First Semester			
S. No.	**Name of Subject**	**Credits**	**Total Marks**
1	Fundamental of Environmental Science	3	100
2	Anatomy and Physiology	5	100
3	Biochemistry	5	100
4	Anatomy and Physiology-(P)	5	100
5	Fundamentals of Medical Laboratory Science	3	100
6	Biochemistry- (P)	3	100
Total		**24**	

Second Semester			
S. No.	**Name of Subject**	**Credits**	**Total Marks**
1	Microbiology (Bacteriology & Parasitology)	5	100
2	Hematology	5	100
3	English	4	100
4	Safe Injection Procedure -(P)	4	100
5	Hematology -(P)	3	100
6	Microbiology (Bacteriology & Parasitology) -(P)	3	100
Total		**24**	

Third Semester			
S. No.	**Name of Subject**	**Credits**	**Total Marks**
1	Fundamental of Information Technology	4	100
2	Pathology and Microbiology-(P)	3	100
3	Pathology and Microbiology	5	100
4	Professional Management	4	100
5	Health and Disease (General Clinical Problem)	5	100
6	Health and Disease (General Clinical Problem)-(P)	3	100
	Total	**24**	

Fourth Semester			
S. No.	**Name of Subject**	**Credits**	**Total Marks**
1	Laboratory Management and Ethics	4	100
2	Enzymology	5	100
3	Bio Medical Waste Management	5	100
4	Health Education & Health Communication	4	100
5	Enzymology-(P)	3	100
6	Bio Medical Waste Management-(P)	3	100
Total		**24**	

Fifth Semester			
S. No.	**Name of Subject**	**Credits**	**Total Marks**
1	Foundation Course in Business Entrepreneurship and Management	4	100
2	Immunohematology	5	100
3	Hematology & Blood Banking	5	100
4	Lab Instruments and Ethics	5	100
5	Seminar	2	100
6	Immunohematology-(P)	3	100
Total		**24**	

Sixth Semester			
S. No.	**Name of Subject**	**Credits**	**Total Marks**
1	Histopathology and Cytopathology Techniques	5	100
2	Biostatistics and Research Methodology	5	100
3	Clinical Endocrinology & Toxicology	4	100
4	Biostatistics and Research Methodology-(P)	3	100
5	Project	4	100
6	Histopathology and Cytopathology Techniques-(P)	3	100
Total		**24**	

Total No. of Credits of Programme: - 144

20. Detailed syllabus: -

First Semester

First Semester			
S. No.	**Name of Subject**	**Credits**	**Total Marks**
1	Fundamental of Environmental Science	3	100
2	Anatomy and Physiology	5	100
3	Biochemistry	5	100
4	Anatomy and Physiology-(P)	5	100
5	Fundamentals of Medical Laboratory Science	3	100
6	Biochemistry- (P)	3	100
Total		**24**	

Subject Name: FUNDAMENTAL OF ENVIRONMENTAL SCIENCE

Unit 1: The Multidisciplinary nature of environmental studies Definition; Scope and importance, Need for public awareness.

Natural Resources: Renewable and non-renewable resources:

Natural resources and associated problems

a) Forest resources: Use and Over-exploitation, deforestation, case studies. Timber extraction, mining, dams and their effects on forests and tribal people.

b) Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams benefits and problems.

c) Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies.

d) Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies.

e) Energy resources: Growing energy needs, renewable and non-renewable energy sources, use of alternate energy sources, Case studies.

f) Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification.

Role of an individual in conservation of natural resources.

Equitable use of resources for sustainable lifestyles.

Unit 2: Ecosystems:

- Concept of an ecosystem.

- Structure and function of an ecosystem.
- Producers, consumers and decomposers.
- Energy flow in the ecosystem.
- Ecological succession. - Food chains, food webs and ecological pyramids.
- Introduction, types, characteristic features, structure and function of the following ecosystem:

a. Forest ecosystem
b. Grassland ecosystem
c. Desert ecosystem
d. Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries).

Biodiversity and its Conservation

a. Introduction-Definition: genetic, species and ecosystem diversity.
b. Biogeographical classification of India.
c. Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values.
d. Biodiversity at global, National and local levels.
e. India as a mega-diversity nation.
f. Hot-spots of biodiversity.
g. Threats to biodiversity: habital loss, poaching of wildlife, man-wildlife conflicts.
h. Endangered and endemic species of India.
i. Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.

Unit 3: Environmental Pollution:

- Causes, effects and control measures of: -

a. Air pollution
b. Water pollution
c. Soil pollution
d. Marine pollution
e. Noise pollution
f. Thermal pollution
g. Nuclear hazards

- Solid waste Management: Causes, effects and control measures of urban and industrial wastes.
- Role of an individual in prevention of pollution.
- Pollution case studies.
- Disaster management: floods, earthquake, cyclone and landslides.

Social Issues and the Environment

- From Unsustainable to Sustainable development.
- Urban problems related to energy.
- Water conservation, rain water harvesting, watershed management.

- Resettlement and rehabilitation of people; its problems and concerns. Case studies.
- Environmental ethics: Issues and possible solutions.
- Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case studies.
- Wasteland reclamation.
- Consumerism and waste products.
- Environment Protection Act.
- Air (Prevention and Control of Pollution) Act.
- Water (Prevention and Control of Pollution) Act.
- Wildlife Protection Act. - Forest Conservation Act.
- Issues involved in enforcement of environmental legislation.
- Public awareness.

