B.PHARM (2013) SYLLABUS AND REGULATIONS

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1.1 The degree of Bachelor of Pharmacy of Andhra University will be conferred on a candidate who has satisfied the following conditions.

1.2 The candidate must have passed the (i) Intermediate examination of the Board of Intermediate Education, Government of Andhra Pradesh, or Diploma in Pharmacy examination of the Dept. of Technical Education, Govt. of Andhra Pradesh or any other examination recognized by the academic senate as equivalent thereto with Physics, Chemistry and Mathematics or Biology as group subjects and must have qualified in the Entrance Exams as prescribed by the University for being eligible to join I semester of B.Pharm course.

1.3.1 The candidate must have, after passing the qualifying examination pursued a regular course of study for not less than four academic years(three academic years in the case of diploma in pharmacy holders who are admitted directly in to 2^{nd} year(3^{rd} semester) of B.Pharm) and satisfied the academic requirements as prescribed thereafter. The scope of subject matter in each course and periods of study shall be as indicated in the syllabus and the scheme of instruction.

1.3.2 Instruction and examination in each academic year is spread over two semesters with a minimum of 90 working days in each semester (180 in any given academic year). However in the case of semesters I and II of B.Pharm the instruction and examination shall be organized simultaneously spread over the entire academic year of 180 days to save time that may be lost due to possible delays in the admission process.

1.4 Each period of instruction is of 45 minutes duration. Eight periods of instruction are provided on each day and there are six working days in a week (Monday to Saturday).

1.5 Attendance Requirements: A regular course of study during an academic semester means a minimum of average attendance of 75% of all the courses of the semester computed by totaling the number of periods of lectures and practicals, as the case may be, held in every course. In special cases where sufficient causes were shown, the Vice-Chancellor may on the recommendation of the Principal and Head of the Department concerned condone the deficiency in the average attendance to an extent of 9% for reasons such as ill health, if the application for condonation is submitted at the time of actual illness and is supported by certificate of; authorized Medical officer approved by the Principal. However, in the case of students, who participate in activities like N.S.S., N.C.C., Inter-Collegiate tournaments

conducted by Andhra University, Inter-University tournaments conducted by Inter-university Board and any such other activities involving the representation of the College/University with the prior approval of the principal, the candidate may be deemed to have attended the college during the period solely for the purpose of the examination.

1.6 A candidate who cannot satisfy the attendance requirements in clause 1.5 because of late admission under special circumstances reasonable and acceptable to the University on the basis of document, shall fulfill the following conditions; Average attendance: A candidate shall have attended at least a total of 90% of the periods-lectures/practicals as the case may be held from the date of admission and also shall attend at least 50% of the total working days during that academic semester (Late admission means, admissions made after 45 days from date of commencement of the academic semester for the course).

1.7 If any candidate fails to satisfy the regulation under 1.5 or 1.6 she/he shall not be allowed for the University Examinations at the end of the semester, and he/she shall not be allowed for promotion to the next higher class of study. He/she shall be required to repeat the regular course of study of that academic semester along with the next regular batch.

2.0 Assessment for the award of degree shall consists of (a) Internal evaluation for 20 marks in each of the theory and practical courses separately except in course 101 A and B Biology theory and practical (bridge course). For course 101A and B the sessional marks shall be 10 and 10 respectively as detailed in the scheme of examination. (b) Semester-end examination as detailed in the scheme of examination for 80 marks in each of the theory and practical, except for 101 A and B Biology theory and practical (bridge course) for which the semester-end examination marks shall be 40 and 40 respectively.

2.1 Regulations concerning sessional examination: (a) Three shall be two sessional examinations in each theory course and the best of the two shall be taken; (b) the marks for the internal evaluation for the practical are awarded based on the continuous assessment of the performance of the candidate at the practical classes and the records. The marks certificate issued to the candidate by the University shall show separately the sessional marks, the semester-end examination marks and the aggregate of both; (c) The teacher who teaches the subject shall ordinarily to be internal examiner, (d) There shall be no provision for the improvement of the sessional marks.

2.2 Regulations concerning semester-end examination: (a) There shall be one semester-end examination in each theory course based on the question paper set by an external paper setter and it shall be evaluated by an internal examiner. There shall be one semester-end examination in each practical course and the setting and evaluation shall be done jointly by two examiners, one internal and one external. The duration of the practical examination may be of 4 to 6 hours as prescribed. There shall be no supplementary examination except for the final semester-end examinations. A candidate shall not be allowed to appear for the sixth semester end examination unless he passes in all the courses of the first and second semester end examinations and the eighth semester-end examinations unless he passes in all the courses of the third and fourth semester-end examinations.

3.1 A candidate shall be declared to have passed the examination in each semester if he obtains (i) not less than 40% marks in each theory and 50% in each practical of the semester-end examinations.

3.1a. A candidate may be permitted to improve his performance in semester-end examination of any semester only after completing the entire eight semester course of study by appearing again for the whole examinations of that semester only during four subsequent years after completion of the study of the entire course. Such an improvement can be availed only once for each one of the semester examinations of the entire course of study. When considered in its totality the better of the two performances as whole at the I, II, III, IV, V, VI, VII or VIII semesters as the case may be shall be taken into consideration for the purpose of awarding the grade.

3.1b. The courses 101 A Mathematics, 101 B Biology theory are bridge courses for candidates with only biology and with only mathematics background respectively at the intermediate level. Candidates with Diploma in Pharmacy have to take course 101 Mathematics. The respective candidates shall have to pass in these courses. The marks awarded in these courses shall not be considered for calculation of SGPA and CGPA.

3.2 Any candidate who carried a backlog at any stage will not be eligible for rank, medal or prizes to be awarded by the University. First attempt means appearance at the first examinations conducted for the particular batch.

4.0 Every candidate shall undergo practical training for at least one month in pharmaceutical factory at the end of the final semester of the course.

Grading system:

Appropriate letter grades are awarded in each theory and practical subject to only such candidates who have passed in the university examinations. Internal assessment marks and university examination marks put together will be taken into account for the letter grading system in each subject separately.

A candidate registered for the university examination but fails to appear or fails to score the minimum required 40% marks in the university examination will get a grade 'F', indicating failure or grade of incompletion.

A subject successfully completed cannot be repeated. Final evaluation of each subject (theory and practical separately) will be carried out on a 10- point grading system corresponding to the marks obtained in that subject. Each subject letter grade is converted into a specific grade value associated with the letter grade as given below (Table).

Table: 10-Point grading system:

S. No.	Range of marks	Grade	Grade points
1.	≥75%	O	10.0
2.	65% - 74%	A	9.0
3.	60% - 64%	B	8.0
4.	55% - 59%	C	7.0
5.	50% - 54%	D	6.0
6.	40% - 49%	E	5.0
7.	< 40%	F(Fail)	0.0
8.	The grade W represents failure due to insufficient attendance in the semester or year	W	0.0
9.	Incomplete (subsequently to be changed into pass or E or O or F grade in the same semester)	I	0.0

Semester Grade point average (SGPA):

The grade pointsare weighted in accordance with the number of credits assigned to a theory or practical subject and it is a product of credit and grade value. The semester grade point average (SGPA) is the weighed average of grade points awarded to a candidate.

$$SGPA = \frac{\text{Total grade points of a particular semester}}{\text{Total number of credits of the semester}}$$

Performance in the non credit courses in which a pass (i.e., 35% or more) is sufficient will not be considered for calculation of SGPA.

