JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR
(Established by Govt. of A.P., ACT No.30 of 2008)
ANANTHAPURAMU – 515 002 (A.P) INDIA

M.PHARM. IN PHARMACOGNOSY
COURSE STRUCTURE & SYLLABI

SEMESTER – I

S. No.	Course codes	Course Name	Hours per week			Credits
			L	T	P	
1.	21S01101	Modern Pharmaceutical Analytical Techniques	4	-	-	4
2.	21S06101	Advanced Pharmacognosy-1	4	-	-	4
3.	21S06102	Phytochemistry	4	-	-	4
4.	21S06103	Industrial Pharmacognostical Technology	4	-	-	4
5.	21S01105	Modern Pharmaceutical Analytical Techniques Lab	-	-	6	3
6.	21S06104	Advanced Pharmacognosy – I Lab	-	-	6	3
7.	21DAC101a 21DAC101b 21DAC101c	**Audit Course – I** English for Research paper writing Disaster Management Sanskrit for Technical Knowledge	2	-	-	0
8.	21S06105	Seminar/Assignment	-	1	6	4
		Total	18	1	18	26

SEMESTER – II

S.No.	Course codes	Course Name	Hours per week			Credits
			L	T	P	
1.	21S06201	Advanced Pharmacognosy-II	4	-	-	4
2.	21S06202	Indian systems of medicine	4	-	-	4
3.	21S06203	Nutraceuticals and Herbal cosmetics	4	-	-	4
4.	21S06204	Medicinal Plant Biotechnology	4	-	-	4
5.	21S06205	Advanced Pharmacognosy-II Lab	-	-	6	3
6.	21S06206	Nutraceuticals and Herbal cosmetics Lab	-	-	6	3
7.	21DAC201a 21DAC201b 21DAC201c	**Audit Course – II** Pedagogy Studies Stress Management for Yoga Personality Development through Life Enlightenment Skills	2	-	-	0
8.	21S06207	Seminar/Assignment	-	1	6	4
		Total	18	1	18	26

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COURSE STRUCTURE

SEMSTER - III

S.No.	Course codes	Course Name	Hours per			Credits
			L	T	P	
1.	21DRM101	Research Methodology and Intellectual Property Right	4	-	-	4
2.	21SOE301d 21SOE301a 21SOE301c	**Open Elective** Biological Screening methods Pharmaceutical Validation Entrepreneurship Management	3	-	-	3
3.	21S06301	Teaching Practice/Assignment	-	-	4	2
4.	21S06302	Comprehensive viva voce	-	-	-	2
5.	21S06303	Research Work - I	-		24	12
		Total	7	-	32	23

SEMESTER - IV

S.No.	Course codes	Course Name	Hours per			Credits
			L	T	P	
1.	21S06401	Co-Curricular Activities	2			2
2.	21S06402	Research Work - II	3		30	18
		Total	5		30	20

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COURSE STRUCTURE & SYLLABI

Course Code	MODERN PHARMACEUTICAL ANALYTICAL TECHNIQUES	L	T	P	C
21S01101		4	0	0	4
	Semester	I			

Course Objectives:

This subject deals with various advanced analytical instrumental techniques for identification, characterization and quantification of drugs. Instruments dealt are NMR, Mass spectrometer, IR, HPLC, GC etc

Course Outcomes (CO): Student will be able to

After completion of course student is able to know about chemicals and excipients.

- The analysis of various drugs in single and combination dosage forms
- Theoretical and practical skills of the instruments

UNIT - I

UV-Visible spectroscopy

Introduction, Theory, Laws, Instrumentation associated with UV-Visible spectroscopy, Choice of solvents and solvent effect and Applications of UV-Visible spectroscopy, Difference/ Derivative spectroscopy.

UNIT - II

IR spectroscopy

Theory, Modes of Molecular vibrations, Sample handling, Instrumentation of Dispersive and Fourier -Transform IR Spectrometer, Factors affecting vibrational frequencies and Applications of IR spectroscopy, Data Interpretation

UNIT - III

NMR spectroscopy

Quantum numbers and their role in NMR, Principle, Instrumentation, Solvent requirement in NMR, Relaxation process, NMR signals in various compounds, Chemical shift, Factors influencing chemical shift, Spin-Spin coupling, Coupling constant, Nuclear magnetic double resonance, Brief outline of principles of FT-NMR and ^{13}C NMR. Applications of NMR spectroscopy.

UNIT - IV

Mass Spectroscopy

Principle, Theory, Instrumentation of Mass Spectroscopy, Different types of ionization like electron impact, chemical, field, FAB and MALDI, APCI, ESI, APPI Analyzers of Quadrupole and Time of Flight, Mass fragmentation and its rules, Meta stable ions, Isotopic peaks and Applications of Mass spectroscopy

UNIT - V Chromatography

Chromatography

Introduction to chromatography and classification of chromatographic methods based on the mechanism of separation, Principle, instrumentation, selection of solvents; chromatographic parameters, factors affecting resolution, applications of the following:

a) Thin Layer chromatography; b) High Performance Thin Layer Chromatography
c) Paper Chromatography; d) Column chromatography
e) Gas chromatography; f) High Performance Liquid chromatography
g) Affinity chromatography; h) Gel Chromatography
i)Hyphenated techniques :

- Ultra High Performance Liquid chromatography- Mass spectroscopy
- Gas Chromatography-Mass Spectroscopy

Reference Books:

1. Instrumental Methods of Chemical Analysis by B.K Sharma

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COURSE STRUCTURE

2. Vogel's Text book of Quantitative Chemical Analysis by A.I. Vogel
3. Spectrometric Identification of Organic compounds - Robert M Silverstein,Sixth edition, John Wiley & Sons, 2004.
4. Principles of Instrumental Analysis - Doglas A Skoog, F. James Holler,Timothy A. Nieman, 5th edition, Eastern press, Bangalore, 1998.
5. Instrumental methods of analysis – Willards, 7th edition, CBS publishers.
6. Practical Pharmaceutical Chemistry – Beckett and Stenlake, Vol II, 4thedition, CBS Publishers, New Delhi, 1997.
7. Organic Spectroscopy - William Kemp, 3rd edition, ELBS, 1991.
8. Quantitative Analysis of Drugs in Pharmaceutical formulation - P D Sethi,3rd Edition, CBS Publishers, New Delhi, 1997.
9. Pharmaceutical Analysis - Modern Methods – Part B - J W Munson, Vol11, Marcel. Dekker Series
10. Spectroscopy of Organic Compounds, 2nd edn., P.S/Kalsi, Wiley esternLtd., Delhi.
11. Textbook of Pharmaceutical Analysis, KA.Connors, 3rd Edition, John Wiley& Sons, 1982.
12. Organic Chemistry by I. L. Finar
13. Quantitative Analysis of Drugs by D. C. Garrett
14. HPTLC by P.D. Seth
15. Indian Pharmacopoeia 2007
16. High Performance thin layer chromatography for the analysis of medicinal plants by Eike
17. Reich, Anne Schibli Introduction to instrumental analysis by Robert. D. Braun

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Course Code	ADVANCED PHARMACOGNOSY- I	L	T	P	C
21S06101		4	0	0	4
	Semester	**I**			

Course Objectives:

To provide an opportunity for the students to understand the cultivation and utilization aspects of drugs falling under this chapter. Helps the students to get exposed to various techniques of plant tissue culture and explore marine origin natural products

Course Outcomes (CO): Student will be able to

The students will gain applicable knowledge about the traditional plants and marine source which helps them to work upon them for proving their use scientifically.

