VIDYASAGAR UNIVERSITY

BACHELOR OF MEDICAL LABORATORY TECHNOLOGY
(BMLT)

Under Graduate Syllabus
(Semester System)
w.e.f. 2014-2015

REVISED

Vidyasagar University
Midnapore 721 102
West Bengal

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VIDYASAGAR UNIVERSITY
Bachelor of Medical Laboratory Technology
(B.M.L.T.)

Scheme of Examination

1ST Year (Total Marks-600):
For each Unit–50 (40+Internal Assesment-10)

No. of Semester	Subjects, Paper & Unit	Marks allotted in theoretical part	Marks allotted in practical part	Total
1st Semester	Functional English Paper – I , Unit-1	50	-	50
	Basic Instrumentation and Application. Paper –I ,Unit-2	50	-	50
	Environment & Health Paper –II, Unit-3	50	-	50
	Community Health Care Paper-II , Unit- 4	50	-	50
	Human Anatomy Paper-III, Unit- 5(Theo) Unit-6 (Prac)	50	50	100
	Total	250	50	300

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No. of Semester	Subjects, Paper & Unit	Marks allotted in theoretical part	Marks allotted in practical part	Total
2nd Semester	Human Physiology Paper-IV Unit-7 (Theo), Unit-8 (Prac)	50	50	100
	Biochemistry & Biophysic Paper-V Unit-9 (Theo), Unit-10 (Prac)	50	50	100
	Medical Entomology & Parasitology Paper-VI Unit-11(Theo), Unit-12(Prac)	50	50	100
	Total	150	150	300

2nd Year (Total Marks-600)

No. of Semester	Subjects, Paper & Unit	Marks allotted in theoretical part	Marks allotted in practical part	Total
3rd Semester	Haematology Paper-VII Unit-13 (Theo),Unit-14 (Prac)	50	50	100
	Clinical Immunology Paper-VIII Unit-15(Theo), Unit-16 (Prac)	50	50	100
	Serology Paper-IX Unit-17(Theo), Unit-18(Prac)	50	50	100
	Total	150	150	300

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No. of Semester	Subjects, Paper & Unit	Marks allotted in theoretical part	Marks allotted in practical part	Total
4th Semester	Clinical Pathology Paper-X Unit-19(Theo), Unit-20 (Prac)	50	50	100
	Clinical Biochemistry Paper-XI Unit-21(Theo), Unit-22(Prac)	50	50	100
	Cytotechnology & Histotechnology Paper-XII Unit-23(Theo), Unit-24(Prac)	50	50	100
	Total	150	150	300

3rd Year (Total Marks-600)

No. of Semester	Subjects, Paper & Unit	Marks allotted in theoretical part	Marks allotted in practical part	Total
5th Semester	Clinical Endocrinology& Andrology Paper-XIII Unit-25 (Theo), Unit-26 (Prac)	50	50	100
	Clinical Microbiology Paper-XIV Unit-27(Theo), Unit-28(Prac)	50	50	100
	Blood Transfusion& Blood Bank	50	50	100

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	Paper-XV Unit-29(Theo), Unit-30 (Prac)			
	Total	150	150	300

No. of Semester	Subjects, Paper & Unit	Marks allotted in theoretical part	Marks allotted in practical part	Total
6th Semester	Research Methodology and Medical Statistics Paper-XVI Unit-31 (Theo), Unit-32(Prac)	50	50	100
	Computer Application including MS Office Paper- XVII Unit-33(Theo), Unit-34(Prac)	50	50	100
	Project Paper-XVIII			100
	Total	100	100	300

Internship – 6 months in Govt. / Govt. recognized hospital for six month.
Report submission & evaluation - 200 Marks.