SGPA (semester grade point average) for each semester will be calculated for those candidates who have passed all the subjects of that particular semester of the course.

D. Pharm holders, who take direct admission to third semester B.Pharm, are exempted from First and second semester B.Pharm credits.

Cumulative Grade Point Average (CGPA):

The weighed average of SGPA's of all Semesters that the student has completed at any point of time is the cumulative grade point average (CGAP) at that point of time.

CGAP up to a semester will be calculated only for those students who have passed all the subjects up to that semester. Generally, CGPA is calculated after the successful completion of the entire B.Pharm course.

$$CGPA = \frac{\sum(\text{SGAP of each semester} * \text{corresponding number of credits})}{\text{Sum of the entire course credits}}$$

After the results are declared, grade cards will be issued to each student, which will contain the list of subjects for that semester and grades obtained by the student.

For Diploma holders, who take direct admission to third semester of B.Pharm, only six semester course credits i.e., 3rd to 8^{th} semesters of B.Pharm will be considered for CGPA calculation.

5. Guidelines for paper setting and model papers.

5.1 Guidelines for paper setting:

1. The semester end question paper in each theory course is to be set for a total of 80 marks by an external paper setter as per the general model given below.

2.1 The question paper in each theory course is to be divided into parts A and B.

2.2 Part A consists of 10 short answer questions each carrying 4 marks out of which 8 questions are to be answered by the candidate. Thus the total of part A is 32 marks.

2.3 Part B consists of six long answer questions each carrying 12 marks out of which 4 questions are to be answered by the candidate. Thus the total of part B is 48 marks.

2.4 The question given in parts A and B should be spread over the entire syllabus in an even manner.

2.5 The question paper in each semester and practical examination is to be set jointly by two examiners, one external and one internal as per the general model provided below.

5.2 MODEL PAPERS

Model question paper for practical course:
Course No.
Title of the course
Date of examination:

1. Synopsis	10 marks
2. Major experiment	35 marks
3. Minor experiment	20 marks
4. Viva voce	15 marks
	Total: 80 marks

Model question paper for theory course:
Course No.
Title of the course
Time: 3Hrs Max.Marks:80

Part A

Answer any **eight** questions 8 X 4 =32

1.
2.
3.
4.
5.
6.
7.
8.
9.
10.

Part B

Answer any **four** questions 4 X 12 = 48

11.
12.
13.
14.
15.
16.

SCHEME OF INSTRUCTION AND EXAMINATION

Course No.	Subject	Periods per week		Exam. duration (Hrs.)	Marks		Total	Credits
		Theory	Practical		Sessional	Semester end		
I/IV B.PHARM I SEMESTER								
101A	Mathematics (Bridge course) For Bi.P.C.	4	…	3	20	80	100	N.C.
101B	Biology (Bridge course) For M.P.C.	4	…	3	20	80	100	N.C.
102	English	2	…	3	20	80	100	N.C.
103	Soft skills	---	6 (2 x 3)	3	20	80	100	N.C.
104	Pharm. Chemistry-I (Inorganic)	4	…	3	20	80	100	4
105	Pharm. Chemistry-II (Organic-1)	4	…	3	20	80	100	4
106	Pharm. Chemistry-II (Organic-I) Practical	…	6 (2 x 3)	4	20	80	100	2
107	Computer Applications	4	…	3	20	80	100	2
108	Computer Applications Practical	…	6 (2 x 3)	4	20	80	100	2
	TOTAL						**800**	**14**
I/IV B.PHARM II SEMESTER								
201	General & Dispensing Pharmacy	4	…	3	20	80	100	4
202	General & Dispensing Pharmacy Practical	…	6 (2 x 3)	4	20	80	100	2
203	Physical Pharmacy-I	4	…	3	20	80	100	4
204	Physical Pharmacy-I Practical	…	6 (2 x 3)	4	20	80	100	2
205	Human Physiology & Health Education-I	4	…	3	20	80	100	4
206	Environmental Sciences	4	…	3	20	80	100	2
	TOTAL						**600**	**18**

II/IV B.PHARM III SEMESTER								
301	Human Physiology & Health Education-II	4	…	3	20	80	100	4
302	Human Physiology & Health Education-II Practical	--	6 (2 x 3)	4	20	80	100	2
303	Pharm. Analysis-I	4	…	3	20	80	100	4
304	Pharm. Analysis-I Practical	…	6 (2 x 3)	4	20	80	100	2
305	Physical Pharmacy-II	4	…	3	20	80	100	4
306	Physical Pharmacy-II Practical	…	6 (2 x 3)	4	20	80	100	2
307	Pharm. Chemistry-III (Organic-II)	4	…	3	20	80	100	4
	TOTAL						**700**	**22**
II/IV B.PHARM IV SEMESTER								
401	Applied Statistics	4	…	3	20	80	100	2
402	Pharm. Engineering-I	4	…	3	20	80	100	4
403	Pharm. Microbiology	4	…	3	20	80	100	4
404	Pharm. Microbiology Practical	…	6 (2 x 3)	4	20	80	100	2
405	Applied Biochemistry	4	…	3	20	80	100	4
406	Applied Biochemistry Practical	…	6 (2 x 3)	4	20	80	100	2
407	Pharmacognosy & Phytochemistry-I	4	…	3	20	80	100	4
408	Pharmacognosy & Phytochemistry-I Practical	…	6 (2 x 3)	4	20	80	100	2
	TOTAL						**800**	**24**
III/IV B.PHARM V SEMESTER								
501	Pharm. Biotechnology	4	…	3	20	80	100	4
502	Pharm. Biotechnology Practical	…	6 (2 x 3)	6	20	80	100	2

503	Medicinal Chemistry-I	4	…	3	20	80	100	4
504	Medicinal Chemistry-I Practical	…	6 (2 x 3)	6	20	80	100	2
505	Pharm. Engineering-II	4	…	3	20	80	100	4
506	Pharm. Engineering-II Practical	…	6 (2 x 3)	6	20	80	100	2
507	Hospital & Community Pharmacy and Industrial Management	4	…	3	20	80	100	2
	TOTAL						**700**	**20**
III/IV B.PHARM VI SEMESTER								
601	Pharmacology-I	4	…	3	20	80	100	4
602	Pharmacology-I Practical	…	6 (2 x 3)	6	20	80	100	2
603	Medicinal Chemistry-II	4	…	3	20	80	100	4
604	Medicinal Chemistry-II Practical	…	6 (2 x 3)	6	20	80	100	2
605	Industrial Pharmacy& Cosmetic Technology	4	…	3	20	80	100	4
606	Industrial Pharmacy & Cosmetic Technology Practical	…	6 (2 x 3)	6	20	80	100	2
607	Pharmaceutical Jurisprudence	4	…	3	20	80	100	4
	TOTAL						**700**	**22**
IV/IV B.PHARM VII SEMESTER								
701	Pharm. Chemistry (Natural products)	4	…	3	20	80	100	4
702	Pharm. Chemistry-V (Natural products) Practical	…	6 (2 x 3)	6	20	80	100	2
703	Pharmacology-II	4	…	3	20	80	100	4
704	Pharmacology-II Practical	…	6 (2 x 3)	6	20	80	100	2