UNIT – I

Plant drug cultivation: a) General introduction to the importance of Pharmacognosy in herbal drug industry, Indian Council of Agricultural Research, Current Good Agricultural Practices, Current Good Cultivation Practices.
b) Post harvesting techniques and utilization of the following Medicinal and Aromatic plants: Ashwagandha, Saffron, Safed musli, Davana, Pachouli and Lemon grass

UNIT – II

A brief account on Chemical and Pharmacological aspects and uses of the following medicinal plants-
1. Immunomodulators
a. Asparagus racemosus
b. Withania somnifera
2. Antidiabetics
a. Gymnema sylvestera
b. Momordica charantia
3. Hepatoprotectives
a. Phyllanthus amarus
b. Silybum marianum
4. Cardioprotectives
a. Coleus forskolin
b. Cinerarifolium

UNIT - III

Marine Pharmacognosy:
A brief account of natural products derived from Marine sources with special reference to Cardiovascular, anti-cancer, anti-viral, anti-microbial, anti-parasitic, anticoagulant and anti-inflammatory agents.

UNIT – IV

a) Definitions of Functional foods, Nutraceuticals and Dietary supplements. Classification of Neutraceuticals, 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 neutraceuticals like Spirulina, Soyabean, Ginseng, Ginger, Broccoli, Ginkgo, Flaxseeds, Black cohosh.

UNIT – V

Phytopharmaceuticals:
Occurrence, isolation and characteristic features (Chemical nature, uses in pharmacy, medicinal and health benefits) of following.

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COURSE STRUCTURE

a) Carotenoids – i) α and β - Carotene ii) Xanthophylls b) Limonoids – i) d-Limonene ii) α – Terpineol c) Flavonoids – i) Reservetrol l ii) Rutin iii) Hesperidin iv) Naringin v) Quercetin d) Phenolic acids- Ellagic acid e) Saponins – Shatavarins f) Vitamins- Tocotrienols and Tocopherols
Textbooks:
TEXT BOOKS: 1) Standardization by Botanicals by V.Rajpal , Vol1 , Eastern Publishers New Delhi 2) Cultivation of Medicinal and Aromatic Crops by A A Farooki 3) Advances in Horticulture by Dr. K.L. Chadha 4) Pharmacognosy and Phytochemistry, A Comprehensive Approach 2nd Edition by S.L. Doore, S.S Khadabadi and B.A. Baviskar 5) A Text Book of Pharmacognosy by NPS Senegar, Ritesh Agarwal and Ashwini Singh
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. Healing plants of peninsular India by Parrota CABI Publications. 8. Principles of integrated medicines by Mathur PR 9. Handbook of Nutraceuticals and Functional Foods, Third Edition (Modern Nutrition)

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COURSE STRUCTURE & SYLLABI

Course Code	PHYTOCHEMISTRY	L	T	P	C
21S06102		4	0	0	4
	Semester	I			

Course Objectives:

Helps the students to get exposed to natural product drug discovery and to perform quantitative and qualitative evaluation of herbal extracts.
To understand the chemistry of important phytoconstituents of different categories.

Course Outcomes (CO): Student will be able to

On the basis of chemistry data of phytoconstituents students will acquire knowledge on various types of phytoconstituents present in the plants.

UNIT - I

Biosynthetic pathways and Radio tracing techniques: containing drugs:
a) Methods of Biogenetic Investigations, detailed study of isotropic tracer techniques.
b) Study of Biosynthetic pathways of following phyto-pharmaceuticals: Atropine, Morphine, Cardiac glycosides and Flavonoids.

UNIT - II

Drug discovery and development: Approaches to discovery and development of natural products as potential new drugs. Sourcing and archiving Natural products for discovery, evaluating natural products for therapeutic properties, identifying the biologically active Natural products, the lead structure selection process and optimization with suitable examples from the following sources: artemesin, andrographolides.

UNIT - III

a) Extraction/Isolation methods for specific Phytochemical groups, Choice of solvents and interfering compounds for general Isolation and purification of desired phytoconstituents.
b) Recent sophisticated extraction techniques like: Super critical fluid extraction and Ultra- sonic extraction. Separation of phytoconstituents by Vacuum and Flash column chromatography.

UNIT – IV

a) Phytochemical finger printing: HPTLC and LCMS/GCMS applications in the characterization of herbal extracts. Structure elucidation of phytoconstituents (Opium, Quinoline & Iso- Quinoline Alkaloids).
b) Structure elucidation of the following compounds by spectroscopic techniques like UV, IR, MS, NMR (1H, 13C)
a. Carvone, Citral, Menthol
b. Luteolin, Kaempferol
c. Nicotine, Caffeine
d. Glycyrrhizin.

UNIT – V

a. Natural colorants: Biological Source, colouring principles, chemical nature and usage of the following Annatto, Cochineal, Caramel, Henna, Indigo, Madder, Saffron , Turmeric
b. Flavours and Perfumes: Sandal wood oil, Orange oil, Lemon oil, Palmarosa oil, Geranium oil.

Textbooks:

1) Pharmacognosy and phytochemistry by Biren seth
2) Pharmacognosy and Phytochemistry by VD Rangari.
3) Textbook of Pharmacognosy by G.E.Trease, W.C.Evans,ELBS
4) Biosynthetic pathways in Higher Plants by J.B. Pridham and T. Swain, Elsevier Publications
5) A Text Book of Pharmacognosy by NPS Senegar, Ritesh Agarwal and Ashwini Singh

Reference Books:

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COURSE STRUCTURE

1) Phytochemical methods of chemical analysis by Harbone
2) Modern methods of plant analysis- peach & M.V.Tracey Vol.1 to VII
3) Pharmacognosy & Phytochemistry of medical plants by Jean Brunton
4) Thin layer chromatography by Stahl
5) Chemistry of natural products by Atur Rahman
6) Comprehensive Medicinal Chemistry, Vol 1-6, Elsevier Publication
7) Medicinal Chemistry Drug Discovery by Donald J, Abrahm,
8) Plant drug analysis by Wagner
9) Clarke's isolation & identification of drugs by AC Mottal
10) Chromatography of Alkaloids by Varpoorte Swendson
11) Jenkins Quantitative pharmaceutical chemistry by AN Kenwell
12) Standardisation of botanicals by V. Rajpal Vol 1 & 2
13) Medicinal chemistry and drug discovery by Burger's
14) Foye's Principles of medicinal chemistry .
15) Herbal Perfumes and cosmetics by Panda
16) Herbal Drug Technology by SS Agarwal

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COURSE STRUCTURE & SYLLABI

Course Code	INDUSTRIAL PHARMACOGNOSTICAL TECHNOLOGY	L	T	P	C
21S06103		4	0	0	4
	Semester	I			

Course Objectives:

To understand the Industrial and commercial potential of drugs of natural origin, integrate traditional Indian systems of medicine with modern medicine and also to know regulatory and quality policy for the trade of herbals and drugs of natural origin.

