JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

(Established by Govt. of A.P., ACT No.30 of 2008)

ANANTAPUR – 515 002 (A.P) INDIA

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Lr.No.JNTUA/DAPO/A1/I B.Pharm I sem syllabus/2015 **Date:27/06/2015**

Sub:- JNTUA – DAPO – B. Pharm (R15) – 1st year I semester course structure & syllabus-Reg.
Ref:- Note Orders of the Vice-Chancellor, dated:- 27-06-2015.

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Vide ref cited above, I am herewith enclosing approved course structure & syllabi of I B.Pharm I semester of R15 regulations which is applicable for the students admitted from 2015-16 onwards.

S.No.	Code No	Title of the Subject
1	15R00101	Remedial Mathematics
	15R00102 15R00103	Remedial Biology Remedial Biology Lab
2	15R52101	Functional English
3	15R00103	Pharmaceutical Organic Chemistry - I
4	15R00104	Human Anatomy and Physiology - I
5	15R00105	Pharmaceutical Inorganic Chemistry
6	15R00106	Pharmaceutical Organic Chemistry – I Lab
7	15R00107	Human Anatomy and Physiology – I Lab
8	15R00108	Pharmaceutical Inorganic Chemistry Lab

Yours faithfully,

D.A.P

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR
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ANANTHAPURAMU – 515 002 (A.P) INDIA
Course Structure for B.Pharmacy - R15 Regulations

I B.Pharm. - I Semester

S.No	Course code	Subject	Th	Tu / Lab	Credits
1.	15R00101	Remedial Mathematics	3	1 -	3
	15R00102	Remedial Biology	2	1 -	2
	15R00103	Remedial Biology Lab	-	- 2	1
2.	15R52101	Functional English	3	1 -	3
3.	15R00104	Pharmaceutical Organic Chemistry - I	3	1 -	3
4.	15R00105	Human Anatomy and Physiology - I	3	1 -	3
5.	15R00106	Pharmaceutical Inorganic Chemistry	3	1 -	3
6.	15R00107	Pharmaceutical Organic Chemistry – I Lab	-	- 4	2
7.	15R00108	Human Anatomy and Physiology – I Lab	-	- 4	2
8.	15R00109	Pharmaceutical Inorganic Chemistry Lab	-	- 4	2
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Subject	**REMEDIAL MATHEMATICS**	***Course Code***	15R00101	***Credits***
Course year	B. Pharmacy I Year	***Semester***	I Semester	3
Theory	3 hrs/week	***Tutorial***	1hr/week	
End exam	70 marks	***Internal***	30 marks	

Objectives: The objective of course is to impart knowledge in basic concepts of Mathematics relevant to pharmacy professionals

UNIT I: Algebra
Arithmetic Progression-Geometric progression, quadratic equations: Equations reducible to quadratics, Logarithms: Logarithm of a real number to an arbitrary base, theorems on logarithms, application of logarithms in pharmaceutical computations and Partial fractions

UNIT II: Trigonometry
Trigonometric ratios and the relations between them, Sin(A+B),Cos(A+B), Tan(A+B) formulae only, Trigonometric ratios of multiple and sub-multiple angles, Sum and Product transformations.

UNIT III: Co-ordinate Geometry
Distance between points, Area of a triangle, Co-ordinates of a point dividing a given line segment in a given ratio, equation to a straight line in different forms, angle between straight lines-point of intersection.

UNIT IV: Differential and Integral calculus
Limit of a function, differentiation, derivatives of trigonometric functions, logarithmic and partial differentiation, maxima and minima (elementary), derivatives of second order.
Integration: Definition of integration, integration by substitution, integration by parts and definite integrals.(Basic problems)

UNIT V: Differential Equations and Laplace Transforms
Differential Equations: Order and degree, formation of a differential, solution of first order differential equations (variable separable method) application of first order and first degree differential equation. Law of natural growth and decay, Newton's law of cooling. Laplace transforms - Definition, elementary functions, properties of linearity and shifting.

Text Books:
1. Intermediate first and second year mathematics text books printed and published by Telugu academy.
2. A textbook of Remedial mathematics by P.Seshagiri Rao.