Unit 4: Human Population and the Environment

- Population growth, variation among nations.
- Population explosion-Family welfare Programme.
- Environment and human health.
- Human Rights.
- Value Education.
- HIV/AIDS.
- Women and Child Welfare.
- Role of information Technology in Environment and human health.
- Case Studies.

Unit 5: Field Work (Practical)

- Visit to a local area to document environmental assets-river/forest/grassland/hill/mountain.
- Visit to a local polluted site-Urban/Rural/Industrial/Agricultural.
- Study of common plants, insects, birds.
- Study of simple ecosystems-pond, river, hill slopes, etc.

Subject Name: ANATOMY AND PHYSIOLOGY

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Subject Name: ANATOMY AND PHYSIOLOGY-(P)

1. The human body as a whole.
2. Blood, Cardio vascular system, Digestive system etc.
3. Definition of Forensic Medicine and Medical Jurisprudence.
4. Courts in India and their powers: Supreme Court, High Court, Sessions Court, Additional Sessions Court, Magistrate's Courts.

5. Court procedures: Summons, conduct money, oath, affirmation, perjury, types of witnesses, recording of evidence, conduct of doctor in witness box.
6. Medical certification and medico-legal reports including dying declaration.
7. Death: Definition, types; somatic, cellular and brain-death, Sudden natural and unnatural deaths, Suspended animation.
8. Changes after death: Immediate changes, cooling of body, lividity, rigor mortis, cadaveric spasm, cold stiffening and heat stiffening, Putrefaction, mummification, adipocere and maceration, Postmortem artifacts.
9. Inquest: Inquest by police, magistrate.
10. Identification of unknown person, dead bodies and remains of a person by age, sex, stature, dental examination, scars, moles, tattoos, dactylography, DNA typing and personal belonging including photographs.
11. Definition, classification of mechanical injuries; description of blunt force, sharp force and firearm injuries.
12. Sexual Offences: Virginity, rape, unnatural sexual offences; sexual perversions.

Subject Name: BIOCHEMISTRY

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Subject Name: BIOCHEMISTRY-(P)

Unit 1: **Amino acids and Proteins:** Properties, Ionization of weak acids and bases, Protein structure, Summary of covalent and non-covalent forces that maintain structures.

Unit 2: **Physical properties of proteins:** charge, size, hydrophobic, methods for observing these properties, Proteins, Catalytic enzymes.

Unit 3: **Thermodynamics vs. kinetics:** Reversibility of reactions, Conservation of energy, Standard conditions, Thermodynamics, Kinetics.

Unit 4: **Protein structure as it relates to function:** Mechanisms of catalysis, Involvement of protein structure in these mechanisms, Changes in structure alter the protein / enzyme properties, Things that alter proteins structure.

Unit 5: **General Chemistry of biochemistry:** Isomerization B. Hydrolysis C. Elimination, Oxidation/reduction, Aldol condensation/cleavage, Thermodynamics of each: use and making of ATP, coupling hydrolysis of ATP to "reverse" reactions.

Unit 6: **Regulation: Different levels of regulation:** protein synthesis/degradation, allosteric regulation, reversible covalent modification, proteolytic processing. Each regulation level good for different reasons, Requirements for ATP in synthesis and degradation cycle, Reversibility of the different methods of regulation, Consequences of misregulation.

Unit 7: **Metabolic processes central to ATP synthesis:** glycolysis: ATP synthesis, No molecular oxygen required end product lactic acid. Krebs Cycle.

Unit 8: **Oxidative Phosphorylation:** redox reactions provide energy to drive ATP synthesis, Requirement for molecular oxygen, coupling a pH gradient to ATP synthesis, the molecular machine required for ATP synthesis.

Subject Name: FUNDAMENTALS OF MEDICAL LABORATORY SCIENCE

1. Introduction to Laboratory Sciences

Historical development, Role of clinical laboratory science in health care, Role of clinical laboratory scientists, Structure of clinical laboratory services in Nepal, International and national organization in laboratory practice.

2. Laboratory Safety Rules

Laboratory hazard and accidents, Safe laboratory design and organization, Preventing laboratory infection, Pipetting and dispensing safety, Safe use and storage of chemical and reagent, WHO guide lines for clinical laboratory biosafety, Biological safety cabinet.

3. Clinical Laboratory Organization

Operational standard and management, Staffing, Element of the services, The Laboratory Manual or protocol accommodation, equipment, training, safety precautions, quality assurance, use of computer in clinical laboratory.

4. The General Clinical Laboratories

Introduction, purposes and practice in a) Microbiology, b) Pathology, c) Biochemistry, d) hematology and e) Blood bank laboratories.

5. Research and Literature in Clinical Laboratory

Medical Dictionaries, Merck Index, Indian Pharmacopoea (IP), British Pharmacopoea (BP), United States Pharmacopoea (USP), European Pharmacopoea (EP), Japanese Pharmacopoea (JP), Nepalese Formularies, General Medical Books, Journals, Original research articles, Review, Pubmed Database, Role of seminar and conference, Role of literature on research.