Course Outcomes (CO): Student will be able to

By the end of the course the student shall be able to know: The requirements for setting up the herbal/natural drug industry. The guidelines for quality of herbal/natural medicines and regulatory issues. The patenting/IPR of herbals/natural drugs and trade of raw and finished materials.

UNIT – I

Herbal drug industry:
a) Study of infrastructure, staff requirements, project profile, plant and equipment applicable to herbal drug industry. Plant design, layout and construction. Pilot plant scale –up techniques.
b) GMP and GLP

UNIT – II

Regulatory requirements for setting herbal drug industry: Global marketing management. Regulatory requirements Export - Import (EXIM) policy. TRIPS
Quality assurance in herbal/ natural drug products. Concepts of TQM, ISO-9000.

UNIT – III

a) A brief account of companies making herbal drug formulations: List of formulations containing single herbal powder/extract, poly herbal powder/ extracts and their composition and uses.
b) Monographs of herbal drugs: General parameters of monographs of herbal drugs in Ayurvedic Pharmacopoeia, Herbal Pharmacopoeia.

UNIT – IV

a) Testing of natural products and drugs: Herbal medicines - clinical laboratory testing.
b) Stability testing of natural products: Indicative substances for quality assurance, GMP and HACCP in traditional system of medicine, methods of stabilization validation of analytical procedures.

UNIT – V

Patents: Patenting of herbal drugs: Benefits of patent protection, Patent application, drafting and filing an application. Indian and international patent laws, proposed amendments as applicable to herbal/natural products and process. Geographical indication, Copyright, Patentable subject maters, novelty, non obviousness, utility, patent processing and grant of patents.

Textbooks:

1. Herbal drug industry by R.D. Choudhary (1996), Eastern Publisher, New Delhi.
2. Text book of Pharmacognosy and Phytochemistry by Vinod D. RangarI (2002), Part I & II, Career Publication, Nasik, India.
3. Quality control of herbal drugs by P.K. Mukherjee
4. Herbal Drug Technology by SS Agarwal and paridhavi
5. Pharmacognosy and Phytochemistry, A Comprehensive Approach 2nd Edition by S.L. Doore, S.S Khadabadi and B.A. Baviskar

Reference Books:

(Latest Editions of)
1. GMP for Botanicals - Regulatory and Quality issues on Phytomedicine by Pulok K Mukharjee

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COURSE STRUCTURE

(2003) 1st Edition, Business horizons Robert Verpoorte, New Delhi.
3. Quality control of herbal drugs by Pulok K Mukarjee (2002), Business Horizons Pharmaceutical Publisher, New Delhi.
4. PDR for Herbal Medicines (2000), Medicinal Economic Company, New Jersey.
5. Herbal Drugs Quality and Chemistry by D. D. Joshi

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COURSE STRUCTURE & SYLLABI

Course Code	MODERN PHARMACEUTICAL ANALYTICAL TECHNIQUES LAB		L	T	P	C
21S01105			0	0	6	3
Pre-requisite		Semester	I			

1. Analysis of Pharmacopoeial compounds and their formulations by UV Vis Spectrophotometer.
2. Simultaneous estimation of multi component containing formulations by UV Spectrophotometry
3. Effect of pH and solvent on UV –Spectrum
4. Determination of Molar absorption coefficient
5. Estimation of riboflavin/ quinine sulphate by fluorimetry
6. Study of quenching effect by fluorimetry
7. Estimation of sodium or potassium by flame photometry
8. Colorimetric determination of drugs by using different reagents
9. Quantitative determination of functional groups
10. Experiments based on Column chromatography
11. Experiments based on HPLC
12. Experiments based on Gas Chromatography

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Course Code	ADVANCED PHARMACOGNOSY-I Lab	L	T	P	C
21S06104		0	0	6	3
	Semester	I			

1. Phytochemical screening.
2. Fluorescence analysis of biodrugs.
3. Development of fingerprint of selected medicinal plant extracts commonly used in herbal drug industry viz. Ashwagandha, Tulsi, Bael, Amla, Ginger,Aloe, Vidang, Senna, Lawsonia by PC & TLC/HPTLC methods.
4. Determination of leaf constants.
5. Determination of volatile oil content.
6. Monograph analysis of Volatile oil like Clove oil.
7. Monograph analysis of fixed oil like Castor oil.
8. Identification of bioactive constituents from plant extracts.
9. Estimation of bioactive constituents.
10. Formulation of different dosage forms and their standardization.
11. Preparation and standardization of simple ISM dosage forms.
12. Preparation of aromatherapy formulation.

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COURSE STRUCTURE & SYLLABI

Course Code	ADVANCED PHRMACOGNOSY-II	L	T	P	C
21S06201		4	0	0	4
	Semester	II			

Course Objectives:

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

Course Outcomes (CO): Student will be able to

Upon completion of the course, the student shall be able to know the, standardization and evaluation techniques for the herbal drugs.

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, microbial contamination in herbs and their formulations.

UNIT – II

a) A brief account on standardization parameters of herbal drugs.
b) Analytical Profiles of herbal drugs: Andrographis paniculata, Boswellia serata, Coleus forskholii, Curcuma longa, Embelica officinalis, Psoralea corylifolia.

UNIT – III

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 – IV

Ethnobotany and Ethnopharmacology: Ethnobotany in herbal drug evaluation, Impact of Ethnobotany in traditional medicine, New development in herbals, Bio-prospecting tools for drug discovery, Role of Ethnopharmacology in drug evaluation, Reverse Pharmacology.