References:
1. Grewal B. S. Numerical Methods Khanna Publishers.
2. Steve Dobbs & Jane, Miller Advanced Level Mathematics Statistics, Cambridge University Press.
3. Adams Dany Spencer Laboratory Mathematics Carrol & Graphs.
4. Jenny Olive Maths. A Students Survival Guide Cambridge University Press.

Outcomes:
- The student is able to identify the type differential equations and uses the right method to solve the differential equations. Also the able to apply the theory of differential equations to the real world problems
- The student is able to transform functions on time domain to frequency domain using Laplace transforms
- The student will able to understand the methods of differential calculus to optimize single and multivariable functions.

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Subject	**REMEDIAL BIOLOGY**	***Course Code***	15R00102	***Credits***
Course year	B. Pharmacy I Year	***Semester***	I Semester	2
Theory	2 hrs/week	***Tutorial***	1hr/week	
End exam	70 marks	***Internal***	30 marks	

Objectives: This subject is introduced to the pharmacy course in order to make the student aware of the characters of the plants and animals. This subject gives basic foundation to Pharmacognosy

UNIT I
Plant and animal cell: Detailed structure and their functions. Mitosis, meiosis, different types of plant tissues and their functions.

UNIT II
Salient features and classification of plants into major groups-algae, fungi, bryophytes, pteridophytes, gymnosperms and angiosperms. Classification of animal kingdom and salient features of each phyla.

UNIT III
Morphology and histology of root, stem, bark, wood, leaf, flower, inflorescence, fruit and seed. Modifications of root stem and leaf.

UNIT IV
Study of Structure and life history of parasites: Amoeba, Entamoeba, Trypanosoma, Plasmodium, Taenia, Ascaris, Schistosoma, Oxyuris and Ancylostoma.

UNIT V
General structure and life history of insects like Cockroach, Mosquito and Housefly.

Text Books:
1. Intermediate First Year and Second Year Botany / Zoology Text Books printed and published by Telugu Academy, Himayatnagar, Hyderabad.
2. A.C. Dutta, Text Book of Botany.
3. Botany for Degree students Vol I & II by B.P. Pandey.

References:
1. Concepts of biology, Enger.
2. Text book of Biology by S.B.Gokhale.
3. Outlines of zoology by M.Ekambaranatha Ayyar and T.N.Ananda Krishnan.

Outcomes:
- Describe the structure and functions of animal and plant cell
- Describe the various salient features of animal and plant kingdom
- Student able to identify the morphology of various plant parts
- Student able to identify the structure of the various diseases causing parasite

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Subject	**REMEDIAL BIOLOGY LAB**	***Course Code***	15R00103	***Credits***
Course year	B. Pharmacy	***Semester***	I Semester	1
Practical	2 hrs/week	***Tutorial***	-	
End exam	50 marks	***Internal***	25 marks	

I.EXPERIMENTS:

a) Care and uses of microscope
b) Morphology of plant parts indicated in theory.
c) Preparation, Microscopic Examination of stem, root and leaf of Mono and Dicot leaves.
d) Structure of human parasites and insects mentioned in the theory with the help of specimen

II. Demo/Workshop:

Dissection of cockroach mouth parts, observation of different phases of mitotic division in onion root tips.

III. Seminar/Assignment/Group discussion:

Preparation of herbarium of plant parts indicated in theory and study of salient features for identification.

Reference:

1. Intermediate Botany/Zoology Text manuals printed and published by Telugu academy, himayatnagar, Hyderabad.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR
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Subject	**FUNCTIONAL ENGLISH**	***Course Code***	15R52101
Course year	B. Pharm. I year	***Semester***	I
Theory	3 hrs/week	***Tutorial***	1hr/week
End exam	70 marks	***Internal***	30 marks
Credits	3		

Preamble:

English is an international language as well as a living and vibrant one. People have found that knowledge of English is a passport for better career, better pay, and advanced knowledge and for communication with the entire world. As it is a language of opportunities in this global age, English is bound to expand its domain of use everywhere. The syllabus has been designed to enhance communication skills of the students of engineering and pharmacy. The prescribed book serves the purpose of preparing them for everyday communication and to face the global competitions in future.