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Details of the Syllabus

Functional English: Paper- I, Unit- 1

(Theory – 50)

1. Reading & Listening Comprehension- Talk, The scientific method. Note taking.
2. Vocabulary- Distinction words having related meanings, Negative prefixes, Phases used to express comparisons use of antonyms, The suffixes- er,-or-ary-eer and ier. Exercise on Vocabulary – use of suitable words.
3. Exercise conversation- open type.
4. Pronunciation- English vowels, Consonant, letter and sound, words rhythm, vowel contrast, Reading words from a phonetic, contracted forms, Intonation.
5. Grammar and usages Concord of number person: be, do, have. Tenses, Articles, Types of sentences, Questions patterns, phrases, Adverbial clauses, Direct, and indirect speech, Voice, Non-finite verbs, model Auxiliaries, Revision.
6. Writing skill- Practice in compositions, Completing paragraphs with the help of an outline, Rewriting a story from a point of view of different characters with given statement, in a bridge form. Essay writing based on a diagram. A short composition based on a passage read. Narrative composition, Description based on passage read, composition based on a passage read.

Basic Instrumentation and it's Application: Paper-I, Unit-2

(Theory - 50)

1. Microscope: Light microscope, Compound microscope, Phase Contrast microscope, Fluorescent and Polarized microscope.
2. Colorimeter: Working Principle, components and it's application.
3. Spectrophotometer: Working Principle, components and it's application.

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4. Centrifuges: Working Principle, types and it's application g and rpm.
5. Spectroflorometer: Working Principle, components and it's application.
6. Laminar flow: Working Principle, components and it's application.
7. Autoclave: Types, Working Principle, and it's application.
8. Incubator: Working Principle, types and it's application.
9. Blood cell counter: Working Principle, and it's application.
10. ELISA: Types, Working Principle, and it's application.
11. Semi and full auto-analyzer: Working Principle, and it's application.
12. Electrophoresis: Types, Working Principle, and it's application.
13. HPLC: Types, Working Principle, and it's application.
14. Laboratory safety and Quality control: General idea's about quality control and laboratory safety.

Environment & Health: Paper-II, Unit-3
(Theory - 50)

1. Basic idea about macro and micro environment, components of environment.
2. Environmental air, water, noise, radiation and food pollutions and pollutants. Pollutant and health hazards. Managements of environmental pollution- arsenic, fluoride, lead and mercury pollution of environment.
3. Occupational health hazards in special reference to heat, cold, light, noise, vibration and dust. Occupational disease like silicosis, asbestosis, farmer's lung.
4. Human excreta disposal system. Health disorders due to mismanaged extra disposal standards of ventilations and types. Good lighting and its importance on health.
5. Communicable disease and role of environment for such transmission. Management of such communicable disease. Special reference to malaria, diarrhoea, cholera, HIV, Hepatitis, Typhoid.

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6. Non-communicable diseases and role of environment for such diseases. Management of non-communicable diseases. Diabetes, CVD, Gout, Asthma.

Community Health Care: Paper –II, Unit-4
(Theory - 50)

1. Concept of dimension of health. Concept of community health. Concept of disease and control of disease.
2. Determinants of health, responsibility of health.
3. Community health indicators. Health care of pregnant and lactating mother and infant in India.
4. Primary idea about present community health care ecosystem.
5. Primary health care in India – mother –child health care system –village level, sub centre level, primary health centre, community health centres.
6. Sources of health information system.
7. Non- Governmental agencies in community health care system.
8. System of health care awareness in community in rural and urban areas. Community nutrition programmes for community health care.
9. National strategies for community health upgradation.

Human Anatomy: Paper – III, Unit- 5
(Theory - 50)

1. <u>System of the human body</u>
   Parts of blood vascular system, anatomy of upper and lower respiratory tract, Anatomy of Gastro intestinal tract, urogenital system, Endocrine system including reproductive organs, integumantary system, CNS & PNS of human body and surface anatomy.

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2. Musculo- skeletal Anatomy

A) Basic idea about the Fascia and muscles of head, neck face, trunk, upper limb and lower limb, muscles of eye

B) General structure of all bones of skeleton and their attachment, Classification of joints, joint of head, neck, trunk, upper limb, shoulder girdle and pelvic girdle.

Human Anatomy: Paper-III, Unit-6
(Practical - 50)

1. Identification of surface land marks of a human body.
2. Study on muscles of trunk, lower and upper extremities and face on a dissected human body.
3. Study on bone on human body with special reference to the origin and insertion of muscles and ligaments.
4. Study on gross anatomy of respiratory, digestive, endocrine, urinary and genital system on a dissected human body.
5. Study on the anatomy of CNS and PNS on a dissected human body.