UNIT – V

Biological screening of herbal drugs: Introduction and need for Phyto Pharmacological screening, new strategies for evaluating Natural products, invitro evaluation techniques for antioxidants, antimicrobial. invivo evaluation of antiulcer, anticancer, wound healing, Hepatoprotectives

Textbooks:

TEXT BOOKS
1. Quality control of herbal drugs by P.K. Mukherjee
2. Standardization of botanicals by V. Rajpal, Vol I &II
3. Herbal Drug industry by Paridhavi
4. Pharmacognosy and Phytochemistry, A Comprehensive Approach 2nd Edition by S.L. Doore, S.S Khadabadi and B.A. Baviskar
5. A Text Book of Pharmacognosy by NPS Senegar, Ritesh Agarwal and Ashwini Singh

Reference Books:

1. Phytochemical methods of chemical analysis by Harbone
2. Indian herbal Pharmacopoeia
3. Dietetics by Sri Lakshmi
4. Herbal Drug industry by Chowdary

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COURSE STRUCTURE

Course Code	INDIAN SYSTEM OF MEDICINE	L	T	P	C
21S06202		4	0	0	4
	Semester	**II**			
Course Objectives:					
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 Outcomes (CO): Student will be able to					
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. 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. Vati : Eladi vati, Lavangadi vati c. Taila: Bhringaraj taila, Shatabindu taila. d. Bhasma: Swarna bhasma, Loha bhasma e. Ghrita : Brahmi ghrita, Jhatyadhi ghrita f. Asavas/Arishtas: Chandan asava, Dashamoola arishta g. Lehya : Vasavalehya, Kusumandavalehya					
UNIT - III					
Naturopathy and Yoga practices: a) Naturopathy - Introduction, basic principles and treatment modalities. b) Yoga - Introduction and Streams of Yoga. Asanas, Pranayama, Meditations and Relaxation techniques.					
UNIT - IV					
a) 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. b) Siddha systems of medicines, their merits and demerits					
UNIT - V					
a) Principles of Unani and. Introduction to different dosage forms and method of preparations of Unani medicines. b) Aromatherapy – Introduction, aroma oils for common problems, carrier oils.					
Textbooks:					
TEXT BOOKS: 1. Standardization by Botanicals by V.Rajpal , Vol1 , Eastern Publishers New Delhi 2. Healing plants of peninsular India by Parrota CABI Publications. 3. Principles of integrated medicines by Mathur PR 4. Principles and Practice of Homeopathy by Dr. M. L. Dhawale 5. The Complete Book of Essential Oils and Aromatherapy by Valerie Ann Worwood 6. Handbook on Unani Medicines with Formulae, Processes, Uses and Analysis					
Reference Books:					

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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) Vaidya Yoga Ratnavali (Formulary of Ayurvedic Medicines)
8) Ayurvedic drugs and their plant sources by VV. Sivarajan
9) Augmented textbook of Homeopathic Pharmacy by Dr. D. D. Benerjee
10) Yoga - The Science of Holistic Living by V.K.Yoga, Vivekananda Yoga Prakashna Publishing, Bangalore.
11) Homeopathic Pharmacopoeia. Formulary of Homeopathic Medicines, IMCOPS, Chennai.

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COURSE STRUCTURE

Course Code	NEUTRACEUTICALS AND HERBAL COSMETICS	L	T	P	C
21S06203		4	0	0	4
	Semester	**II**			

Course Objectives:

Objectives: The topics helps the students to get exposed to processes involved in the manufacturing of herbal cosmetics including the skin and hair care herbal products preparation and their evaluation.

Course Outcomes (CO): Student will be able to

The students will expose to characteristic features of various phytochemicals as neutraceuticals in various diseased conditions and also know the role of antioxidant in free radical induced disease conditions and will expose to various food laws and regulations. Scientific knowledge to develop nutraceuticals and herbal cosmetics with desired Safety, stability, and efficacy.

UNIT - I — 12Hrs

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 / functional foods: Spirulina, Soyabean, Ginseng, Garlic, Broccoli, Gingko, Flaxseeds

UNIT - II — 12Hrs

Phytochemicals as neutraceuticals: Occurrence and characteristic features(chemical nature medicinal benefits) of following
a) Carotenoids- α and β-Carotene, Lycopene, Xanthophylls, lutein
b) Sulfides: Diallylsulfides, Allyltrisulfide.
c) Polyphenolics: Reservetrol
d) Flavonoids- Rutin, Naringin, Quercitin, Anthocyanidins, catechins, Flavones
e) Prebiotates / Probiotics: Fructo oligosaccharides, Lacto bacillum
f) Phytoestrogens : Isoflavones, daidzein, Geebustin, lignans
g) Tocopherols

UNIT – III

a) Introduction to free radicals: Free radicals, reactive oxygen species, production of Free radicals in cells, damaging reactions of free radicals on lipids, proteins, Carbohydrates, nucleic acids.
b) Measurement of free radicals: Lipid peroxidation products, lipid hydroperoxide, malondialdehyde.
c) Antioxidants: Endogenous antioxidants – enzymatic and nonenzymatic antioxidant defence, Superoxide dismutase, catalase, Glutathione peroxidase, Glutathione
Vitamin C, Vitamin E, α- Lipoic acid, melatonin
Synthetic antioxidants : Butylatedhydroxy Toluene, Butylatedhydroxy Anisole.

UNIT – IV — 12Hrs

Cosmoceuticals of herbal and natural origin: Hair growth formulations, Shampoos, Conditioners, Colorants & hair oils, Fairness formulations, vanishing & foundation creams, anti-sunburn preparations, moisturizing creams, deodorants.
Analysis of Cosmetics, Toxicity screening and test methods: Quality control and toxicity studies as per Drug and Cosmetics Act.

UNIT – V — 12Hrs

Food Laws and Regulations; FDA, FPO, MPO, AGMARK. HACCP and GMPs on Food Safety. Adultration of foods.

Regulations and Claims – Current Products: Label Claims, Nutrient Content Claims, Health Claims, Dietary Supplements Claims
Textbooks:
1) Advanced Nutritional Therapies by Cooper. K.A., (1996). 2) The Food Pharmacy by Jean Carper, Simon & Schuster, UK Ltd., (1988). 3) Handbook of Nutraceuticals and Functional Foods, Third Edition (Modern Nutrition) 4) Herbal Cosmetics Hand Book- H. Panda 5) Herbal Cosmetics by P.K Chattopadhyay 6) The Complete Technology Book on Herbal Perfumes and Cosmetics by H. Panda 7) Supriya K B. Handbook of Aromatic Plants, Pointer Publishers, Jaipur.
Reference Books:
1. Dietetics by Sri Lakshmi 2. Role of dietary fibres and neutraceuticals in preventing diseases by K.T Agusti and P.Faizal: BSPunblication. 3. Prescription for Nutritional Healing by James F.Balch and Phyllis A.Balch2ndEdn., Avery Publishing Group, NY (1997). 4. G. Gibson and C.williams Editors 2000 Functional foods WoodheadPubl.Co.London. 5. Goldberg, I. Functional Foods. 1994. Chapman and Hall, New York. 6. Labuza, T.P. 2000 Functional Foods and Dietary Supplements: Safety, Good Manufacturing Practice (GMPs) and Shelf Life Testing in Essentials of Functional Foods M.K. Sachmidl and T.P. Labuza eds. Aspen Press. 7. Shils, ME, Olson, JA, Shike, M. 1994 Modern Nutrition in Health and Disease. Eighthedition. Lea and Febiger 8. Cosmetics- Formulation, Manufacturing and Quality control –P.P.Sharma 9. Skaria P. Aromatic Plants (Horticulture Science Series), New India Publishing Agency, New Delhi. 10. Kathi Keville and Mindy Green. Aromatheraphy (A Complete Guide to the Healing Art), Sri Satguru Publications, New Delhi. 11.Chattopadhyay PK. Herbal Cosmetics & Ayurvedic Medicines (EOU), National Institute of Industrial Research, Delhi. 12. Balsam MS & Edward Sagarin. Cosmetics Science and Technology, Wiley Interscience, New York.