Reference Books:

1. Clinical Diagnosis and Management by Laboratory Methods. 20th Ed. John Bernard Henary M. D. W. B. Saunders Co.Philadelphia.
2. Mackie and McCartney, Practical Medical Microbiology, 14th Ed.
3. Monica Chees Brough: Medical Laboratory Manual for tropical countries, volume I, II.
4. WHO: Laboratory biosafety Manual.
5. Mapping the literature of Clinical Laboratory Science JMLA, 2003; July91 (3)303-3110(1999a).
6. A brief history of medical diagnosis and the birth of the clinical laboratory: Part 1.Ancient times through the 19th century. Medical Laboratory Observer (July), 28-40.
7. Berger, D. (1999b). A brief history of medical diagnosis and the birth of the clinical laboratory: part 2. Laboratory science and professional certification in the 20th century. Medical Laboratory Observer (August), 32-38.
8. Berger, D. (1999c). A brief history of medical diagnosis and the birth of the clinical laboratory Part 3. Medicare, government regulation, and competency certification. Medical Laboratory Observer (October), 40- 44.
9. Berger, D. (1999d). A brief history of medical diagnosis and the birth of the clinical laboratory: Part 4. Fraud and abuse, managed care, and lab consolidation. Medical Laboratory Observer(December), 38-42.

10. Bailey and Scott's Diagnostic Microbiology, 9th edition.

Second Semester

Second Semester			
S. No.	**Name of Subject**	**Credits**	**Total Marks**
1	Microbiology (Bacteriology & Parasitology)	5	100
2	Hematology	5	100
3	English	4	100
4	Safe Injection Procedure -(P)	4	100
5	Hematology -(P)	3	100
6	Microbiology (Bacteriology & Parasitology) -(P)	3	100
Total		**24**	

Subject Name: MICROBIOLOGY (BACTERIOLOGY & PARASITOLOGY)

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Subject Name: MICROBIOLOGY (BACTERIOLOGY & PARASITOLOGY)

1. Morphology, Biology, Sterilization, Chemotherapy.
2. Principles of Artificial Media.
3. Function, Reference mechanisms, Reactions, immunity Hypersensitiveness, Skin Tests.
4. Systematic study of Bacterial habits, Importance morphological, Cultural, Biochemical, serological and toxic behavior of common pathogenic and nonpathogenic species.
5. Pathological changes produced by disease bacteria and their laboratory diagnosis.
6. Study of morphological cultural, Bio-Chemical structure of staphylococci, streptococci, Diplococcic, Neisseria, Mycobacterium tuberculosis (types) myco bacterium lepra, names and differentiation of spirochaetes from pathogenic mycobacteria corynebacterium diphthera Aerobic spore baring bacteria-bacillus anthersis, anaeropes general and special features of the pathogens.
7. Names of some important non-pathogens. Gram negative intestinal bacteria, classification, ineqlification of the pathogen salmonella Vibrio bacterium, Pasteurells, general idea about homophiles, pseudomonas,b rucella ricketsia, proteus spirochaetes,general idea.
8. Details of treponema pallidum & leptospiraictero haemorrhagics.
9. Protozoa classification names of important rhixopoda ent. Histolytica;morphology, pathogenisis & patho-genecity, diagnosis, difference from colisporozea species of plasmodia life history and Pathogenisis differentiotion of species.
10. Mastigophora general broad morphological features, Classification, pathogensis, vectors, pathology of Kalazar, important features, source disease due to alantidium coli.
11. Helminutus definition of certain terms. Simple classification differences between nematodes, cestodes and tre matodes., Broad differentiating morphological fea tures and braod life history and pathogenesis of important species of cestodes and Nematodes, intesting liver, Lungs, intestines, and blood general life differences between schistosomes and other Nematodes.

Subject Name: HEMATOLOGY

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Subject Name: HEMATOLOGY

1. Identification of normal blood cells on a peripheral blood smear and recognition of abnormal cells.
2. Description and identification of normal blood cell maturation.
3. Performance of routine automated and non-automated procedures in the hematology laboratories.
4. Recognition of causes of red cell and white cell abnormalities.
5. Performance of routine platelet examination and evaluation.
6. Reporting of hematology results.
7. Following safety and quality control procedures.

Subject Name: ENGLISH

Unit 1: English Grammar

1. **An Introduction to Part of Speech :** Verb, Tenses, Voice, Direct and Indirect Forms of Speech.
2. Prepositions
3. List of Appropriate Preposition Used
4. Sentence
5. Synthesis of Sentences
6. Transformation of Sentences
7. Syntax
8. Punctuation
9. **Vocabulary :** Antonyms and Synonyms, Similar Words Distinguished, One Word Substitutions, More about words, Idioms & Phrases, Idioms.
10. **Common Error :** Some fundamental Rules for Correction, Sentences with error.
11. Comprehension

Unit 2 : Composition

1. Paragraph Writing
2. Letter writing
3. Essay Writing
4. The Essays

Subject Name: SAFE INJECTION PROCEDURE-(P)

1. Best practices for injection
   a. General safety practices: Hand hygiene, Gloves, Other single-use personal protective equipment, Skin preparation and disinfection.
   b. Injection devices and medications: Injection devices, Medication, Preparing injections, Administering injections.