The text prescribed for detailed study focuses on LSRW skills and vocabulary development. The teachers should encourage the students to use the target language. The classes should be interactive and learner-centered. They should be encouraged to participate in the classroom activities keenly.

In addition to the exercises from the text done in the class, the teacher can bring variety by using authentic materials such as newspaper articles, advertisements, promotional material etc.

Objectives:

- To enable the students to communicate in English for academic and social purpose.
- To enable the students to acquire structure and written expressions required for their profession.
- To develop the listening skills of the students.
- To inculcate the habit of reading and critical thinking skills.
- To enhance the study skills of the students with emphasis on LSRW skills.

UNIT –I

Topics: Paragraph writing, writing letters, role play, reading graphs, prepositions, designing posters, tenses, making recommendations.

Text: ENVIRONMENTAL CONSCIOUSNESS' from *MINDSCAPES*

Climate Change - Green Cover – Pollution

UNIT –II

Topics: Compound nouns, imperatives, writing instructions, interpreting charts and pictures, note making, role play, prefixes, subject-verb agreement.

Text: EMERGING TECHNOLOGIES from *MINDSCAPES*

Solar Thermal Power - Cloud Computing - Nanotechnology

UNIT –III

Topics: Making conversations, homonyms and homophones, SMS and use of emotions, past participle for irregular verbs, group discussion, E - mail communication, antonyms, Preparing projects

Text: GLOBAL ISSUES from *MINDSCAPES*

Child Labour - Food Crisis - Genetic Modification - E-Waste - Assistive Technology

UNIT –IV

Topics: Group discussion, affixes, double consonants, debates, writing a book / film review, predicting and problem-solving-future tense, adverbs

Text: SPACE TREK from *MINDSCAPES*

Hubble Telescope - Chandrayan-2 - Anusat - Living Quarters - Space Tourism

UNIT –V

Topics: Compare and contrast, effective writing, group discussion, writing reports, writing advertisements, tweeting and blogging, types of interviews, framing questions.

Text: MEDIA MATTERS from *MINDSCAPES*

History of Media - Language and Media - Milestone in Media - Manipulation by Media - Entertainment Media - Interviews

Text Books:

1. MINDSCAPES: English for Technologists and Engineers, Orient Blackswan, 2014.

References:

1. A Practical Course in Effective English Speaking Skills by J.K.Gangal, PHI Publishers, New Delhi.2012
2. Technical Communication, Meenakshi Raman, Oxford University Press,2011.
3. Spoken English, R.K. Bansal & JB Harrison, Orient Longman,2013, 4Th edition.
4. Murphy's English Grammar with CD, Murphy, Cambridge University Press,3 Rd edition.
5. An Interactive Grammar of Modern English, Shivendra K. Verma and Hemlatha Nagarajan , Frank Bros & CO,2008.

Outcomes:

- Have improved communication in listening, speaking, reading and writing skills in general.
- Have developed their oral communication and fluency in group discussions and interviews.
- Have improved awareness of English in science and technology context.
- Have achieved familiarity with a variety of technical reports.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR
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Subject	**PHARMACEUTICAL ORGANIC CHEMISTRY-I**	***Course Code***	15R00104	***Credits***
Course year	B. Pharmacy I year	***Semester***	I	3
Theory	3 hrs/week	***Tutorial***	1hr/week	
End exam	70 marks	***Internal exam***	30 marks	

Objectives:

- To understand fundamentals of organic chemistry
- To apply the knowledge for the synthesis of various new organic molecules.

UNIT I

Structure and activity of Organic Molecules: Concept on shapes of organic molecules, valency (C, H, O, N, S, P, X, Si), hybridization SP3, SP2, SP, different bonds, bond lengths, bond angles, bond dissociation energies, molecular weight calculations, impact of structure on BP, MP, refractive index, surface tension and solubility.

Electronic effect in organic molecules: Inductive effect, electromeric, mesomeric effect, hyperconjugation, concept of resonance and stability. Types of organic reagents and reactions.

UNIT II

Aliphatic/Alicyclic Hydrocarbons: Nomenclature, isomerism (Chain, Conformational and geometrical) relative stabilities (heat of combustion and hydrogenation) ring stabilities of cyclohexane, Chair-boat conformation, Bayer's strain theory and Sachse- Mohr concept. Free radical substitution reactions (halogenation) of alkanes, selectivity and reactivity of halogens.