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M.PHARM. IN PHARMACOGNOSY

COURSE STRUCTURE

Course Code	MEDICINAL PLANT BIOTECHNOLOGY	L	T	P	C
21S06204		4	0	0	4
	Semester	II			

Course Objectives:

Upon completion of the course, the student shall be able to,

- Know the process like genetic engineering in medicinal plants for higher yield of Phytopharmaceuticals.
- Use the biotechnological techniques for obtaining and improving the quality of natural products/medicinal plants

Course Outcomes (CO): Student will be able to

To explore the knowledge of Biotechnology and its application in the improvement of quality of medicinal plants

UNIT - I

Introduction to Plant biotechnology: Historical perspectives, prospects for development of plant biotechnology as a source of medicinal agents. Applications in pharmacy and allied fields. Genetic and molecular biology as applied to pharmacognosy, study of DNA, RNA and protein replication, genetic code, regulation of gene expression, structure and complicity of genome, cell signaling, DNA recombinant technology.

UNIT - II

Different tissue culture techniques: Organogenesis and embryogenesis, synthetic seed and monoclonal variation, Protoplast fusion, Hairy root multiple shoot cultures and their applications. Micro propagation of medicinal and aromatic plants. Sterilization methods involved in tissue culture, gene transfer in plants and their applications.

UNIT – III

Immobilisation techniques & Secondary Metabolite Production: Immobilization techniques of plant cell and its application on secondary metabolite Production. Cloning of plant cell: Different methods of cloning and its applications. Advantages and disadvantages of plant cell cloning. Secondary metabolism in tissue cultures with emphasis on production of medicinal agents. Precursors and elicitors on production of secondary metabolites.

UNIT – IV

Biotransformation and Transgenesis: Biotransformation, bioreactors for pilot and large scale cultures of plant cells and retention of biosynthetic potential in cell culture. Transgenic plants, methods used in gene identification, localization and sequencing of genes. Application of PCR in plant genome analysis.

UNIT - V

Fermentation technology: Application of Fermentation technology, Production of ergot alkaloids, single cell proteins, enzymes of pharmaceutical interest.

Reference Books:

1. Plant tissue culture, Bhagwani, vol 5, Elsevier Publishers.
2. Plant cell and Tissue Culture (Lab. Manual), JRMM. Yeoman.
3. Elements in biotechnology by PK. Gupta, Rastogi Publications, New Delhi.
4. An introduction to plant tissue culture by MK. Razdan, Science Publishers.
5. Experiments in plant tissue culture by John HD and Lorin WR. CambridgeUniversity Press.
6. Pharmaceutical biotechnology by SP. Vyas and VK. Dixit, CBS Publishers.
7. Plant cell and tissue culture by Jeffrey W. Pollard and John M Walker, Humana press.

8. Plant tissue culture by Dixon, Oxford Press, Washington DC, 1985
9. Plant tissue culture by Street.
10.Pharmacognosy by G. E. Trease and WC. Evans, Elsevier.
11.Biotechnology by Purohit and Mathur, Agro-Bio, 3rd revised edition.
12.Biotechnological applications to tissue culture by Shargool, Peter D,Shargoal, CKC Press.
13.Pharmacognosy by Varo E. Tyler, Lynn R. Brady and James E. Robberrt,ThatTjen, NGO.
14. Plant Biotechnology, CiddiVeerasham.

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M.PHARM. IN PHARMACOGNOSY

COURSE STRUCTURE

Course Code	ADVANCED PHARMACOGNOSY – II LAB	L	T	P	C
21S06205		0	0	6	3
	Semester	II			

List of Experiments:
1) Preparation and standardization of any two herbal tablets
2) Estimation of total alkaloid content in herbal raw materials
3) Estimation of total flavonoid content in herbal raw materials
4) Formulation of different dosage forms and their standardization.
5) Estimation of aldehyde and ketone in volatile oils by titrimetric methods
6) Estimation of phenolic substances
7) Determination of Sennoside content in Senna leaves by colorimetric analysis
8) Determination of Withania alkaloids/steroids by colorimetric analysis
9) Determination of moisture content, heavy metals and ash values of crude drugs
10) Microscopical evaluation of organized powder crude drugs
11) Screening of herbal extracts/ products for anti microbial and antifungal
12) Screening of herbal extracts/ products for antioxidant activity by free radical scavenging methods
13) Study of analytical profile of any two plants mentioned in theory with specialemphasis on marker compounds

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M.PHARM. IN PHARMACOGNOSY
COURSE STRUCTURE & SYLLABI

Course Code	NUTRACEUTICALS AND HERBAL COSMETICS LAB	L	T	P	C
21S06206		0	0	6	3
	Semester	II			

List of Experiments:
1. Preparation of Herbarium
2. Preparation and standardization of various simple dosage forms from Ayurvedic system.
3. Preparation of Oral rehydration Solution (ORS)
4. Preparation of Protein Powder
5. Preparation of Herbal Neutraceuticals using Ginseng, Spirulina etc.
6. Formulation of Sports food
7. Preparation of Multivitamin formulations
8. Preparation of herbal cosmetic formulation such as lipstick, herbal hair and nail care products
9. Preparation of sunscreen, skin care formulations
10. Evaluation of herbal tablets and capsules
11. Preparation and evaluation of any two of each hair care and skin care products
12.Preparation and Evaluation of Ascorbic acid tablets
13. Preparation of Iron supplements
14. Preparation and evaluation of herbal acid balanced shampoo

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M.PHARM. IN PHARMACOGNOSY

COURSE STRUCTURE

Course Code	RESEARCH METHODOLOGY AND	L	T	P	C
21DRM101	INTELLECTUAL PROPERTY RIGHTS	4	0	0	4
	Semester	III			

Course Objectives:

Scope:

- To understand the research problem
- To know the literature studies, plagiarism and ethics
- To get the knowledge about technical writing
- To analyze the nature of intellectual property rights and new developments
- To know the patent rights

Course Outcomes (CO): Student will be able to

Objectives: At the end of this course, students will be able to

- Understand research problem formulation.
- Analyze research related information
- Follow research ethics
- Understand that today's world is controlled by Computer, Information Technology, but tomorrow world will be ruled by ideas, concept, and creativity.
- Understanding that when IPR would take such important place in growth of individuals & nation, it is needless to emphasis the need of information about Intellectual Property Right to be promoted among students in general & engineering in particular.
- Understand that IPR protection provides an incentive to inventors for further research work and investment in R & D, which leads to creation of new and better products, and in turn brings about, economic growth and social benefits.