c. Prevention of sharps injuries to health workers
d. Waste management

2. Best practice in phlebotomy and blood collection
   a. Potential effects of unsafe phlebotomy
   b. Background information on best practices in phlebotomy: Quality care for patients and health workers, Quality of laboratory sampling, Blood-sampling systems, Blood collection for blood transfusion purposes
   c. Practical guidance on best practices in phlebotomy: Provision of an appropriate location, Provision of clear instructions, Procedure for drawing blood, Collecting blood for blood donation, After a blood donation, Adverse events in blood donation
   d. Illustrations for best practices in phlebotomy
3. Occupational risks and management of bloodborne pathogens
   a. Basic occupational health care: Immunization against hepatitis B, Testing for HBV, HCV and HIV.
   b. Prevention of needle-stick injuries and other blood exposures using a hierarchy of controls.
   c. Overview of management of exposure to blood: First aid, Risk assessment

Suggested Reading:

1. WHO best practices for injections and related procedures toolkit March 2010.

Third Semester

Third Semester			
S. No.	**Name of Subject**	**Credits**	**Total Marks**
1	Fundamental of Information Technology	4	100
2	Pathology and Microbiology-(P)	3	100
3	Pathology and Microbiology	5	100
4	Professional Management	4	100
5	Health and Disease (General Clinical Problem)	5	100
6	Health and Disease (General Clinical Problem)-(P)	3	100
	Total	**24**	

Subject Name: FUNDAMENTAL OF INFORMATION TECHNOLOGY

1. **Information Concepts & Processing:** Definition of Information, Data VS Information, Introduction to Information System, Information Representation Digital Media, Images, Graphics, Animation, Audio, Video etc. Need a Value & Quality of Information the concept of Information entropy & Numerical.

2. **Computer Appreciation:** Definition of electronic Computer, History, Generation, Characteristics & Application of Computers, Classification of Computers, RAM, ROM, Computer Hardware, CPU, Various I/O Devices, Peripherals, Storage Media, Software Definition and Concepts.

3. **Data Communication & Networks:** Computer Networks, Networking of Computers, Introduction to LAN, WAN, MAN, Network Topologies, Basic Concepts in Computer Networks, Introduction to GPRS, CDMA, GSM & FM Technologies.

4. **Introduction to Internet Technologies:** HTML, DHTML, WWW, FTP, TELNET, Web Browser, Net Surfing, Search Engines, E -Mail, ISP, E-Commerce, Public Key, Private Key, Safety of Business Transaction on Web.

5. **Concepts in Operating System:** Elementary Concepts in Operating System, GUI, Introduction to DOS, MS Windows.

Subject Name: PATHOLOGY & MICROBIOLOGY

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Subject Name: PATHOLOGY & MICROBIOLOGY-(P)

1. General characters and classification of Bacteria.
2. Characteristics of Bacteria.
3. Growth and Maintenance of Microbes.
4. Sterilization and Disinfection.
5. Culture Media.
6. Staining Methods.
7. Collection and Transportation of Specimen.
8. Care and Handling of Laboratory Animals.
9. Disposal of Laboratory/Hospital Waste.
10. Cell Injury and Cellular Adaptations.
11. Inflammation.
12. Haemodynamic Disorders.
13. Neoplasia.
14. Healing.

Subject Name: PROFESSIONAL MANAGEMENT

1. **Management Techniques**:
    a. Leadership, authority, responsibility.
    b. Functions of Management
2. **Quality Control**:
    a. Meaning, importance of keeping standard.
    b. Factors responsible for deviation from standards.
    c. ISO and 180-9000 to 9006.
    d. Total quality management.
3. **Financial Management**:
    a. Sources of finance.
    b. Brief idea of cash and credit, cheques, drafts, bill of exchanges, promissory note.
4. Marketing:
    a. Basic concept.
    b. Market promotion, market promotion.
    c. Branding, packaging, pricing, planning and development.

d. Advertisement media and effectiveness.

e. Sales forecasting, marketing fix-princing policy, sales promotion and salesmanship.

f. After sales services, complaints and their redressal.

5. Human Relations:

a. Motivating the employers

b. Inter personnel relations,

c. Grievances and their banding

d. Staff requirement, training and monitoring.

6. Foreign Trade:

a. Export procedure.

b. Channels of distribution in export trade.

c. Export promotion.

d. Registration of firm/factory in R.B.I., AEPC or others.

Reference Books:

1. 4. Statistical Quality Control - Manohar Mahajan
2. ISO: 9000 Quality System – 2000 - S. Dalela
3. ISO: 14000
4. Organisation & Management of Small Scale Industries - Desai J.V. Himalaya, Bombay, 1985
5. Management of Small Scale Industries - 3rd, Himalaya, Bombay, 1986

Subject Name: HEALTH AND DISEASE (GENERAL CLINICAL PROBLEM)

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Subject Name: HEALTH AND DISEASE (GENERAL CLINICAL PROBLEM)-(P)

1. Man and Medicine

History of medicine, Modern medicine, Curative medicine, Preventive medicine, Social medicine

2. Concepts of Health and Disease

Biomedical concept, Ecological concept, Definition of health, Dimensions of health, Concept of wellbeing, HPI, Determination of health, Responsibility for health, Indicators of health, Mortality, Morbidity, Concepts of disease, Concepts of causation, Concepts of control, Modes of intervention, Population medicine

3. Principles of Epidemiology and Epidemiological Methods

Aims, Approaches, Measurements of morbidity and mortality, Methods, Infectious disease epidemiology, Disease transmission, Immunity, Prevention and control, Dealing with an epidemic