705	Pharmacognosy & Phytochemistry-II	4	…	3	20	80	100	4
706	Pharmacognosy & Phytochemistry-II Practical	…	6 (2 x 3)	6	20	80	100	2
707	GMP & Validation	4	…	3	20	80	100	4
708	Professional Training *	Viva-Voce and Project Report		One month	20	80	100	4
*Industrial or Hospital or Community Pharmacy								
	TOTAL						**800**	**26**
IV/IV B.PHARM VIII SEMESTER								
801	Pharm. Analysis-II	4	…	3	20	80	100	4
802	Pharm. Analysis-II Practical	…	6 (2 x 3)	6	20	80	100	2
803	Biopharmaceutics& Pharmacokinetics	4	…	3	20	80	100	4
804	Biopharmaceutics& Pharmacokinetics Practical	…	6 (2 x 3)	6	20	80	100	2
805	Clinical Pharmacy &Therapeutics	4	…	3	20	80	100	4
806	Novel Drug Delivery Systems	4	…	3	20	80	100	4
	TOTAL						**600**	**20**
	I SEMESTER						**800**	**14**
	II SEMESTER						**600**	**18**
	III SEMESTER						**700**	**22**
	IV SEMESTER						**800**	**24**
	V SEMESTER						**700**	**20**
	VI SEMESTER						**700**	**22**
	VI I SEMESTER						**800**	**26**
	VIII SEMESTER						**600**	**20**
	GRAND TOTAL						**5700**	**164**

B.PHARM I SEMESTER

COURSE NO 101A: MATHEMATICS
(BRIDGE COURSE FOR BIOLOGY STUDENTS)

Learning objectives: This is an introductory course in mathematics upon completion of which the student shall be able to solve different types of problems in matrices, trigonometry, co-ordinate geometry, differentiation and integration. He/she can also implement the applications of mathematics in pharmacy.

Units	Contents	Hrs
Unit-1:	**Algebra:** Functions, mapping, one-one function or injection, onto function or surjection, bijection, identity function, constant function, inverse function, composite function, real valued functions, addition and multiplication of real valued functions. Quadratic expressions in one variable, extreme value change in sign and magnitude, quadratic expressions in two variables, summation series involving A.P., G.P., H.P. Expression of $^{n}P_{r}$ and $^{n}C_{r}$ and their definitions.	**09**
Unit-2:	**Matrices:** Definition, types of matrices, addition and multiplication of matrices, transpose of a matrix-properties, determinant, inverse of a matrix, solution of simultaneous linear equations in two and three variables.	**08**
Unit-3:	**Trigonometry:** Fundamentals of trigonometry, general definition of trigonometric ratios, sign of the trigonometric ratios as the angle varies from 0 to 2π, trigonometric ratios of the angles of -θ, 90°± θ, 180°± θ, 270°± θ in terms of those of θ, graphs and periodicity of trigonometric ratios, inverse trigonometric functions, expressions for sin2x, cos2x, tan2x in terms x, hyperbolic functions, inverse hyperbolic functions.	**06**
Unit-4:	**Co-ordinate geometry 1:** Translation and rotation of axis, locus and its equation. Straight line - equations to a straight line in point-slope form, slope-intercept form, perpendicular form, two point form, intercept form, symmetric form. The straight line and the equation a+b x=0. Families of lines (one parameter), point of intersection of two straight lines, angle of intersection of two straight lines, condition of parallelism and perpendicularity of lines.	**07**
Unit-5:	**Co-ordinate geometry 2:** Pair of straight lines, homogenous equation of second degree in x and y, angle between the lines and the combined equation of the bisectors of the angles between the lines, respectively, by the above equation, general second degree equation	**07**

	in x and y, point of intersection and the angle between the lines.	
Unit-6:	**Limits and Continuity:** Concept of intervals and neighborhood, definition of limit, standard limits, continuity of a function.	**05**
Unit-7:	**Differential Calculus:** Derivatives of composite, implicit, parametric, inverse circular, hyperbolic functions, logarithmic differentiation, derivative of a function with reference to another function, applications of differentiation, partial differentiation, computation of first and second order partial derivatives.	**09**
Unit-8:	**Integral Calculus:** Integration as the inverse processes of differentiation, indefinite and definite integral, standard integral covering algebraic, trigonometric exponential and hyperbolic functions. Measures of integration, substitution methods, integration by parts, properties of definite integral and its equations, trapezoidal and Simpson's rules for approximate integration area under the curves, formation of differential equations.	**09**

COURSE NO 101 B: PHARMACEUTICAL BIOLOGY
(BRIDGE COURSE FOR MATHEMATICS STUDENTS)

Learning objectives:

1. To understand the nature of biological population.
2. To provide general knowledge of environmental effects and behavior.
3. To introduce the learner towards the organizational and functional aspects of lower animals.
4. To introduce students towards the structural and functional aspects of plant kingdom.

Units	Contents	Hrs
Unit-1:	Structure of the plant and animal cells. The functions of cell components. Cell division-mitosis and meiosis. The animal kingdom outline, classification with salient features and examples of each phylum. Principles of the histology of animal tissues.	**08**
Unit-2:	Amphibian (frog) Physiology with reference to cardiovascular system, nervous system and muscle contraction.	**06**
Unit-3:	Parasitology- Introduction to the important protozoa and helminthes in man. Outline of the life history of plasmodium, Trypnasoma, Liver fluke, tapeworm and round worm. The structure and life history and physiology	**12**

	of amoeba and mosquito (Anopheles and Culex).	
Unit-4:	Anintroduction to the classification of plants with specific examples, Characterization of the following medicinally important plant families with specific examples. Leguminosae, Rutaceae, Apocyanaceae, Solanaceae, Liliaceae, Rubiaceae, Scrophulariaceae, Compositae, Umbelliferae and Papaveraceae.	**12**
Unit-5:	Study of general morphological and histological characters of stem, flower, root, seed and fruit. Fertilization and methods of propagation of plants.	**10**

Books suggested:

1.Text book of Botany –Vignan series
2. Text book of Zoology –Vignan series

COURSE NO 102: ENGLISH

Learning objectives:

1. To teach the fundamental of English language- Grammar, Vocabulary, Synonyms, usage etc.
2. To teach the skills of communication and correspondence in English.
3. To teach the methods of acquiring fluency and proficiency in English language.
4. To acquiring them with models of English prose and teach the skills of writing in English.
5. To facilitate practices of target language in class room.