UNIT – I

Meaning of research problem, Sources of research problem, Criteria Characteristics of a good research problem, Errors in selecting a research problem, Scope and objectives of research problem. Approaches of investigation of solutions for research problem, data collection, analysis, interpretation, Necessary instrumentations

UNIT – II

Effective literature studies approaches, analysis, Plagiarism, Research ethics

UNIT – III

Effective technical writing, how to write report, Paper Developing a Research Proposal, Format of research proposal, a presentation and assessment by a review committee

UNIT – IV

Nature of Intellectual Property: Patents, Designs, Trade and Copyright. Process of Patenting and Development: technological research, innovation, patenting, development. International Scenario: International cooperation on Intellectual Property. Procedure for grants of patents, Patenting under PCT.

UNIT – V

Patent Rights: Scope of Patent Rights. Licensing and transfer of technology. Patent information and databases. Geographical Indications. New Developments in IPR: Administration of Patent System. New developments in IPR; IPR of Biological Systems, Computer Software etc. Traditional knowledge Case Studies, IPR and IITs.

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COURSE STRUCTURE & SYLLABI

Textbooks:
1. Stuart Melville and Wayne Goddard, "Research methodology: an introduction for science & engineering students'" 2. Wayne Goddard and Stuart Melville, "Research Methodology: An Introduction"
Reference Books:
1. Ranjit Kumar, 2nd Edition, "Research Methodology: A Step by Step Guide for beginners" 2. Halbert, "Resisting Intellectual Property", Taylor & Francis Ltd ,2007. 3. Mayall, "Industrial Design", McGraw Hill, 1992. 4. Niebel, "Product Design", McGraw Hill, 1974. 5. Asimov, "Introduction to Design", Prentice Hall, 1962. 6. Robert P. Merges, Peter S. Menell, Mark A. Lemley, "Intellectual Property in New 7. Technological Age", 2016. 8. T. Ramappa, "Intellectual Property Rights Under WTO", S. Chand, 2008

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COURSE STRUCTURE

AUDIT COURSE-I

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M.PHARM. IN PHARMACOGNOSY
COURSE STRUCTURE & SYLLABI

Course Code	ENGLISH FOR RESEARCH PAPER WRITING	L	T	P	C
21DAC101a		2	0	0	0
	Semester	I			

Course Objectives: This course will enable students:

- Understand the essentials of writing skills and their level of readability
- Learn about what to write in each section
- Ensure qualitative presentation with linguistic accuracy

Course Outcomes (CO): Student will be able to

- Understand the significance of writing skills and the level of readability
- Analyze and write title, abstract, different sections in research paper
- Develop the skills needed while writing a research paper

UNIT - I		Lecture Hrs:10

1Overview of a Research Paper- Planning and Preparation- Word Order- Useful Phrases - Breaking up Long Sentences-Structuring Paragraphs and Sentences-Being Concise and Removing Redundancy -Avoiding Ambiguity

UNIT - II		Lecture Hrs:10

Essential Components of a Research Paper- Abstracts- Building Hypothesis-Research Problem - Highlight Findings- Hedging and Criticizing, Paraphrasing and Plagiarism, Cauterization

UNIT - III		Lecture Hrs:10

Introducing Review of the Literature – Methodology - Analysis of the Data-Findings - Discussion-Conclusions-Recommendations.

UNIT - IV		Lecture Hrs:9

Key skills needed for writing a Title, Abstract, and Introduction

UNIT - V		Lecture Hrs:9

Appropriate language to formulate Methodology, incorporate Results, put forth Arguments and draw Conclusions

Suggested Reading

1. Goldbort R (2006) Writing for Science, Yale University Press (available on Google Books) Model Curriculum of Engineering & Technology PG Courses [Volume-I]
2. Day R (2006) How to Write and Publish a Scientific Paper, Cambridge University Press
3. Highman N (1998), Handbook of Writing for the Mathematical Sciences, SIAM. Highman'sbook
4. Adrian Wallwork , English for Writing Research Papers, Springer New York Dordrecht Heidelberg London, 2011

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COURSE STRUCTURE

Course Code	DISASTER MANAGEMENT	L	T	P	C
21DAC101b		2	0	0	0
	Semester	I			

Course Objectives: This course will enable students:

- Learn to demonstrate critical understanding of key concepts in disaster risk reduction and humanitarian response.
- Critically evaluatedisasterriskreduction and humanitarian response policy and practice from Multiple perspectives.
- Developanunderstandingofstandardsofhumanitarianresponseandpracticalrelevanceinspecific types of disasters and conflict situations
- Criticallyunderstandthestrengthsandweaknessesofdisastermanagementapproaches,planningand programming in different countries, particularly their home country or the countries they work in

UNIT - I

Introduction:
Disaster:Definition,FactorsandSignificance;DifferenceBetweenHazardandDisaster;Naturaland Manmade Disasters: Difference, Nature, Types and Magnitude.

Disaster Prone Areas in India:
Study of Seismic Zones; Areas Prone to Floods and Droughts, Landslides and Avalanches; Areas Prone to Cyclonic and Coastal Hazards with Special Reference to Tsunami; Post- Disaster Diseases and Epidemics

UNIT - II

Repercussions of Disasters and Hazards:
Economic Damage, Loss of Human and Animal Life, Destruction of Ecosystem. Natural Disasters: Earthquakes,Volcanisms,Cyclones,Tsunamis,Floods,DroughtsandFamines,Landslides and Avalanches, Man-made disaster: Nuclear Reactor Meltdown, Industrial Accidents, Oil Slicks and Spills, Outbreaks of Disease and Epidemics, War and Conflicts.

UNIT - III

Disaster Preparedness and Management:
Preparedness: Monitoring of Phenomena Triggering ADisasteror Hazard; Evaluation of Risk: Application of Remote Sensing, Data from Meteorological and Other Agencies, Media Reports: Governmental and Community Preparedness.

UNIT - IV

Risk Assessment Disaster Risk:
Concept and Elements, Disaster Risk Reduction, Global and National Disaster Risk Situation. TechniquesofRiskAssessment,GlobalCo-OperationinRiskAssessmentand Warning, People's Participation in Risk Assessment. Strategies for Survival.

UNIT - V

Disaster Mitigation:
Meaning,ConceptandStrategiesofDisasterMitigation,EmergingTrendsInMitigation.Structural Mitigationand Non-Structural Mitigation, Programs of Disaster Mitigation in India.