UNIT III

Alkenes: Electrophilic addition reactions of alkenes, Markovnikow's rule, anti-Markovnikow's rule, Hkarasch effect, Bayer's oxidation (Cis-hydroxylation, Polymerization)

Alkadienes: Stability of conjugated dienes, 1,2 and **1,4** - addition reactions of conjugated dienes.

UNIT IV

Alkynes: Acidity of 1-alkynes, formation of metal acetylides, stereo specific reduction of alkynes, addition of hydrogen halide, addition of water and keto-enol tautomerism.

Halogen compounds - Aliphatic: Nomenclature, general methods of preparation Characteristic nucleophilic substitution reactions, factors that play role **in** SN 1 and SN2, Walden inversion, elimination reaction and Saytzeff's rule.

UNIT V

Carbonyl compounds: Nomenclature, two important methods of preparation, polarity of carbonyl group, relative reactivities of carbonyl compounds, nucleophilic addition and addition-elimination reactions, Oxidation-reduction reactions, aldol condensation, Cannizzaro reaction, benzoin condensation, Perkins reactions, Reformatsky reaction and Oppenauer oxidation.

Text Books:

1. Advanced pharmaceutical organic chemistry, Bahl & Bahl, S.Chand.
2. Organic chemistry, T.R.Morrison and R.N.Boyd, Pearson Education India , New Delhi.

References:

1. Reactions and Mechanism, Jerry March, 4th edition Wiley Publication.
2. Organic chemistry, Carey, 8th Edition, Mc Graw-Hill.
3. Organic chemistry, Pillai Orient Longman Publisher.

Outcomes:

- Graduates will demonstrate the knowledge of the inter-link of pharmaceutical sciences with pharmaceutical organic chemistry by learning.
- Graduates will understand IUPAC Common system of nomenclature, types of organic reactions, mechanisms, named reaction with mechanism.
- Graduates will expertise their skills for pharmaceutical organic chemistry concepts, tools and atomic models.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR
ANANTHAPURAMU

Subject	**HUMAN ANATOMY AND PHYSIOLOGY - I**	***Course Code***	15R00105	***Credits***
Course year	B. Pharmacy I year	***Semester***	I Semester	3
Theory	3 hrs/week	***Tutorial***	I	
End exam	70 marks	***Internal***	30 marks	

Objectives: This course is designed to impart a fundamental knowledge on the structure and functions of the human body. It also helps in understanding both homeostasis mechanisms and homeostatic imbalances of various body systems

UNIT - I: Cell
Scope of anatomy and physiology, basic terminology used in these subjects. Structure of cell, its components and their functions. Body fluids, homeostasis.
Tissues Elementary tissues of the human body: epithelial, connective, muscular and nervous tissues, their sub types and characteristics and functions.
Urinary system: Various parts, structure & functions of the kidney and urinary tract.
Physiology of urine formation.

UNIT- II:
Haemopoietic system: Composition and functions of blood, blood groups and their significance and mechanism of coagulation of blood. Types of anemia, disorders related to blood components (Definitions only)
Respiratory System*:* Various parts of respiratory tract and their functions. mechanism and regulation of respiration, respiratory volumes and vital capacity. Disorders related to respiratory system (Definitions only)

UNIT-III:
Reproductive Systems: Male and Female reproductive systems and their hormones, physiology of menstruation, coitus and fertilization. Sex differentiation, spermatogenesis & oogeneisis.
Digestive *System:* Gross anatomy of the gastro-intestinal tract, functions of its different parts including those of liver, pancreas and gall bladder. Disorders related to GIT (definitions only)

UNIT - IV:
a) Cardiovascular system: Basic anatomy and physiology of heart and blood vessels, circulation (Systemic, pulmonary, coronary). Understanding of cardiac cycle, heart sounds and electrocardiogram. Blood pressure and its regulation. Disorders related to Cardiovascular system (Definitions only)
b) Lymph and Lymphatic System: Composition, formation and circulation of lymph; Disorders related to lymphatic system (Definitions only)
C) **Study of sense organs:** Structure and detailed functions of eye, ear, nose, tongue, skin

UNIT - V:
a) **Central Nervous System**: Functions of different parts of brain and spinal cord. Structure of blood brain barrier and its importance. Neurochemical transmission in the central nervous system, electroencephalogram, cranial nerves and their functions.
b) **Autonomic Nervous System**: Physiology and functions of autonomic nervous system. Mechanism of neurohumoral transmission in the A.N.S.
c) **Musculoskeletal system:** Structure, composition and functions of skeleton, Joints, classification of joints and types of movements of synovial joints.

