biostatistics. W.H. Freeman and Company.
6. Bailey, N. T. J. 1981. Statistical Methods in Biology. English University Press.
7. Mitchell, K. and Glover, T. 2001. Introduction to Biostatistics. McGraw Hill, Publishing Co.
8. Biostatistics and Computer Applications by G. N. Rao and N.K. Tiwari
9. Fundamentals of Biostatistics by Khan and Khanum
10. Research Methodology by R K Khanna bis and Suvasis Saha
11. Research methods and Quantity methods by G. N. Rao
12. A practical approach to PG dissertation.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
I Year – II Sem M. Pharm (Pharmacognosy)

ENTREPRENEURSHIP MANAGEMENT (Open Elective - II)

Course Objective: This course is designed to impart knowledge and skills necessary to train the Students on entrepreneurship management.

Course Outcome: On completion of this course it is expected that students will be able to understand,

- The Role of enterprise in national and global economy
- Dynamics of motivation and concepts of entrepreneurship
- Demands and challenges of Growth Strategies And Networking

UNIT I

Conceptual Frame Work: Concept need and process in entrepreneurship development. Role of enterprise in national and global economy. Types of enterprise – Merits and Demerits. Government policies and schemes for enterprise development. Institutional support in enterprise development and management.

UNIT II

Entrepreneur: Entrepreneurial motivation – dynamics of motivation. Entrepreneurial competency – Concepts. Developing Entrepreneurial competencies - requirements and understanding the process of entrepreneurship development, self-awareness, interpersonal skills, creativity, assertiveness, achievement, factors affecting entrepreneur role.

UNIT III

Launching And Organising An Enterprise: Environment scanning – Information, sources, schemes of assistance, problems. Enterprise selection, market assessment, enterprise feasibility study, SWOT Analysis. Resource mobilisation -finance, technology, raw material, site and manpower. Costing and marketing management and quality control. Feedback, monitoring and evaluation.

UNIT IV

Growth Strategies And Networking: Performance appraisal and assessment. Profitability and control measures, demands and challenges. Need for diversification. Future Growth – Techniques of expansion and diversification, vision strategies. Concept and dynamics. Methods, Joint venture, co-ordination and feasibility study.

UNIT V

Preparing Project Proposal to Start on New Enterprise Project work – Feasibility report; Planning, resource mobilization and implementation.

TEXT AND REFERENCE BOOKS:

1. Akhauri, M. M. P.(1990): Entrepreneurship for Women in India, NIESBUD, New Delhi.
2. Hisrich, R. D & Brush, C.G.(1996) The Women Entrepreneurs, D.C. Health & Co., Toronto.
3. Hisrich, R.D. and Peters, M.P. (1995): Entrepreneurship – Starting Developing and Managing a New Enterprise, Richard D., Inwin, INC, USA.
4. Meredith, G. G. etal (1982): Practice of Entrepreneurship, ILO, Geneva.
5. Patel, V.C. (1987): Women Entrepreneurship – Developing New Entrepreneurs, Ahmedabad EDII
6. Arya kumar.(2012): Entrepreneurship- Creating and Leading an Entrepreneurial Organization, Pearson

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I Year – II Sem M. Pharm (Pharmacognosy)

HERBAL AND COSMETICS ANALYSIS (Open Elective - II)

Course Objectives: This course is designed to impart knowledge on analysis of herbal products. Regulatory requirements; herbal drug interaction with monographs. Performance evaluation of cosmetic products is included for the better understanding of the equipments used in cosmetic industries for the purpose.

Course Outcomes: At completion of this course student shall be able to understand

- Determination of herbal remedies and regulations
- Analysis of natural products and monographs
- Determination of Herbal drug-drug interaction
- Principles of performance evaluation of cosmetic products.

UNIT I

Herbal remedies- Toxicity and Regulations: Herbals vs Conventional drugs, Efficacy of herbal medicine products, Validation of Herbal Therapies, Pharmacodynamic and Pharmacokinetic issues. Herbal drug standardization: WHO and AYUSH guidelines.

UNIT II

Adulteration and Deterioration: Introduction, types of adulteration/substitution of herbal drugs, Causes and Measure of adulteration, Sampling Procedures, Determination of Foreign Matter, DNA Finger printing techniques in identification of drugs of natural origin, heavy metals, pesticide residues, phototoxin and microbial contamination in herbal formulations.

Regulatory requirements for setting herbal drug industry: Global marketing management, Indian and international patent law as applicable herbal drugs and natural products and its protocol.

UNIT III

Testing of natural products and drugs: Effect of herbal medicine on clinical laboratory testing, Adulterant Screening using modern analytical instruments, Regulation and dispensing of herbal drugs, Stability testing of natural products, protocol. Monographs of Herbal drugs: Study of monographs of herbal drugs and comparative study in IP, USP, Ayurvedic Pharmacopoeia, American herbal Pharmacopoeia, British herbal Pharmacopoeia, Siddha and Unani Pharmacopoeia, WHO guidelines in quality assessment of herbal drugs.

UNIT IV

Herbal drug-drug interaction: WHO and AYUSH guidelines for safety monitoring of natural medicine, Spontaneous reporting schemes for bio drug adverse reactions, bio drug-drug and biodrug-food interactions with suitable examples. Challenges in monitoring the safety of herbal medicines.

UNIT V

Evaluation of cosmetic products: Determination of acid value, ester value, saponification value, iodine value, peroxide value, rancidity, moisture, ash, volatile matter, heavy metals, fineness of powder, density, viscosity of cosmetic raw materials and finished products. Study of quality of raw materials and general methods of analysis of raw material used in cosmetic manufacture as per BIS.

Indian Standard specification laid down for sampling and testing of various cosmetics in finished forms such as baby care products, skin care products, dental products, personal hygiene preparations, lips sticks. Hair products and skin creams by the Bureau Indian Standards.

REFERENCES:

1. Pharmacognosy by Trease and Evans
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JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
I Year – II Sem M.Pharm (Pharmacognosy)

ADVANCED PHARMACOGNOSY- II LAB

List of Experiments:

1. Estimation of total flavonoid content in herbal raw materials
2. Estimation of total phenolic content in herbal raw materials
3. Estimation of total alkaloid content in herbal raw materials
4. Determination of Sennoside content in Senna leaves by colorimetric analysis
5. Determination of Withania alkaloids/steroids by colorimetric analysis
6. Determination of moisture content and heavy metals in crude drugs.
7. Determination of adulterant herbal drugs.
8. Estimation of biochemical parameters using Auto analyzer.
9. Preparation and evaluation of any two hair care products.
10. Preparation and evaluation of any skin care products.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
I Year – II Sem M. Pharm (Pharmacognosy)

HERBAL DRUG TECHNOLOGY

List of Experiments:

1. Isolation of Lawsone from Henna leaves.
2. Isolation of Curcuminoids from Turmeric
3. Isolation of sennosides from senna leaves.
4. Determination of swelling index of natural gums.
5. Isolation of nucleic acid from cauliflower heads
6. Isolation and evaluation of starches from potatoes and rice
7. Preparation and standardization of any two herbal tablets
8. Preparation and evaluation of herbal ointments.
9. Extraction and isolation of coloring principles of Natural colorants
10. Isolation of Glycyrrhizin from *Glycyrrhiza glabra*