Units	Contents	Hrs
Unit-1:	Role and importance of communication, verbal and nonverbal communication, group communication, effective communication, barriers to communication, communication media, participating in discussions, conduct of seminars, conferences etc., making presentations through collection, evaluation, organizing the information, interacting with learners and teachers, role of wit and humor in communication.	**03**
Unit-2:	Spoken English Vs written English, reading method, formal/informal English(one way/two way) British /American/Indian English, how two introduce one self and others, how to tender apology, how to thank in different ways, greetings, some polite expressions.	**05**
Unit-3:	Agreements and disagreements, how to use a dictionary, how to use a thesaurus, vocabulary development, synonyms and antonyms, one word substitutes, comprehension.	**03**
Unit-4:	Communication through letters, official and personal letters, letters of complaint, letters of enquiries and responses, writing memos, circulars and notices, what to avoid while writing, paragraph writing.	**02**
Unit-5:	Scientific/technical report writing, drafting and delivering a speech, resume writing and interview techniques.	**03**
Unit-6:	Grammar: sequence of tenses, voice, articles, direct and indirect speech, degrees of comparison, common errors in English made by Indian learners of English.	**04**
Unit-7:	***Concepts of learning and listening, types and methods of learning and listening, learning and listening of knowledge, attitudes, skills and***	**04**

	practices.	
Unit-8:	***The following four essays from "selections from modern English" prose edited by Haladhar panda are prescribed.*** 1. Our own civilization-C.E.M.joad 2. Andrew Carnegie-E.H.carter 3. The secret of work-swami Vivekananda 4. The generation gap-Benjamin spock	**04**

Textbooks:

1. **"**bussiness correspondence and report writing" R.C.sharma and Krishna mohan Tata Mcgrawhillpublishers,New Delhi
2. Communicative English,E.SureshKumar,RajKamalPublications,Hyd.
3. "Selections of Modern English Prose"Ed by HladharPanda,Published by Universities Press(India)PvtLtd,Hyd.
4. A hand book of English for professionals, 2nd edition by P.Elliah Published by Pharma book syndicate

COURSE NO 103: SOFT SKILLS

Learning objectives:

1. To introduce the students to the basics of phonology, pronunciation, and way of expressing …….
2. To develop general skills for clear and effective communication by using appropriate vocabulary and grammar.
3. To teach techniques for improving memory for better communication.
4. To teach the skills time management for effective utilization of time.
5. To teach methods of managing stress in the work place.
6. To identify and focus on goals to be achieved by using effective communication methods.
7. To teach the art and skills of listening and derive the right information.
8. To teach the use of non verbal communication as a supplement to verbal forms.

Units	Contents	Hrs
Unit-1:	**Effective Communication**: Elements of Communication,7Cs of Communication, Types of Communication, Speaking and Listening, Non Verbal Communication, Writing Skills, Body Language, Improvement of Communication Skills.	**06**

Unit-2:	**Effective Public Speaking:** Audience Analysis, Choosing the Subject, Preparation of Speech, Presentation, Use of various Aids, Launching Pad, Evaluation, How to overcome Stage fear.	**06**
Unit-3:	**Memory Techniques:** Memory Testing, Process of Learning, How to train your observation, retention of information, link method of memory, importance of memory, absent-mindedness, memory demonstration.	**06**
Unit-4:	**Human relations:** Understanding people and human nature, communication barriers, skillful talk, listening to people, influencing and convincing people, making good impression, final thoughts.	**06**
Unit-5:	**Decision making:** crisis, identification and understanding the problem, writing possible solutions and selecting the best one, implementation.	**06**
Unit-6:	**Stress management:** causes of stress, understanding human nature, mood, temperament, needs, behavior, reactions, stress at home, work place, relaxation techniques.	**06**
Unit-7:	**Time management:** importance of time, identifying time wasters, four chambers of time management, steps for proper management of time. **Goal setting:** introduction, identifying goals, SWORT analysis, SMART goals, short term and long term goals, writing of mission statement, evaluation.	**06**
Unit-8:	**Team management:** identifying goals, setting targets, delegating tasks, monitoring and coordination. **Interview facing:** preparation of the bio-data, preparation for the interview, attire, postures and gestures, right way of answering questions.	**06**

Recommended books

1. Quick and easy way to effective speaking by Dale Carneige.
2. How to develop a super power memory by Harry Lorayne, Gaurav publishing house, New Delhi.
3. Improve your memory by Ran Fry.
4. Skill with people by Les Gibilin,Printmedia,New Delhi.
5. How to develop self-confidence and influence people by public speaking by Dale Carneige.
6. Coping with stress at work by J.M. Atkinson.
7. How to make successful decisions by A. Hardingham.
8. Communicative competence by Varanasi BhaskaraRao Published by Pharma book syndicate.
9. Personal and emotional competence by Varanasi BhaskaraRao Published by Pharma book syndicate.

COURSE 104: PHARMACEUTICAL CHEMISTRY- I (INORGANIC) THEORY

Learning objectives:

1. To impart the knowledge on the concept of inorganic pharmaceuticals and their applications.
2. To make the student understand about the sources of impurities and limit tests and purity tests for various inorganic chemicals.
3. To gain the knowledge on the electrolytes and their role in human body.
4. To gain the knowledge on the use of inorganic compounds as gastrointestinal, topical agents, dental products and other miscellaneous agents.
5. To impart knowledge on the use of inorganic compounds as pharmaceutical aids.

Units	Contents	Hrs
Unit-1:	1) General introduction to pharmaceutical inorganic chemistry. 2) Classification of inorganic pharmaceuticals based on their applications with examples. 3) Sources of impurities in pharmaceutical substances. 4) Principle and procedure for the limit tests of chlorides, sulphates, iron, lead, heavy metals and arsenic.	**12**
Unit-2:	**Test for purity of following**: 1) Neutralization capacity of Aluminium hydroxide gel. 2) Bulkiness in barium sulphate. 3) Limit test of copper and silver in bismuth subcarbonate. 4) Sucrose and reducing sugars in calcium gluconate. 5) Sedimentation volume, swelling power, coarse particles of bentonite. 6) Stability of hydrogen peroxide. 7) Absorption power and swelling power of kaolin.	**04**
Unit-3:	**Electrolytes:** Description, preparation and uses of following: 1) Sodium and potassium replenishers – sodium chloride, compound sodium chloride, potassium chloride, oral rehydration salts. 2) Calcium replenishers : calcium gluconate, dibasic calcium phosphate, calcium chloride. Acid base regulators: sodium bicarbonate, sodium lactate, sodium citrate, sodium acetate, ammonium chloride, potassium citrate.	**08**
Unit-4:	**Gastro intestinal agents** Properties, preparation and uses of the following:	**09**