4. Screening for disease

Concepts, Criteria, Sensitivity and Specificity, Problems

5. Epidemiology of Communicable Diseases

Respiratory infections, Intestinal infections, Arthropod-borne infections, Zoonoses, Surface infections, Emerging and re-emerging infectious diseases, Hospital acquired infections, Emporiatrics

6. Epidemiology of Chronic Non-Communicable Diseases

Coronary hearth disease, Hypertension, Stroke, Rheumatic hearth disease, Cancer, Diabetes

7. Demography and Family Planning

Demographic trends, Family planning, Contraceptive methods, Post-conceptional methods, Terminal methods, Delivery system

8. Preventive Medicine in Obstretics, Paediatrics and Geriatrics

Mother and child, Antenatal care, Intranatal care, Postnatal care, Care of children, Infancy, Neonatal care, Growth chart, School Health Service, Geriatric prevention of disease

9. Nutrition and Health

Classification of food, Dietary goals, Deficiencies, Food hygiene, Foodborne diseases, Food toxicants

10. Environment and Health

Water, Acceptability, Microbiological aspects, Chemical aspects, Air pollution, Meterological environment, Excreta disposal, Medical Entomology

11. Occupational Health

Occupational hazards, Radiation hazards, Prevention, Legislation

Reference Books:

1. K. Park: Park's Textbook of Preventive and Social Medicine (16th Ed.) 2000, M/s Banarsidas Bhanot Publishers, Jabalpur.
2. Carolyn Jarvis: Physical Examination and Health Assessment (2nd Ed.) 1996, W. B. Saunders Company, Philadelphia.
3. Robert H. Gates: Infectious Disease Secrets, 1999, Jaypee Brothers Medical Publishers Ltd., New Delhi.

Fourth Semester

Fourth Semester			
S. No.	**Name of Subject**	**Credits**	**Total Marks**
1	Laboratory Management and Ethics	4	100
2	Enzymology	5	100
3	Bio Medical Waste Management	5	100
4	Health Education & Health Communication	4	100
5	Enzymology-(P)	3	100
6	Bio Medical Waste Management-(P)	3	100
Total		**24**	

Subject Name: LABORATORY MANAGEMENT AND ETHICS

LABORATORY MANAGEMENT

1. Introduction to Quality control
2. Total quality management framework
3. Quality laboratory processes, Quality assurance, Quality assessment, Quality control, Quality planning and Quality improvement
4. Costs of conformance and non conformance, appraisal costs, prevention costs
5. Internal quality control, basic steps, sources of error and their correction methods, CAPA - corrective action & preventive action
6. Sources of variation in laboratory results
7. Quality control charts, Levy- Jennings and Cusum charts
8. External quality control
9. Quality control programme, intrinsic and extrinsic and random errors
10. Current trends in laboratory accreditation, ISO certificate, West guard Rules
11. Demonstration of various methods of quality control.

AUTOMATION

1. Automation - Introduction, meaning, advantages, history
2. Continuous flow analyzers
3. Single channel continuous flow analyzers-advantages, disadvantages
4. Multi channel flow analyzers
5. Discrete auto analyzers - basic features, types, semi automated, fully automated
6. Batch analyzers
7. Random access analyzers (RAA)
8. Component steps in fully automated analyzers
9. Auto analyzers based on immunoassay techniques, Micro particle enzyme immunoassay (MEIA)
10. Various random access analyzers - Hitachi- 704, BM/Hitachi - 717
11. Centrifugal analyzers, ASCA
12. Dry chemistry analyzers
13. Dimension RxL clinical chemistry system
14. The Heterogeneous Immunoassay module components
15. Beckman Array 360 system
16. Mini Vidas analyzers
17. Immulite automated immunoassay analyzers
18. Latest trends in Automation, Biochips, Lab on a chip (LoC), Nano sensors advantages and disadvantages, PCR & its applications.

Subject Name: ENZYMOLOGY

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Subject Name: ENZYMOLOGY-(P)

1. Introduction to bio-catalysis, differences between chemical and biological catalysis.
2. Nomenclature and classification of enzymes. Enzyme specificity. Active site.
3. Principles of energy of activation, transition state. Interaction between enzyme and substrate- lock and key, induced fit models. Definition of holo-enzyme, apo-enzyme , coenzyme, cofactor. Fundamentals of enzyme assay, enzyme units.
4. Factors affecting the catalysis- substrate concentration, pH, temperature. Michaelis - Menten equation for uni-substrate reaction (derivation not necessary), significance of KM and Vmax. Enzyme inhibition- irreversible and reversible, types of reversible inhibitions- competitive and non-competitive.
5. Outline of mechanism of enzyme action- acid-base catalysis, covalent catalysis, electrostatic catalysis, and metal ion catalysis. Regulation of enzyme activity- allosterism and co-operatitvity, ATCase as an allosteric enzyme, covalent modulation- covalent phosphorylation of phosphorylase, zymogen activation- activation of trypsinogen and chymotrypsinogen. Isoenzymes (LDH). Multienzyme complexes (PDH). Ribozyme.