Human Physiology: paper – IV, Unit – 7
(Theory – 50)

1. Cell and tissue introduction: Basic concept of cell structure, structure of cellular contents and transport across membranes, Different type of tissues, distribution and function.
2. Cardiovascular system: Cardiac cycle, cardiac output, blood pressure, heart rate and their regulation. Coronary circulation, renal circulation, hepatic circulation, cerebral circulation. Erythropoesis, stem cell concept in bone marrow, haemoglobin and their functions, blood coagulation, blood groups, regulation of blood P^H.

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3. Respiration: Mechanism of inspiration, expiration, gaseous transport through blood, breathing rate regulation, hypoxia, asphyxia, dyspnoea and oxygen therapy.
4. Endocrine system: Different hormones in endocrine system. Action of pituitary, thyroid, parathyroid, adrenal and gonadal hormones.
5. Digestive system: Digestion of carbohydrate, protein, fat, egg, milk and absorption of different food stuffs. Absorption of water. Movement of small intestinal tract and their role.
6. Skin and body temperature: Structure of the skin, function of the skin. Body temperature regulatory process in human - role of endocrine and nervous system.
7. Neurophysiology: Reflex system, automatic nervous system, parts of brain and function of each part. Nerve tract and their role.
8. Muscle Physiology: Structure of skeletal muscle. Muscle contraction and relaxation. Types of muscle contraction.
9. Special senses: Structure of retina, rhodopsin and iodopsin cycle, visual tract, accommodation. Auditory tract, mechanism of audition. Structure of taste bud, taste pathway, Olfaction and its physiology.
10. Renal physiology: Structure and function of renal system. Urine formation, micturition, renal clearance test, renal buffer system.
11. Reproductive system: Male and female reproductive organs, Gamatogenesis, Ovulation, Menstrual Cycle.

Human Physiology: paper – IV, Unit – 8
(Practical – 50)

1. Staining of Squamous epithelium.
2. Measurement of Heart rate and Blood pressure, PFI (Harvard Step Test) in different posture.
3. Blood group determination.

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4. Identification of blood cells and TC, DC. Separation of acellular and cellular components.
5. Study on Superficial and Deep reflexes.
6. Haemoglobin estimation by Sahli's of Drabkin's method.
7. ESR by Westergren method.
8. Muscle striation study by Methelene blue.
9. Study of nodes of Ranvier by Silver chloride method

Biochemistry & Biophysics: Paper – V, Unit – 9
(Theory – 50)

1. Carbohydrate – Definition, Source, Classification, Functions and Importance, Physiological importance of major type of carbohydrates.
2. Protein – Definition, Source, Classification, Function and Importance of major type of proteins.
3. Lipids - Definition, Source, Classification, Function of major type of lipids. Saturated and Unsaturated type of fatty acids, Essential fatty acids and their importance. Phospholipids and their importance.
4. Nucleic acid – Structure and function of DNA &RNA. Nucleosides and Nucleotides, Genetic code, Biologically important nucleotides.
5. Vitamins – Fat-soluble and water-soluble vitamins, Daily requirements, Physiological functions and diseases of vitamin deficiency.
6. Bioenergetics – Energy rich compounds. Respiratory chain and biological oxidation.
7. Carbohydrate metabolism – Glycolysis, HMP shunt, TCA cycle, Glycogenesis, Glycogenolysis, Neoglucogenesis, Blood sugar level.
8. Lipid metabolism – Fatty acid oxidation, Ketone bodies, Metabolism of cholesterol, Arteriosclerosis and Obesity.
9. Protein metabolism – Transamination, Transmethylation, Deamylation, Urea synthesis, Inborn error of metabolism.
10. Enzymes – Definition, Classification, Mode of action, Factors affecting enzyme action, Chemical importance of enzyme.

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11. Concept of P^H and buffers, Acid-base equilibrium, Osmotic pressure and physiological importance.
12. Electrolytes – Sodium and potassium metabolism.
13. Isotopes – Isotopes and their role in treatment and diagnosis of diseases.