	1) Acidifying agents: Hydrogen chloride, sodium acid phosphate. 2) Antacids: aluminium hydroxide gel, sodium carbonate, magnesium carbonate (light and heavy) milk of magnesia, magnesium trisilicate, magnesium oxide. 3) Protectives and adsorbents: Boric acid, zinc oxide, kaolin(light and heavy), calamine, charcoal. 4) Laxatives: Magnesium sulphate, sodium phosphate, sodium potassium tartarate.	
Unit-5:	**Topical agents** Definition, classification, mechanism of action, preparation and uses of the following: 1) Astringents: zinc sulphate, calcium hydroxide, zinc oxide, bismuth subcarbonate. 2) Topical protectants: zinc oxide, zinc stearate, talc, calamine, titanium dioxide. 3) Anti-infectives: hydrogen peroxide, potassium permanganate, silver nitrate, Iodine, Boric acid, seliniumsulphide, yellow mercuric oxide.	**07**
Unit-6:	**Miscellaneous inorganic pharmaceutical agents** Preparations and uses: 1) Heamatinics: ferrous sulphate, ferrous fummerate, ferrous gluconate, ferric ammonium citrate, iodinized dextrose. 2) Halogens: iodine, iodides. 3) Antidotes: sodium thiosulphate, sodium nitrite. 4) Expectorants: ammonium chloride, potassium chloride. 5) Emetics: potassium antimony tartarate, copper sulphate. Importance of essential and non-essential trace ions: essential ions- iron, copper, zinc, manganese, sulphur; Non-essential- lithium, lead, mercury, bromide, chloride, gold.	**12**
Unit-7:	**Dental products** Introduction, classification with examples. Preparations and uses: 1. Flourides- Sodiumfluoride, sodium monofluorophosphate, stannous fluoride.	**06**

	2. Oral antiseptics and astringents- hydrogen peroxide, magnesium peroxide, zinc peroxide, mouth washes. 3. Dentrifices: - calcium carbonate, dibasic calcium phosphate, calcium phosphate, sodium metaphosphate and strontium chloride.	
Unit-8:	**Pharmaceutical Aids:** properties, preparation (wherever applicable) and uses 1. Excipents: dicalcium phosphate, magnesium stearate, Talc, calcium carbonate. 2. Suspending agents: bentonite, colloidal silica, aluminium stearate. 3. Colorants: Titanium oxide, Ferric oxide.	**04**

Text books:

1) Bentley and Driver's text book of pharmaceutical chemistry Ed: L.M.Atherden, 1983, Oxford university press, Delhi.

2) Inorganic Medicinal and pharmaceutical chemistry; J.H. Block, F.B. Roche, T.O. Soine, C.V.Wilson, 1986, Varghese publishing house.

3) Inorganic pharmaceutical chemistry; P. GunduRao, Vallabhprakashan 1995, Delhi.

Reference Books:

1) Pharmacopoeia; (Indian, British, US and European)

2) Remington Pharmaceutical Sciences; 20th Edition Lippincott Williams and Wilkins.

3) Martindale: The Extra Pharmacopoeia; 31StEdn, 1996, The Royal pharmaceutical society.

4) Hand book of pharmacy and health care Ed: Robin.J. Haiwan 1990, The Pharm Press, UK.

COURSE 105: PHARMACEUTICAL CHEMISTRY-II(ORGANIC-I)THEORY

Learning objectives:

This course is designed to impart a very good knowledge about

1. IUPAC/Common system of nomenclature of simple organic compounds belonging to different classes of organic compounds;
2. Some important physical properties of organic compounds and their role in biological system as well as chemical reactivity;
3. Free radical/ nucleophyllic [alkyl/ acyl/ aryl] /electrophyllic substitution, free radical/ nucleophyllic / electrophyllic addition, elimination, oxidation and reduction reactions with mechanism, orientation of the reaction, order of reactivity, stability of compounds;
4. Some named organic reactions with mechanisms; and
5. Methods of preparation, test for purity, principle involved in the assay, important medicinal uses of some important organic compounds.
6. Identification, naming of stereo chemical centers. Stereochemistry and its importance in bioactivity of an organic compound.

Units	Contents	Hrs
Unit-1:	**Structure and properties of organic molecules:** Polarity of bonds and molecules; Intra and inter molecular forces, influence of electromeric, inductive, mesomeric (resonance), hyperconjugation effects on physical properties. Modern theories of acids and bases. Interpretation of acidity and basicity based on inductive effect. Significance of resonance energy. Importance of equivalent and non equivalent resonance structures in resonance stabilization. Electrophiles and nucleophiles. Carbocations: formation, stability and rearrangement and reactions. Carbanions: formation, stability and reactions. Steric effects and their influence on reactivity.	**06**
Unit-2:	**Alkanes**: Nomenclature, General methods of preparation, reactions of alkanes with special reference to free radical substitution. Rotation about carbon-carbon single bonds and conformational isomerism. **Cyclo alkanes**: Nomenclature, General preparation, Bayer's strain theory, chair and boat conformations of cyclohexane, axial and equatorial bonds.	**08**
Unit-3:	**Stereo chemistry**: Concepts of isomerism and its comparision to stereo isomerism. Optical isomerism (enantiomerism), planes of symmetry, centre of symmetry, chirality and other characteristics of optical isomers. Racemic mixture, resolution of racemic mixture; Diastereomer: properties and optical activity. Optical rotation and specific rotation, mesoforms.	**08**

	Configuration-Relative configuration (D&L system), absolute configuration (R&S system), sequence rules. Geometric isomerism- Cis-trans isomerism and E&Z nomenclature.	
Unit-4	**Halo alkanes**: Nomenclature, general methods of preparation. Significance of nucleophilic substitution of alkyl halides. S_N1 and S_N2 mechanisms; evidences in favour of these reactions; S_N1 vs S_N2 E1 and E2 mechanisms; evidences in favour of these reactions. Saytzeff' rule and Hofmann's rule for eliminations, E1 vs E2 and Substitution vs elimination.	**08**
Unit-5:	**Alkenes and dienes**: Nomenclature, general methods of preparation. Electrophilic and nucleophilic addition to –C=C- and allylic substitution. Markovnikon's rule, peroxide effect, ozonolysis. Dienes- Introduction to alkadienes, stability of conjugated dienes.	**08**
Unit-6:	**Alkynes**: Nomenclature, general methods of preparation. Reactions of alkynes. Acidity of alkynes. Stereospecific reduction of alkynes.	**05**
Unit-7:	**Organometallic compounds**- Grignard reagents-preparation and nucleophilic addition and nucleophilic substitution reactions of Grignard reagent and their applications in synthetic chemistry.	**04**
Unit-8:	**Alcohols**- Nomenclature, general methods of preparation. Industrial preparation of ethanol and methanol. Preparation of absolute alcohol. Reactions of alcohols, importance of iodoform and lucas test. **Ethers**- Nomenclature, Williamson's-synthesis and acid cleavage of ethers.	**08**

COURSE NO 106: PHARMACEUTICAL CHEMISTRY-II (ORGANIC- I)PRACTICAL

1. Experiments to provide practice to the students in the uses of organic chemistry laboratory techniques such as crystallization, distillation (at normal pressure and under reduced pressure), sublimation, determination of physical constants like melting point and boiling point.
2. Identification of mono and multi functional organic compounds by systematic qualitative organic analysis (carboxylic acid, phenols, amines, aldehydes and ketones, alcohols, esters, hydrocarbons, nitro compounds and anilides).
3. Preparation of simple organic compounds such as nitrobenzene, iodoform, acetanilide, aspirin, sulphanilic acid, benzoic acid and benzanilide.