Subject Name: BIO MEDICAL WASTE MANAGEMENT

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Subject Name: BIO MEDICAL WASTE MANAGEMENT-(P)

1. Instruction in safety precaution as applicable to the trade. Awareness of environmental pollution, occupational health hazards, its causes, consequences, mitigation and remedies. Health impacts of bio chemical waste.
2. Practice on disease epidemiology. Vaccination and prevention of various diseases
3. Waste survey in hospital practice on categorization of hospital waste
4. Practice on segregation, Polly bags collection, bin, autoclaving, labeling. Use, care and maintenance of autoclave, Incinerator, Microwave Hydro pulping. Plasma Touch.
5. Practice on collection and handling of waste. Pretreatment.
6. Demonstration on hazards of various chemicals use in hospital Pathological, Microbiological and radiological waste.
7. Infection control system in hospital. Visit to ideal waste management site.
8. Record keeping and various form to be submitted to the government and waste auditing.
9. Practice on digging, vats, Pits, Trenches. Practice on composting, Vermi composting
10. Demonstration in recycling.
11. Demonstration on pretreatment of linen, Laundry. Central sterilization
12. Mechanical treatment and chemical disinfections store and off site transportation.

13. Liquid waste treatment using different technologies. Conventional treatment technologies. Alternative treatment technologies, Microwave, Rota clave, Hydro clave, ETP, Electron beam technology.
14. Occupational health programmers and safety practices
15. Preparation of paper for legal proceeding.
16. Estimate of various items of waste management based on No. of wards, No. of beds in each ward.

Subject Name: HEALTH EDUCATION & HEALTH COMMUNICATION

Unit 1: Health education principles, theories, concept and practice.

Unit 2: Counseling as an approach for health education and awareness for family centered health education

Unit 3: Planning health education program within community services.

- Evaluation in health education.

- Evaluation versus assessment.

- Determining the focus of evaluation.

Unit 4: Interpersonal communication skills for special population.

- Handicapped.

- Chronic illness.

Unit 5: Technology in education.

- Health education in the information age.

- The impact of technology on teacher & learner

Unit 6: Characteristics of the learner.

-Determinants of learning.

- The educator role in learning.

- Developmental stages of learner.

- Developmental characteristics stages of childhood

- Role of the family in health education.

Unit 7: Instructional materials , setting & methods.

- Types

- Selection and evaluation .

- General principles.

Unit 8: Motivation, compliance and health behaviors of thelearner.

- Motivation

- Compliance and control.

- Health behaviors of the learner.

- Selection of models for health education.

Fifth Semester

Fifth Semester			
S. No.	**Name of Subject**	**Credits**	**Total Marks**
1	Foundation Course in Business Entrepreneurship and Management	4	100
2	Immunohematology	5	100
3	Hematology & Blood Banking	5	100
4	Lab Instruments and Ethics	5	100
5	Seminar	2	100
6	Immunohematology-(P)	3	100
Total		**24**	

Subject Name: FOUNDATION COURSE IN BUSINESS ENTREPRENEURSHIP AND MANAGEMENT

1. Entrepreneurship:
   a. Definition, basic concept, need, scope and characteristics of entrepreneurship.
   b. Women entrepreneurship.
   c. Assistance to small scale enterprises form national level organization like SIDO, NSIC, NRDC,m KVIC
   d. Assistance to small scale enterprises from State level organization like DOI, DIG; RFC, SISI< RHDC, Pollution Control Board, Rajasthan Khadi &
   e. Facilities to ~omen entrepreneurs.
2. Emerging Areas in Entrepreneurship:
   a. Innovation & Creativity
   b. Introduction to Intellectual Property Rights (IPRs) & Patents
   c. National Knowledge Commission:: basic concept, need & scope
   d. Service sector: scope & future trends
   e. Energy & Auditing
3. Project formulation Process:
   a. Steps in planning a small scale enterprise,
   b. Structure of project report,
   c. Analysis of sample, project reports
   d. Preparation of project reports,
   e. Techno-economic & Feasibility of the project.
4. Financial Sources for SSI Loan:
   a. State Govt. RFC, Credit facilities by banks.
5. Roles & Regulation:
   a. Licensing & regi'stration procedure .
   b. Important provision of Factory, Act.
   c. Shop & Commercial Establishment Act.
   d. Sales of Goods Act.
   e. Partnerspip Act.

f. Value Added Tax (VAT)
g. Service Tax
h. Professional Tax
i. Income Tax,
j. Sales tax & Excise rules
k. Municipal bye laws & insurance coverage.

6. Meaning and Scope of Business:
   a. Definition of profession, trade and Industry.
   b. Objective of business and profession.
   c. Types of Business Organization:
   d. Brief description, advantage and disadvantages of individual-partnership cooperative private and public limited organizations,
   e. Characteristics of small business ethics, organization charts.

Entrepreneurial Awareness Camp:

Topics to be covered in the camp:

1. Who is an entrepreneur?
2. Need for entrepreneurship, entrepreneuriai career and wage employment.
3. Scenario of development of small scale enterprises in India.
4. Entrepreneurial history in India, Indian values and entrepreneurship.
5. Assistance from District Industries Center. Commercial banks. State Financial Corporation. Small Industries Service Institutes. Research and Development laboratories & other financial and development corporations.
6. Considerations for product selection.
7. Opportunities for business, service & entrepreneurship ventures.
8. Learning from Indian experiences in entrepreneurship (Interaction with successful entrepreneurs should be arranged).