Text Books:

1. Principles of Anatomy and Physiology, Tortora, G.J. and Anagnodokas, N.P. Harper & Row Publishers N.Y.
2. Text Book of Human Anatomy, Ross & Willson, M.J. Mycek S.B. Gerther and MMPER.
3. Human Physiology, C.C. Chatterjee. Rosen Educational Publishing 13th Edition.

References:

1. Essential of Human Anatomy & Physiology, Elaine N. Marieb 6th Edition Benjamin Eumming's.
2. Fundamentals of Anatomy & Physiology, Rizzo, Cengage Learning (2009) 3rd Edition.
3. Human Anatomy, Mc. Kinley, Mc. Graw Hill 2009.

Outcomes:

- Describe the structure (gross and histology) and functions of various organs of the human body.
- Describe the various homeostatic mechanisms and their imbalances of various systems.
- Identify the various tissues and organs of the different systems of the human body.
- Perform the hematological tests and also record blood pressure, heart rate, pulse rate.
- Appreciate coordinated working pattern of different organs of each system
- Appreciate the interlinked mechanisms in the maintenance of normal functioning (homeostasis) of human body.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR
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Subject	**PHARMACEUTICAL INORGANIC CHEMISTRY**	***Course Code***	15R00106	Credits
Course year	B. Pharmacy I year	***Semester***	I	3
Theory	3 hrs/week	***Tutorial***	1hr/week	
End exam	70 marks	***Internal exam***	30 marks	

Objectives:

- To understand the knowledge on inorganic compounds those exist as pharmaceutical preparations and pharmaceutical aids.
- To apply the knowledge of volumetric analysis for identification and purity testing for inorganic pharmaceutical compounds specified in IP & BP.

UNIT - I: Basic concepts of Pharmaceutical inorganic chemistry

Introduction to indian pharmacopoeia, concept and content of monograph and definition of various specifications under monograph. Classification of Inorganic Pharmaceuticals based on their applications and therapeutic uses as specified in Indian Pharmacopoeia and British Pharmacopoeia. Sources of impurities in Pharmaceuticals, concept of test for purity, assay, idendification and limit test. Qualitative tests for anion and cations. Limit tests for arsenic, heavy metals, lead, iron, chloride and sulphate.

UNIT - II: Introduction to volumetric analysis

Concept and understanding of titration, titrate, titrant, indicator, primary standard, secondary standard, normality, molarity, molality, concencentrated and dilute acids and bases as per IP. Basic reaction and different titrants used in alkalimetry, acidimetry, oxidation-reduction, non-aqueous, complexometry, argentometry, diazotization titrations. Standardization of sodium hydroxide, perchloric acid, potassium permanganate, silver nitrate, EDTA, sodium nitrite.

Note: Definition, structure, formula, Preparation*, Properties, uses identification test*, principle behind Assays* of the compounds mentioned in Unit III to Unit V (*ONLY FOR SPECIFIED COMPOUNDS)

UNIT- III: Electrolytes, Mineral supplements and Dental products

Electrolytes: Sodium chloride*, compound sodium chloride solution (Ringer's solution), potassiumchloride, ORS, calcium gluconate*, calcium chloride, sodium citrate, haemodialysis fluids.
Mineral Nutrients/Supplements: Ferrous sulphate*, ferrous fumarate, ferrous gluconate, ferricammonium citrate*, iron and dextrose injection.
Dental products:Sodium fluoride*, sodium monofluorophosphate, stannous fluoride, calciumcarbonate, dibasic calcium phosphate* and strontium chloride.