Suggested Reading

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M.PHARM. IN PHARMACOGNOSY
COURSE STRUCTURE & SYLLABI

1. R.Nishith,SinghAK,"DisasterManagementinIndia:Perspectives,issuesandstrategies
2. "'New Royal book Company..Sahni,PardeepEt.Al.(Eds.),"DisasterMitigationExperiencesAndReflections",PrenticeHall OfIndia, New Delhi.
3. GoelS.L.,DisasterAdministrationAndManagementTextAndCaseStudies",Deep&Deep Publication Pvt. Ltd., New Delhi

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COURSE STRUCTURE

Course Code	SANSKRITFOR TECHNICAL KNOWLEDGE	L	T	P	C
21DAC101c		2	0	0	0
	Semester	**I**			

Course Objectives: This course will enable students:

- To get a working knowledge in illustrious Sanskrit, the scientific language in the world
- Learning of Sanskrit to improve brain functioning
- LearningofSanskrittodevelopthelogicinmathematics,science&othersubjects enhancing the memory power
- The engineering scholars equipped with Sanskrit will be able to explore the huge
- Knowledge from ancientliterature

Course Outcomes (CO): Student will be able to

- Understanding basic Sanskrit language
- Ancient Sanskrit literature about science &technology can be understood
- Being a logical language will help to develop logic in students

UNIT - I		
Alphabets in Sanskrit,		
UNIT - II		
Past/Present/Future Tense, Simple Sentences		
UNIT - III		
Order, Introduction of roots		
UNIT - IV		
Technical information about Sanskrit Literature		
UNIT - V		
Technical concepts of Engineering-Electrical, Mechanical, Architecture, Mathematics		

Suggested Reading

1.“Abhyaspustakam” –Dr.Vishwas, Sanskrit-Bharti Publication, New Delhi
2.“Teach Yourself Sanskrit” Prathama Deeksha- VempatiKutumbshastri, RashtriyaSanskrit Sansthanam, New Delhi Publication
3.“India’s Glorious ScientificTradition” Suresh Soni, Ocean books (P) Ltd.,New Delhi

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COURSE STRUCTURE & SYLLABI

AUDIT COURSE-II

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COURSE STRUCTURE

Course Code	PEDAGOGY STUDIES	L	T	P	C
21DAC201a		2	0	0	0
	Semester	**II**			

Course Objectives: This course will enable students:

- Reviewexistingevidenceonthereviewtopictoinformprogrammedesignandpolicy making undertaken by the DfID, other agencies and researchers.
- Identify critical evidence gaps to guide the development.

Course Outcomes (CO): Student will be able to

Students will be able to understand:

- Whatpedagogicalpracticesarebeingusedbyteachersinformalandinformalclassrooms in developing countries?
- What is the evidence on the effectiveness of these pedagogical practices, in what conditions, and with what population of learners?
- Howcanteachereducation(curriculumandpracticum)andtheschoolcurriculumand guidance materials best support effective pedagogy?

UNIT - I

Introduction and Methodology: Aims and rationale, Policy back ground, Conceptual frame work and terminology Theories oflearning,Curriculum,Teachereducation.Conceptualframework,Research questions**.** Overview of methodology and Searching.

UNIT - II

Thematic overview: Pedagogical practices are being used by teachers in formal and informal classrooms in developing countries. Curriculum, Teacher education.

UNIT - III

Evidence on theeffectivenessofpedagogicalpractices,Methodologyfortheindepthstage:quality assessmen t of included studies. How can teacher education (curriculumandpracticum) andthescho curriculum and guidance materials best support effective pedagogy? Theory of change. Strength and nature of th body of evidence for effective pedagogical practices. Pedagogic theory and pedagogical approaches. Teachers' attitudes and beliefs and Pedagogic strategies.

UNIT - IV

Professional development: alignment with classroom practices and follow-up support, Peer support, Support from the head teacherandthecommunity.Curriculumandassessment,Barrierstolearning:limitedresourcesand large class sizes

UNIT - V

Researchgapsandfuturedirections: Researchdesign**,**Contexts**,**Pedagogy**,**Teachereducation**,** Curriculum and assessment**,** Dissemination and research impact.

Suggested Reading

1. AckersJ,HardmanF(2001)ClassroominteractioninKenyanprimaryschools,Compare, 31 (2): 245-261.
2. AgrawalM(2004)Curricularreforminschools:Theimportanceofevaluation,Journalof

3. Curriculum Studies, 36 (3): 361-379.
4. AkyeampongK(2003) Teacher training in Ghana - does it count? Multi-site teachereducation research project (MUSTER) country report 1. London: DFID.
5. Akyeampong K, LussierK, PryorJ, Westbrook J (2013)Improving teaching and learning of basic maths and reading in Africa: Does teacherpreparation count?International Journal Educational Development, 33 (3): 272–282.
6. Alexander RJ(2001) Culture and pedagogy: International comparisons in primary education. Oxford and Boston: Blackwell.
   Chavan M (2003)ReadIndia: A mass scale, rapid, 'learning to read'campaign.
7. www.pratham.org/images/resource%20working%20paper%202.pdf.

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COURSE STRUCTURE

Course Code	STRESSMANAGEMENT BY YOGA	L	T	P	C
21DAC201b		2	0	0	0
	Semester	**II**			

Course Objectives: This course will enable students:

- To achieve overall health of body and mind
- To overcome stres

Course Outcomes (CO): Student will be able to

- Develop healthy mind in a healthy body thus improving social health also
- Improve efficiency

UNIT - I		
Definitions of Eight parts of yog.(Ashtanga)		
UNIT - II		
Yam and Niyam.		
UNIT - III		
Do`sand Don't'sin life. i) Ahinsa,satya,astheya,bramhacharyaand aparigrahaii) Shaucha,santosh,tapa,swadhyay,ishwarpranidhan		
UNIT - IV		
Asan and Pranayam		
UNIT - V		
i)Variousyogposesand theirbenefitsformind &body ii)Regularizationofbreathingtechniques and its effects-Types ofpranayam		

Suggested Reading

1.'Yogic Asanas forGroupTarining-Part-I": Janardan SwamiYogabhyasiMandal, Nagpur
2."Rajayogaor conquering the Internal Nature" by Swami Vivekananda, Advaita Ashrama (Publication Department), Kolkata

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M.PHARM. IN PHARMACOGNOSY
COURSE STRUCTURE & SYLLABI

Course Code	PERSONALITY DEVELOPMENT THROUGHLIFE ENLIGHTENMENTSKILLS	L	T	P	C
21DAC201c		2	0	0	0
	Semester	II			

Course Objectives: This course will enable students:

- To learn to achieve the highest goal happily
- To become a person with stable mind, pleasing personality and determination
- To awaken wisdom in students

Course Outcomes (CO): Student will be able to

- StudyofShrimad-Bhagwad-Geetawillhelpthestudentindevelopinghispersonalityand achieve the highest goal in life
- The person who has studied Geetawilllead the nation and mankind to peace and prosperity
- Study of Neetishatakam will help in developing versatile personality of students

UNIT - I

Neetisatakam- Holistic development of personality
Verses-19,20,21,22(wisdom)
Verses-29,31,32(pride &heroism)
Verses-26,28,63,65(virtue)

UNIT - II

Neetisatakam- Holistic development of personality
Verses-52,53,59(dont's)
Verses-71,73,75,78(do's)

UNIT - III

Approach to day to day work and duties.
ShrimadBhagwadGeeta:Chapter2-Verses41,47,48,
Chapter3-Verses13,21,27,35,Chapter6-Verses5,13,17,23,35,
Chapter18-Verses45,46,48.