Reference Books:

1. Hand Book of Small Scale Industry - P.M. Bhandari
2. Hand Book on Entrepreneurship Development - O/O. Harkut
3. Entrepreneurial Development - S.S. Khanka
4. Statistical Quality Control - Manohar Mahajan
5. Management of Small Scale Industries - 3rd, Himalaya, Bombay, 1986
6. The Story of an Entrepreneur - M. Nath, IMT Monograph
7. Small Industry Entrepreneurs Hand Book Service International - Mohan K.R., Bombay Productivity
8. Hand Book of Entrepreneurship – Rao & Pareek, New Delhi, Learning System 1978

Subject Name: IMMUNOHEMATOLOGY

&

Subject Name: IMMUNOHEMATOLOGY-(P)

1. History of Immunology, Immunohematology, structures composition and functions of cells and organs involved in immune system. Blood groups. Blood transfusion - Rh incompatibilities. Host-parasitic relationships. Microbial infections, virulence and host resistance. Innate immunity, Acquired immunity.

2. Antigens, types, properties, Haptens, adjuvants; Vaccines - Types - Toxoids - antitoxins. Immunoglobulin. Structure, types and properties. Theories of antibody production. Complement structure properties, function of complement components and pathways. Antigen antibody reaction; Invitro methods: precipitation reactions, agglutination, complement fixation, Inmiunofluroscence ELISA, RIA. Invivo methods: skin tests - immune complex tissue demonstrations.
3. Hypersensitivity Reactions - Antibody mediated - Typed I anaphylaxis - Type II Antibody dependent cell cytotoxicity - Type III - Immune complex reaction - the respective reaction. Cell mediated immune response - Lymphokines, cytokines.
4. History of Transfusion Medicine.
5. Scientific Basis of Transfusion.
6. Management of blood donation and preparation of blood components.
7. Pretransfusion testing.
8. Transfusion of blood components.
9. Emergency medicine.
10. General surgical support.

Subject Name: HEMATOLOGY & BLOOD BANKING

1. Specimen Collection and Laboratory Preparations in Hematology.
2. Routine Hematological Test: HB Estimation, Total Leukocyte Estimation, Total ERY Throcyte Estimation, Differential Leulo Cycte Count.
3. Routine Hematological Test: ESR, Packed Cell Colume, Reticulocy Count, Plate Lot Count.
4. Routine Hematological Test: Absolute Eosin Phil Count, Arneth Count, Sechilling Count, Red Cell Indices, Periphery Cell – Morphology.
5. Special Hematological Test: Foetal Hemoglobin Estimation, Foetal Red Cell Estimations.
6. Special Hemological Test: Lupus Ery Thrematous Cell Preparation, Osmotic Fragiliy Test.
7. Heinz Bodies Preparation: Bone Marrow Smear Preparations, Study of Blood Parasites.
8. Interpretation of Lab Findings In Hematology Anemia, Leukemia, Abnormal RBC And WSC Morphology.
9. Introduction to Homeostasis, Coagulation And Bleeding Disorders.
10. Clotting and Bleeding Time Determinations, Coagulations Mechanisms Coagulation Studies.
11. Principles of immucohae metrology, clinical significance of blood transfusains. Collections and processing`s of blood for transfusion.
12. Routine Lab Procedures In Blood Bank: Abo System, Rh System, Sub Grouping, Compatibility Testing, Coombs Testing, Antibody Titration And D` Testing.

Subject Name: LAB INSTRUMENTS AND ETHICS

1. Safety Measures.
2. PH and buffer solution.
3. Photometric techniques.
4. Centrifugation techniques.
5. Chromatography.
6. Electrophoresis.
7. Molecular biology techniques.

8. Automation in clinical chemistry.
9. Automated cell counter 18 parameters and 21 parameters, coagulometer, microhematocrit.
10. Flow cytometry, qbc analysis, elisa reader.
11. Component separator, cell washer, blood bag shaker.
12. Reprigerated centrifuge, apheresis machine, automation in blood group.
13. Serology - photometric reading system and continuous flow system.
14. Automatic tissue processor. automated microtome, automated knife sharpening machine automated hones.
15. Automated stainer, cryostat, trinocular microscope with microphoto.
16. Accessories and monitor, computer printer and scanner.
17. Electron mecroscope, cytocentrifuge, tissue microarray, auto pap stainer.
18. Hot air oven, autoclave, incubator, biosafety cabinet.
19. Microscope: light microscope, fluorescent microscope, dark field microscope, electron microscope.
20. Centrifuge, elisa reader, pcr, bactec, api system.

Subject Name: SEMINAR

Sixth Semester

Sixth Semester			
S. No.	**Name of Subject**	**Credits**	**Total Marks**
1	Histopathology and Cytopathology Techniques	5	100
2	Biostatistics and Research Methodology	5	100
3	Clinical Endocrinology & Toxicology	4	100
4	Biostatistics and Research Methodology-(P)	3	100
5	Project	4	100
6	Histopathology and Cytopathology Techniques-(P)	3	100
Total		**24**	

Subject Name: HISTOPATHOLOGY AND CYTOPATHOLOGY TECHNIQUES

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Subject Name: HISTOPATHOLOGY AND CYTOPATHOLOGY TECHNIQUES-(P)

1. Theory of histopathology, reception of specimens, histopathology of tumor cell.
2. Histopathology of liver, kidney, adrenal, ovary, testies.
3. Method of preparing stains & fixatives.
4. Theory of tissue processing and embedding.
5. Theory of h & e staining.
6. Use of microtome.
7. Tissues section cutting.
8. Embedding and preparation of blocks.
9. Fixation of tissue with DPX mount.
10. Theory of frozen section preparation.
11. Preparation of smear for fine needle aspiration cytology.
12. Pap`s smear theory and identification of cells in a normal vaginal smear

Subject Name: BIOSTATISTICS AND RESEARCH METHODOLOGY

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Subject Name: BIOSTATISTICS AND RESEARCH METHODOLOGY-(P)

Unit I Introduction and Presentation of data

Meaning, Branches of Statistics, Uses of statistics in medicine, Basic concepts, Scales of measurement, Collection of data, Presentation of data; Tabulation, Frequency Distribution, Diagrammatic and Graphical Representation of Data.