UNIT – IV: Topical agents and Pharmaceutical aids

Topical Agents: Zinc sulphate, calcium hydroxide*, bismuth sub carbonate. zinc oxide*, calamine,zinc stearate, talc, titanium-dioxide, heavy kaolin and light kaolin (only uses), activated dimethicone, hydrogen peroxide solution*, potassium permanganate, silver nitrate (silver protein), iodine (solutions of iodine, povidoneiodine), boric acid*, zinc undecylenate and yellow mercury oxide.
Pharmaceutical aids: Magnesium stearate*, talc, bentonite, colloidal silica. titanium dioxide, ferric oxide.

UNIT – V: Gastro-intestinal agents and other medicinal agents

Acidifiers & Antacids: Dilute hydrochloric acid, sodium acid phosphate, sodium bicarbonate*, aluminium hydroxide gel*, dried aluminium hydroxide gel, magnesium hydroxide mixture,

magnesium trisilicate.
Expectorants: Ammonium chloride* and potassium iodide.
Emetics: Potassium antimony tartarate, copper sulphate*.
Antidotes:sodium thiosulphate*, sodium nitrite, Activated charcoal.
Structure and clinical uses for: Cisplatin, lithium carbonate, barium sulphate, plaster of paris, sodium aurothiomalate, sodium antimony gluconate, potassium perchlorate, sodium tetradecyl sulphate, sodium chloride hypertonic injection.

Text Books:

1. Practical pharmaceutical chemistry, Part-I, A.H.Beckett and J.B.Stenlake, The Athtone press, University of London, London.
2. Inorganic Medical and Pharmaceutical Chemistry, J.H Block, E.Roche, T.O Soine and C.O. Wilson, Lea & Febiger Philadelphia PA. 1974.
3. Pharmaceutical Chemistry-Inorganic, G.R. Chatwal, Himalaya Publishing House, Mubai, India.

References:

1. Inorganic chemistry, Gary L.Miessler and Donald A.Tarr,3/e, Pearson education, New Delhi.
2. Inorganic pharmaceutical chemistry, P. Gundu Rao, Vallabh Prakashan, Delhi.
3. Advanced Inorganic Chemistry, G.D.Tuli, Satya prakash, S.Chand 2006.
4. Modern inorganic chemistry by William L. Jolly Mc Graw-Hill, New Yark 1984
5. Indian Pharmacopoeia 1996, 2007.

Outcomes:

- The graduates will develop the knowledge to find out the purity of pharmaceutical substances.
- They came to know the importance of pharmaceutical inorganic agents in certain diseases.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR
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Subject	**PHARMACEUTICAL ORGANIC CHEMISTRY-I LAB**	***Course Code***	15R00107	***Credits***
Course year	B. Pharmacy I year	***Semester***	I	2
Practical	4 hrs/week	***Tutorial***	NIL	
End exam	50 marks	***Internal***	25 marks	

I. Experiments:

A. Introduction to Equipment and Glassware, Recrystallization methods, experiments on melting point, boiling point and distillation.

B. Preparation of organic compounds (each involving a specific organic reaction covered in theory- any 10 synthesis)

1. N-Acetylation : Preparation of Acetanilide from Aniline
2. O-Acetylation : Preparation of Aspirin from Salicylic acid
3. Bromination : Preparation of p-Bromoacetanilide from Acetanilide
4. Hydrolysis : Preparation of p-Bromoaniline from p-Bromoacetanilide
5. Nitration : Preparation of m-dinitrobenzene from Nitrobenzene/picric acid from phenol
6. Reduction : Preparation of m-nitro aniline from m-dinitro benzene.
7. Oxidation : Preparation of Benzoic acid from benzyl chloride / benzyl alcohol.
8. Esterification : Preparation of Benzyl benzoate from benzoyl chloride.
9. Condensation : Benzoin from benzaldehyde.
10. □-Halogenation : Preparation of Iodoform from Oxidation of Acetone / Ethanol.

II. Demo / work shop

Laboratory safety exercises, melting point for different crystals of same compound, atomic models emphasizing hybridization.

III. Seminar/assignment/group discussion

Exercise on nomenclature of compounds, Knowledge on CAS, IUPAC, ACS, material safety data and different types of explosive, oxidizable substances.