4. Building organic molecules (ethane, isobutanol, tartaric acid, cyclohexane in chair and boat form) using sterio model sets.

TEXT BOOKS:

1. Organic Chemistry By Morrison and Boyd
2. Bently and Driver's Textbook of Pharmaceutical Chemistry
3. Organic Chemistry, Vol. I by I.L. Finar.

COURSE NO 107: COMPUTER APPLICATIONS

Learning objectives:

1. To educate students in basics of computer hardware.
2. To educate the students about the different operating systems.
3. To teach the students use of MS office and its applications.
4. To teach the students the use of C language and its applications.
5. To impart knowledge on the use of MATLAB software and its applications

Units	Contents	Hrs
Unit-1:	**COMPUTER ARCHETECTURE:** Evolution of Microprocessors and Digital Computers – Computer Generations –Architecture of the General Purpose Computer–Memories –Semiconductor memory – Optical Disks –Cache Memory -- Buses –Input/output Devices – Number Systems – Assemble languages– Machine languages.	**04**
Unit-2:	**MS DOS- DISK OPERATING SYSTEM:** Introduction – Need of Operating System – Function of Operating system –Introduction to MS-Dos – Disk Drivers –Loading of Dos into main memory – Files and File Naming Conventions –Types of Dos commands – Directory Structure of MS-Dos –Concept of path – Dos Internal commands – External Commands.	**06**
Unit-3:	**MS OFFICE APPLICATIONS.** Introduction of MS Word – Word control functions – Editing Document – Find and Replace –Tab Stops – Formatting the document – Spell Check –Tables & Graphs preparation – Graphics – Advanced Tools.	**06**
Unit-4:	**MS OFFICE APPLICATIONS.** Introduction of MS Excel – Excel Basics – Editing cell contents – worksheet – Command for worksheet. Introduction of MS PowerPoint –Steps to a Presentation – Adding new slides –Editing & Formatting new slides – Creating slide show.	**08**
Unit-5:	**C LANGUAGE & APPLICATIONS:** Introduction to C language – Difference between High level & low level language–Constants – variables – arithmetic operators – Integer expressions – Floating point – compound statement – conditional statement -- while loop – for loop – do while loop – logical operators – precedence rules for logical operators – switch & brake statements.	**06**
Unit-6:	**MATLAB -SCIENTIFIC ORIENTED PROGRAMMING:** Introduction to MATLAB –workspace – Command Window --	**06**

	Arrays of Numbers – Creating and Executing a Script file –Function files -- Matrices and Vector operations -- Graphics – 2D plots – 3D plots – Multiple Curves -- Input/output Functions -- Special effects of graphs – Generating and executing .M files.	
Unit-7:	**DATA BASE APPLICATIONS USING MATLAB:** Reading in the Data – Operating with the data – Counter and Bar Graphs – Frequencies and Histograms – Multivariate Tables -- Scatter Plots– Measures of Location/speed/shape – Hypothesis Test.	**06**
Unit-8:	**ANOVA APPLICATIONS USING MATLAB:** Introduction to the Analysis of Variance –Testing Mean – Testing Variance – One way ANOVA – Two way ANOVA.	**06**

REFERENCE BOOKS:

1. Fundamentals of Microprocessors &Microcomputer by B.RAM.
2. Computer Applications by SUMITA ARORA; DhanapatRai& Co publications.
3. Computer Programming in C by V. RAJARAMAN; PHI publications.
4. Let us C by YESWANTH KANITKAR; BPB publications.
5. Programming In ANSI-C by E.Balaguruswamy.
6. Getting Started with MATLAB by RUDRA PRATHAP SHING.
7. Applied Statistics using SPSS, STATISTICS& MATLAB by JOAQUIM.P. MARQUE.

ONLINE REFERENCES:

1. http://www.tutorialspoint.com/cprogramming/
2. http://www.cprogramming.com/tutorial.html
3. http://www.learnconline.com/
4. http://www.mathworks.in/academia/
5. http://www.mathworks.in/help/matlab/

COURSE NO 108: COMPUTER APPLICATIONS (PRACTICAL)

CYCLE 1: MS-DOS.

CYCLE 2: MS-OFFICE.

CYCLE 3: C–LANGUAGE.

CYCLE 4: MATLAB PROGRAMMING.

B.PHARM II SEMESTER

COURSE NO 201: GENERAL AND DISPENSING PHARMACY

Learning objectives:		
Units	**Contents**	**Hrs**
Unit-1:	History of Pharmacy, Pharmacy Profession and Evolution of Pharmacy – Pharmacy in India – Pharmacopoeias of India, B.P., U.S.P. and International Pharmacopoeia – Metrology – Weights and Measures – Balances – Types and Care.	**04**
Unit-2:	**Dosage Forms** – Classification – Definition and Essential Characteristics – Formulation and its purpose – Formulation additives. A study of principles, formulation, general methods of preparation, dispensing and uses of the following types of preparations including a study of official (IP/BP) and other popular products under each category.	**08**
Unit-3:	**Liquids for External Use:** Lotions, Liniments, Glycerins, Collodions, Paints, Gargles, Mouth Washes, Ear Drops. Liquids for Internal Use: Waters, Solutions, Spirits, Elixirs, Syrups.	**06**
Unit-4:	**Emulsions and Suspensions.**	**08**
Unit-5:	**Powders, Semisolids**: Ointments, Creams, Pastes, Gels, Suppositories.	**08**
Unit-6:	**Galenicals:** A Study of Maceration, Percolation and Continuous Hot Extraction. Method of Preparation and Uses of the Following Galenicals: Compound Tincture of Benzoin, Liquid Extract of Belladonna, Dry Extract of Nux Vomica.	**06**
Unit-7:	Prescription, Types, Latin term terms in prescriptions – General principles of Dispensing, Accuracy and Care in Dispensing and Administrating Medicines, Labelling and Packing. Pharmaceutical Calculations on Percentage Solutions, Doses, Posology, Alligation, Proof Strength.	**06**
Unit-8:	**Incompatibility:** Physical, Chemical and Therapeutic – Methods of Overcoming and Handling Incompatible Prescription.	**08**

Text Books:

1. Introduction to Pharmaceutical Dosage Forms by H. C. Ansel;
2. Bently's Textbook of Pharmaceutics by E. A. Rawlins;
3. I.P., B.P. and B.P.C (Current Editions);
4. Textbook of Professional Pharmacy by N.K. Jain and S.N. Sharma;
5. Cooper and Gunn's Dispensing Pharmacy;
6. Tutorial Pharmacy by Cooper and Gunn;
7. The Science and Practice of Pharmacy by Remingtons.
8. Modern dispensing pharmacy by N.K. Jain and G.D.Gupta published by Pharma book syndicate.