Unit II Measures of central tendency and Measures of Variation

Arithmetic Mean (Mean), Median, Mode, Partition values, Range, Interquartile range , Mean Deviation, Standard Deviation, Coefficient of Variation.

Unit III Probability and standard distributions

Definition of some terms commonly encountered in probability, Probability distributions; Binomial distribution, Poisson distribution, Normal distribution, Divergence from normality; Skewness and kurtosis

Unit IV Census and Sampling Methods

Census and sample survey, Common terms used in sampling theory, Non-probability (Non random) Sampling Methods; Convenience sampling, Consecutive Sampling, Quota sampling, Snowball sampling, Judgmental sampling or Purposive sampling, Volunteer sampling, Probability (Random) Sampling methods; Simple random sampling, Systematic Sampling, Stratified Sampling, Cluster sampling, Multi-stage sampling, Sampling error, Non-sampling error.

Unit V Inferential statistics

Parameter and statistic, Estimation of parameters; Point estimation, Interval Estimation, Testing of hypothesis; Null and alternative hypotheses, Type-I and Type-II Errors.

RESEARCH METHODOLOGY

Unit I - Introduction to research methodology

Types of research; Descriptive vs. Analytical, Applied vs. Fundamental, Quantitative vs. Qualitative, Conceptual vs. Empirical, Some Other Types of Research

Unit II - Study Designs-Observational Studies

Epidemiological study designs; Observational studies, Descriptive studies; Case reports, Case series, Analytical studies; Case control studies, Cohort studies, Cross sectional

Unit III Experimental Studies

Experimental studies (Interventional studies); Randomized control Trials (Clinical trials), Field trials, Community trials, Nm-Randomized Trials

Unit IV Uses of Epidemiology

Unit VApplication of study Designs in Medical Research

References

1. K.R.Sundaram, S.N.Dwivedi and V Sreenivas (2010), Medical statistics, principles and methods, BI Publications Pvt Ltd, New Delhi
2. NSN Rao and NS Murthy (2008), Applied Statistics in Health Sciences, Second Edition, Jaypee Brothers Medical Publishers (P) Ltd.
3. J.V.Dixit and L.B.Suryavanshi (1996), Principles and practice of biostatistics, First Edition, M/S Banarsidas Bhanot Publishers.
4. GetuDegu and Fasil Tessema (2005), Biostatistics, Ethiopia Public Health Training Initiative.
5. Essentials of Community Medicine for Allied Health Sciences, JSS University Publications, 20.
6. Park K. Park's Textbook of Preventive and Social Medicine. 23rd ed. Jabalpur: Banarsidas Bhanot Publishers, 2015. p.135-141.
7. Suryakantha. Textbook of Community medicine with recent advances. 4th edition.
8. Bhalwar R. Textbook of Public Health and Community Medicine.2nd Edition. Pune, Department of Community Medicine AFMC, 2012.
9. Leon Gordis. Epidemiology Fourth Edition - Elsevier Saunders Publication

Subject Name: CLINICAL ENDOCRINOLOGY & TOXICOLOGY

Unit-I

Hormones, Classification of hormones, organs of endocrine system their secretion and function, regulation of hormone secretion, Mechanism of action

Unit-II

Thyroid function test: Thyroid hormones, biological function, hypothyroidism, hyperthyroidism, Determination of T3, T4, TSH, FT3, FT4, TBG, Disorder associated with thyroid dysfunction.

Unit-III

Infertility profile: LH, FSH, TSH, Estrogen, Progesterone, Total Testosterone, Free testosterone,DHEA-S, 17- Ketosteroids, Prolactin, their estimation and clinical significance, reference range, hypo and hyper secretion, Triple Test

Unit-IV

Growth hormone, ACTH, Aldosterone, Cortisol their estimation and clinical significance, reference range, hypo and hyper secretion

Unit-V

Introduction of Toxicology, Alcohol poisoning, Lead poisoning, Zinc poisoning, Mercury poisoning drugs abuse, screening procedure for drug screening, Spot tests, hair and urine test, Immunoassay for drugs.

Suggested readings:

1. Teitz,(2007),Fundamentals of Clinical Chemistry,6th edition,Elsevier Publications
2. Bishop(2013),Clinical Chemistry,7th edition, WileyPublications

3. Henry's Clinical Diagnosis and Management by Laboratory Methods,(2011),22nd edition, Elsevier

4. D M Vasudevan, (2011),Text book of Medical Biochemistry,6th edition Jaypee Publishers

5. M N Chatterjea & Rana Shinde,(2012),Text book of Medical Biochemistry,8th edition, Jayppe Publications

6. Singh & Sahni,(2008),Introductory Practical Biochemistry,2nd edition, Alpha science

7. Lehninger,(2013),Principles of Biochemistry,6th edition, W H Freeman

Subject Name: PROJECT