References:

1. Text Book of Practical Organic Chemistry, Vogel's, 5th Edition Pearson.
2. Laboratory Manual of Organic Chemistry, R.K. Bansal, New Age International 5th Edition 2007.
3. Advanced Practical Organic Chemistry, O.P. Agarwal, 3rd Edition Goel Publication.
4. Practical Organic Chemistry, F.G.Mann & B.C. Saunders, Pearson 4th Edition.

List of Minimum Equipment Required:

1. Triple beam balances
2. Physical balances
3. Melting point apparatus
4. Suction pumps
5. Oven
6. Hot plates
7. Water baths
8. Distillation unit
9. Refrigerator
10. Adequate glassware

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Subject	**HUMAN ANATOMY AND PHYSIOLOGY – I LAB**	***Course Code***	15R00108	***Credits***
Course year	B. Pharmacy I year	***Semester***	I	2
Practical	4 hrs/week	***Tutorial***	NIL	
End exam	50 marks	***Internal***	25 marks	

I. EXPERIMENTS:

1. Study of compound microscope
2. Microscopic study of different tissues(Epithelial, Nervous tissues)
3. Microscopic study of different tissues (Muscular, connective tissues)
4. Determination of blood groups
5. Estimation of Haemoglobin in blood.
6. Determination of bleeding time & clotting time.
7. Recording of Blood pressure.
8. Recording of pulse rate
9. Study of ECG
10. Recording of body temperature.

II. DEMO

Study of different systems with the help of charts and models.

1. Study of Cardiovascular system.
2. Study of nervous system.
3. Study of Lymphatic system.

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Subject	**PHARMACEUTICAL INORGANIC CHEMISTRY LAB**	***Course Code***	15R00109	***Credits***
Course year	B. Pharmacy I year	***Semester***	I	2
Practical	4 hrs/week	***Tutorial***	NIL	
End exam	50 marks	***Internal***	25 marks	

I. Experiments:

1. Limit tests for the following as per the procedure given in Indian Pharmacopoeia
   a) Chlorides &Modifications in limit test for chlorides inpotassiumpermanaganate
   b) Sulphates &Modifications in limit test for sulphates inpotassiumpermanaganate
   c) Iron
   d) Arsenic
2. Balances and Weighing: Calibration of Pipette and Burette.
3. Preparation and standardization of Hydrochloric acid solution (0.1N).
4. Preparation and standardization of Potassium permanganate solution (0.1N).
5. Preparation and purification of Boric acid.
6. Preparation and purification of Potash alum.
7. Assay of sodium bicarbonate and assay of Boric acid (Neutralization).
8. Assay of calcium gluconate (or) any calcium compounds (Complexometry).
9. Assay of copper sulphate (Redox titration).
10. Assay of sodium acetate (Non-aqueous titration).
11. Assay of ferrous sulphate (Oxidation-reduction / Redox titration).

II. Demo/workshop

Labelling, handling, storage of inorganic compounds, safety practices in laboratory, identification of anions and cations.

III. Assignment/Seminar/Group Discussion

a) Radioactive metals in the environment and its importance
b) Importance of inorganic compounds in cancer
c) Different catalysts which are used in various organic preparations and their characteristics
d) Inorganic metals used in biochemical functions and their rule.

References:

1. Practical pharmaceutical chemistry, Part-I, A.H.Beckett and J.B.Stenlake, The Athtone press, University of London, London.
2. Inorganic chemistry, Gary L.Miessler and Donald A.Tarr,3/e, Pearson education, New Delhi
3. Inorganic pharmaceutical chemistry, P. Gundu Rao, Vallabh Prakashan, Delhi.
4. Advanced Inorganic Chemistry, G.D.Tuli, Satya prakash, S.Chand 2006.
5. Modern inorganic chemistry by William L. Jolly Mc Graw-Hill, New Yark 1984
6. Indian Pharmacopoeia 1996, 2007.

List of Minimum Equipment Required:

1. Analytical balances
2. Physical balances
3. Suction pumps
4. Oven
5. Hot plates
6. Water baths
7. Distillation unit
8. Limit test apparatus for arsenic