COURSE NO 202: GENERAL AND DISPENSING PHARMACY PRACTICALS

Preparation of atleast 60 Pharmaceutical Products Covering Various Types of Dosage Forms (25) and Aromatic waters (3), Solutions (4), Syrups (3), Elixirs (3), Lotions (2), Liniments (2), Galenicals (1), Glycerins (3), Ointments (2), Creams (2), Mixtures (8), Powders (6), Emulsions (6), Suppositories (2), Incompatibilities (10), Paints, Gargles, Mouth Washes (3), Prescriptions related to: mixtures of different classes in each (4), Powders in eutectic and effervescent preparations, physical and chemical incompatibilities each (2).

COURSE NO 203: PHYSICAL PHARMACY I – THEORY

Learning objectives:		
Units	**Contents**	**Hrs**
Unit-1:	**Intermolecular forces and state of matter:** Binding forces between molecules, the states of matter, the gaseous state, the liquid state, solids and the crystalline state phase equilibria and the phase rule.	**08**
Unit-2:	**Thermodynamics:** Basic principles of first, second and third laws of thermodynamics, modification of first law under different thermodynamic conditions differential and integral heat of solutions, entropy and its significance, applications of three laws of thermodynamics in Pharmacy, Gibbs and Helmholtz free energy functions.	**08**
Unit-3:	**Solutions of non-electrolytes:** Concentration expressions: molarity, molality, normality, mole fraction percentage by weight, volume, their relative advantages and disadvantages, Roults Law and its applications, ideal and real solutions. Colligative properties and their significance in Pharmacy.	**08**
Unit-4:	**Solutions of electrolytes:** Properties of electrolytic solutions, conductance and equivalent conductance. Arrhenius theory of strong electrolytes and its merits and demerits. Degree of dissociation and Van'tHoffs factor. Activity and activity coefficients. Debye-HuckelTheory ionic strength, coefficients for expressing the colligative properties.	**08**
Unit-5:	**Ionic equilibria:** Ionization of water, weak acids and weak bases, Sorensen's pH scale and interconversion of ionic concentrations to pH and vice-versa. pH calculations involving proton balance equations. Acidity conditions and their significance	**07**
Unit-6:	**Electrodes** Electromotive force and oxidation – reduction systems: Electrochemical cells, electrometric determination of pH and redox.	**07**
Unit-7:	**Buffers:** Buffers and buffered isotonic systems. The buffer equation,	**07**

	buffer capacity, buffers in pharmaceuticals and biologics, buffered isotonic, methods of adjusting tonicity and pH.	
Unit-8:	**Physical properties:** Study of the following principles with emphasis on problem solution, wherever applicable.Viscosity and Poisseulli's formulae for liquids, experimental determination of viscosity, Ostwald's viscometer, comparison of viscosities. Surface Tension: Definition, method of determination. Significance in Pharmacy. Dielectric constant, induced polarization, dipole moment, refractive index and molar refraction. Optical rotation, optical rotatory dispersion.	**09**

COURSE NO 204: PHYSICAL PHARMACY-PRACTICAL

1. Determination of viscosity of liquids such as water, glycerin, liquid paraffin – light and heavy;
2. Determination of surface tension of water and a surfactant solution;
3. Determination of density of a solid;
4. Phase Rule: Construction of phase diagram for phenol – water system;
5. Construction of Phase diagram for triethanolamine – water system;
6. Rast camphor method: Determination of molecular weight of a substance (benzoic acid and aspirin);
7. Elevation of boiling point – determination of vant Hoff's factor;
8. Determination of refractive index and molar refractivity of liquids such as water, acetone, carbon tetrachloride and alcohol;
9. Quatitative applications of refractive index – determination of strength of alcohol or acetone;
10. Determination of specific rotation of dextrose solution and estimation of dextrose in solution by polarimetry;
11. Calibration of pH meter and determination of pH of solutions;
12. Acid – base titrations using pH meter;
13. Determination of pKa by half – neutralization method;
14. Preparation of selected buffers and determination of buffer capacity of acetate buffer.

Suggested Books:

1. Physical Pharmacy by Alfred Martin.
2. Bentley's Textbook of Pharmaceutics by E.A. Rawlins.
3. Remington's Pharmaceutical Sciences.

4. Physical pharmacy Practical text by Guru Prasad Mohanta and Prabal Kumar Manna Published by Pharma book syndicate.
5. Essentials of physical pharmacy by Derle D.V. published by pharma book syndicate.

COURSE NO 205: HUMAN PHYSIOLOGY -1
(INCLUDING HEALTH EDUCATION AND PATHOPHYSIOLOGY)

Learning objectives:

1. To impart fundamental knowledge of the structure and functions of the human body.
2. To understand homeostasis mechanisms and its relation with various body systems.
3. To gain the knowledge regarding various tissues and organs of different systems of human body.
4. To impart a thorough knowledge of pathophysiological aspects of various diseases.
5. The knowledge imparted should help the students to understand the pharmacology of drugs.

Units	Contents	Hrs
Unit-1:	Fundamentals of anatomy of different systems of body including skeleton. Extracellular fluid-internal environment. Difference between extracellular fluid and intracellular fluids. Membrane potentials, action potentials. Homeostatic mechanisms, electrolytes, pH and buffers. Classification of tissues and their functions, neuromuscular junction, mechanism of muscle contraction and its electrical and metabolic correlates. Muscle function during exercise. Knowledge of myasthenia gravis, spasticity, tetanus.	**10**
Unit-2:	Composition and the functions of blood. Genesis and regulation of red blood cells production, blood groups, transfusion of blood. Leukocytes, properties of white blood cells, tissue macrophages. Blood coagulation, Formation and circulation of lymph. Diseases related to blood: anemia and blood dyscrasias like purpura, agranulocytosis, thrombocytopenia, leukemias, leucopenia, hemophilia and polycythemia.	**06**
Unit-3:	Cardiovascular system: Structure and functions of heart and blood vessels. Excitatory and conductive system of the heart, Action potentials in cardiac muscle, cardiac cycle, Nervous regulation of the heart. Systemic, pulmonary, coronary and hepatic blood circulation, cardiac output, blood pressure in different blood vessels, blood pressure regulation and measurement. E.C.G of heart, abnormal rhythms of the heart, congestive heart failure, hypertension, atheroscelerosis, arterioscelerosis, angina pectoris, IHD.	**12**
Unit-4:	Structure and functions of different parts of gastrointestinal tract. Motility of alimentary canal and its regulation. Gastrointestinal secretions, their composition, function and regulation. Digestion of food in mouth, stomach and small intestine and its absorption. Balanced diet	**10**