UNIT - IV

Statements of basic knowledge.
ShrimadBhagwadGeeta:Chapter2-Verses 56,62,68
Chapter12 -Verses13,14,15,16,17,18
Personality of Rolemodel. Shrimad Bhagwad Geeta:

UNIT - V

Chapter2-Verses 17,Chapter3-Verses36,37,42,
Chapter4-Verses18,38,39
Chapter18– Verses37,38,63

Suggested Reading

1."SrimadBhagavadGita"bySwamiSwarupanandaAdvaitaAshram(PublicationDepartment), Kolkata
2.Bhartrihari'sThree Satakam (Niti-sringar-vairagya) by P.Gopinath, RashtriyaSanskrit Sansthanam, New Delhi.

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COURSE STRUCTURE

OPEN ELECTIVS

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M.PHARM. IN PHARMACOGNOSY
COURSE STRUCTURE & SYLLABI

Course Code	BIOLOGICAL SCREENING METHODS	L	T	P	C
21SOE301d	(Elective)	3	0	0	3
	Semester	III			

Course Objectives:

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 Outcomes (CO): Student will be able to

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

Drug discovery process: Principles, techniques and strategies used in new drug discovery. High throughput screening, human genomics, robotics and economics of drug discovery, Regulations. Alternatives to animal screening procedures, cell-line, patch –clamp technique, In-vitro models, molecular biology techniques.

UNIT - II

Bioassays: Basic principles of bioassays, official bioassays, experimental models and statistical designs employed in biological standardization.

UNIT - III

Principles of toxicity evaluations, ED50, LD50 and TD values, International guidelines (ICH recommendations).
Preclinical studies: General principles and procedures involved in acute, sub-acute, chronic, teratogenicity, mutagenicity and carcinogenicity.

UNIT - IV

Screening of different classes of drugs using micro-organisms. Vitamin and antibiotic assays.
Screening methods involved in toxins and pathogens.

UNIT - V

Enzymatic screening methods: α-glucosidase, α- amylase, DNA polymerase, nucleases, Lasparginase, lipases and peptidases.

Reference Books:

1. Basic and clinical pharmacology by Bertram G. Katzung (International edition) lange medical book / Mc Graw Hill, USA 2001 8th edition
2. Pharmacology by Rang H.P, Dale MM and Ritter JM., Churchill Livingston, London, 4/e
3. Goodman and Gilman's The pharmacological basis of therapeutics (International edition) Mc Graw Hill, USA 2001 10th edition.
4. General and applid toxicology by B.Ballantyne, T.Marrs, P.Turner (Eds) The Mc Millan press Ltd, London.
5. Drug Discovery by Vogel's
6. Drug Discovery and evaluation – Pharmacological assays by H.Gerhard.Vogel, 2nd edition,Springer verlag, Berlin, Heidelberg.
7. Tutorial Pharmacy (Vol I and II) by Cooper and Gunns.

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ANANTHAPURAMU – 515 002 (A.P) INDIA

M.PHARM. IN PHARMACOGNOSY

COURSE STRUCTURE

Course Code	PHARMACEUTICAL VALIDATION	L	T	P	C
21SOE301a	(Elective)	3	0	0	3
	Semester	III			

Course Objectives:

Course Objective: The main purpose of the subject is to understand about validation and how it can be applied to industry and thus to improve the quality of the products. The subject covers the complete information about validation, types, methodology and application.

Course Outcomes (CO): Student will be able to

Upon completion of the subject student shall be able to

- Explain the aspect of validation
- Carryout validation of manufacturing processes
- Apply the knowledge of validation to instruments and equipments
- Validate the manufacturing facilities

UNIT - I

Introduction: Definition of Qualification and Validation, Advantage of Validation, Streamlining of Qualification & Validation process and Validation Master Plan. Qualification: User Requirement Specification, Design Qualification, Factory Acceptance Test (FAT)/ Site Acceptance Test (SAT), Installation Qualification, Operational Qualification, Performance Qualification, Re- Qualification (Maintaining status -Calibration Preventive Maintenance, Change management), Qualification of Manufacturing Equipment, Qualification of Analytical Instruments and Laboratory equipments.

UNIT – II

Qualification of analytical instruments: Electronic balance, pH meter, UV-Visible spectrophotometer, FTIR, GC, HPLC, HPTLC
Qualification of Glassware: Volumetric flask, pipette, Measuring cylinder, beakers and burette.

UNIT - III

Qualification of laboratory equipments: Hardness tester, Friability test apparatus, tap density tester, Disintegration tester, Dissolution test apparatus.
Validation of Utility systems: Pharmaceutical water system & pure steam, HVAC system, Compressed air and nitrogen.

UNIT - IV

Cleaning Validation: Cleaning Validation - Cleaning Method development, Validation and validation of analytical method used in cleaning. Cleaning of Equipment. Cleaning of Facilities. Cleaning in place (CIP).

UNIT - V

Analytical method validation: General principles, Validation of analytical method as per ICH guidelines and USP.

Textbooks:

1. T. Loftus & R. A. Nash, "Pharmaceutical Process Validation", Drugs and Pharm Sci. Series, Vol.129, 3rd Ed., Marcel Dekker Inc., N.Y.
2. The Theory & Practice of Industrial Pharmacy, 3rd edition, Leon Lachman, Herbert A. Lieberman,Joseph. L. Karig, Varghese Publishing House, Bombay.
3. Validation Master plan by Terveeks or Deeks, Davis Harwood International publishing.
4. Validation of Aseptic Pharmaceutical Processes, 2nd Edition, by Carleton & Agalloco, (Marcel Dekker).
5. Michael Levin, Pharmaceutical Process Scale-Up‖, Drugs and Pharm. Sci. Series, Vol. 157, 2nd Ed., Marcel Dekker Inc., N.Y.

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M.PHARM. IN PHARMACOGNOSY
COURSE STRUCTURE & SYLLABI

Course Code	ENTREPRENEURSHIP MANAGEMENT	L	T	P	C
21SOE301c	(Elective)	3	0	0	3
	Semester	III			

Course Objectives:

This course is designed to impart knowledge and skills necessary to train the students on entrepreneurship management.

Course Outcomes (CO): Student will be able to

On completion of this course it is expected that students will be able to:

- 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 Organizing an Enterprise: Environment scanning – Information, sources, schemes of assistance, problems. Enterprise selection, market assessment, enterprise feasibility study, SWOT Analysis. Resource mobilization -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, coordination and feasibility study.

UNIT – V

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

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., Toranto.
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