	and deficiency disorders. Structure and functions of Liver. Diseases related to GIT: emesis, pyloric stenosis, hyperacidity, peptic and duodenal ulcer, dyspepsia, colic, constipation and diarrhea, piles, jaundice, cirrhosis, diabetes.	
Unit-5:	Respiratory organs and their physiology. Mechanisms of respiration. Molecular aspects of cellular respiration. Transport of gases between lungs and tissues. Artificial respiration methods. Diseases related to respiratory tract: asthma, bronchitis and pulmonary tuberculosis.	**04**
Unit-6:	Kidney: structure and function of nephron, formation of urine and renal mechanisms for concentrating and diluting the urine, regulation of acid-base balance. Renin-angiotensin-aldosterone system, Regulation of blood volume, extracellular fluid volume. Diseases related to kidney: Nephritis, crystalluria, edema, nephrogenic diabetes insipidus, and acute renal failure.	**04**
Unit-7:	Spread and prevention of contagious diseases, venereal diseases, leprosy, droplet's infection, water and air-borne diseases, diseases caused by insects.	**06**
Unit-8:	Population problem, family planning programme. The role of pharmacist in motivating public in the implementation of family planning programme, Principles of family planning methods, contraceptives and their use. First aid for fractures of limbs, joints, bleeding, drowning and snakebite, burns, scalds and poisoning.	**06**

Suggested Books:

1. Medical Physiology by Tortora.
2. Shambu lingam- Essentials of Physiology.
3. Ross & Wilson- Anatomy & Physiology in health and illness- Anne Waugh, Allison Grant.
4. First Aid to the injured- Published by Saint John Ambulance Association.
5. A Treatise on Hygiene and Public Health, B.N. Ghosh, Calcutta Scientific Publishing Company.

Reference Books:

1. Text Book of Medical Physiology- Arthur.C.Guyton
2. Samson Wright's Applied Physiology.

COURSE NO 206: ENVIRONMENTAL SCIENCES

Name of the Course: Environmental Sciences		
Course No. 206		Semester II
Duration: 60 Hrs		Maximum Marks: 100
Teaching Scheme		Examination Scheme
Theory: 04 Hrs/week		Mid Semester Exam: 20 Marks
Practical: Not Applicable		End Semester Exam: 80 Marks
Credits: 04		
Aim: Impart environmental awareness for the rational utilization of resources and protection of the environment		
Objectives:		
1.	To impart knowledge on the importance of environmental resources for humanity	
2.	To create awareness on local and global environmental problems	
3.	To make the students understand the environmental impacts of developmental activities taking place in various sectors	
4.	To provide basic knowledge on the connection between economy and environment	
5.	To make the students understand the social issues related to environmental pollution	
6.	To provide basic knowledge on the governance and regulations regarding the environment	
7.	To provide field knowledge in order to enable the students to understand the state of ecology, environment and natural resources	
Pre-Requisite:		
1.	10 + 2 level qualification	

Units	Contents	Hrs
Unit - 1	Introduction: definition, scope and importance of environment. Types, characteristics, structure and function of forest, grassland, desert and aquatic (lakes, rivers and estuaries) ecosystems.	**05**
Unit - 2	Natural resources (land, water, forest and energy) management: Land degradation, soil erosion and desertification, impacts of modern agriculture Water use and over-utilization of surface and ground water, water conflicts, floods, droughts, water logging and salinity Forest use, abuse and over-use, impacts of mining and dams on forests and tribal people Energy needs, renewable and non-renewable energy sources, alternate energy sources, impacts of energy use on environment.	**10**
Unit - 3	Biodiversity and its conservation and management: Social, ethical, aesthetic, commercial and medicinal values of biodiversity, India as a mega diversity center, threats to biodiversity (Hot spots, Habitat loss, Wildlife poaching, Species loss), *In-situ* and *Ex-situ* conservation and management of biodiversity.	**05**

Unit - 4	Global environmental problems: Causes, effects and control measures of air pollution, water pollution, soil pollution, marine pollution, noise pollution and thermal pollution; Nuclear hazards, acid rain, ozone depletion, global warming and climate change; Solid waste management, organic compost; Urban and industrial wastes, recycling and re-use.	**10**
Unit - 5	Environmental problems of India: Drinking water, sanitation and public health; effects of urbanization, transportation, industrialization and green revolution on the quality of environment; water scarcity and ground water depletion; rain water harvesting, cloud seeding and watershed management. Controversies on major dams – resettlement and rehabilitation of people, problems and concerns.	**08**
Unit - 6	Economy and Environment: Economics of development, preservation and conservation; sustainability – theory and practice; Equitable use of resources for sustainable lifestyles; environmental impact assessment. Environmental education, environmental movements and environment versus development.	**05**
Unit - 7	Institutional governance and environmental regulations: Government regulations, monitoring and enforcement; environmental governance, environmental acts (Water Act, Air Act, Environment Protection Act, Wildlife Protection Act, Forest Conservation Act and Coastal Zone Regulations); Institutions and Policies relating to India. International Conventions – Stockholm Conference 1972; Earth Summit 1992; World Commission for Environmental Development.	**07**
Unit - 8	Case Studies: Chipko movement, Narmada BachaoAndolan, Silent Valley Project, Madhura Refinery and TajMahal, Industrialization of Pattancheru, Hyderabad, Nuclear Reactor at NagarjunaSagar, Tehri Dam, Ralegaon Siddhi (Anna Hazare), Kolleru Lake Aquaculture and Florosis in Andhra Pradesh Field Work: Study of local flora and fauna; hill, river and pond ecosystems; Field knowledge on local industries, water treatment plants, and effluent treatment plants.	**10**
	Total	**60**

Text Books:

1.	G. Tyler Miller and S. Spoolman 2010. Environmental Science, 13th Edition, Cengage Learning, USA. ISBN-13: 9780495560166
2.	Arvind Kumar 2004. A Text Book of Environmental Science. APH Publishing, ISBN 817648590X
3.	Robert M. Schoch 1996. Case Studies in Environmental Science. Jones & Bartlett Publishers, ISBN 0314203974

4.	Energy Primer – Solar, Water, Wind and Biofuels 1974. Published by Portola Institute, USA. ISBN 0-91477400-X.
5.	Richard T.W. and Bernard J.N. 2002. Environmental Sciences: Toward a sustainable future. 8th Edition, Prentice Hall Publisher, ISBN 10.0130325384.
6.	Daniel B.B. and Edward A.K. 2002. Environmental Sciences: Earth as a Living Planet. Wiley Publishers, ISBN 10.0471389145.
7.	Christopher, A.S. 2006. Alternative energy Political, Economic and Social Feasibility. Rowman& Littlefield, Maryland. ISBN 0-7425-4909-7.
8.	Krishnamurthy, K.V. 2003. Text Book of Biodiversity, Scientific Publishers Inc., USA. ISBN 1-57808-325-7.
9.	Singh, R.B. and Suresh M. 1996. Environmental Law in India: Issues and Responses. Concept Publishing Company, New Delhi. ISBN 81-7022-575-2.
10.	Goodstein, E.S. 2011. Economics and the Environment. John Wiley & Sons Inc., USA ISBN 13-978-0-470-56109-6.