Biochemistry & Biophysics: Paper – V, Unit – 10
(Practical – 50)

1. Qualitative identification of Glucose, Fructose, Lactose, Maltose, Sucrose, Starch, Peptone, Glycerol, Cholesterol, Acetone, Bile salt in sample by biochemical tests.
2. P^H determination of a solution by titration.
3. Quantification of Glucose, Lactose and Sucrose in a specific sample.
4. Preparation of different buffers used in pathological laboratory and their P^H determination.
5. Sodium and Potassium estimation in Serum.

Medical Entomology and Parasitology: Paper – VI, Unit – 11
(Theory – 50)

1. Basic concept of Medical Entomology and Parasitology in relation of this course.
2. Arthopods of medical importance. Arthopods borne disease and their transmission. Principle of arthopod control.
3. Mosquito – Role of this arthopod in disease transmission, Diseases types, Controlling measures.
4. Houseflies – Role of disease transmission and controlling measures. And Sandflies.
5. Flea – Role of disease transmission and controlling measure & itch mite.
6. Filaria – Causes, Symptoms and controlling measures.
7. Taeniasis – Causes, Symptoms and controlling measures.

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Medical Entomology and Parasitology: Paper – VI, Unit – 12
(Practical – 50)

1. Collection, Presentation & Identification of different disease causing Arthopods (Housefly, Mosquito etc.)
2. Whole mount preparation of slide of different disease causing arthopods for their detailed anatomical studies.
3. Identification of different disease causing Helminth and Protozoan parasites.
4. Identification of different phases of life cycle of arthopods protozoa, helminth, having medical importance for causing disease.
5. Slide identification of microfilaria, *Taenia solium*, ascaris, and deferent stages of malaria.
6. Examination of stool for OPV(Ova parasite Cyst)

Haematology: Paper-VII, Unit-13
(Theory – 50)

1. Cleaning of laboratory glassware in Haematology.
2. Blood sample collection by pricking method and brachial vein in adult and children.
3. Anticoagulants used for collection of blood samples with merits and demerits.
4. Separation of plasma and serum from blood.
5. Routine of haematological tests like Haemoglobin concentration, haematocrit, TC, DC of leukocytes, total count of Erythrocytes, determination of erythrocyte indices - PCV, MCV, MCH, MCHC, Reticulocyte count, platelets count, ESR.

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6. Bleeding disorder—Determination of Clotting time, bleeding time and Prothrombin time.
7. Idea about Thalassaemia and Sickle cell anaemia, Importance of blood tests before marriage. Laboratory reports preparation and made interpretation of laboratory finding in haematology.
8. Haemostasis: Definition, types, clotting factors, Extrinsic and Intrinsic pathway, disorders.

Haematology: Paper-VII, Unit-14
(Practical – 50)

1. Collection of blood sample from vein, Blood film preparation and it's staining.(Leishman Giemsa method)
2. Experiments on TC & DC, PCV, MCV, MCH, MCHC and ESR.(Wintrob method)
3. Determination of haemoglobin by haemoglobinometer and by colorimetric method.
4. Quantification of reticulocyte, thrombocyte and erythrocyte count.
5. Determination of Bleeding time and clotting time, PT.
6. Screening test for sickle cell anemia and slide identification of thalasemia.

Clinical Immunology: Paper-VIII, Unit-15
(Theory – 50)

1. Basic concept of Immune system. Types of immunity, cellular, humoral, active, passive, natural, and acquired immunity. Primary immune organs.
2. Antibody formation and antigen-antibody reaction, type of reaction.
3. Basic concept of immunization. Primary and secondary response of immunization. Vaccination and Booster dose.
4. Immunoglobins—type, structure and their specific importance.
5. Immunodeficiency diseases.
6. Immunosuppression - role of organ transplantation.

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7. Auto immune disease: Hasimotor disease, myasthenia gravis, RA and Lupus erythromatosus.
8. Erthoblastosis foetslis.

Clinical Immunology: Paper-VIII, Unit-16
(Practical – 50)

1. Determination of 'ABO' blood grouping and 'Rh' typing.
2. Antibody measurement by Radial immuno-diffusion (RID) technique.
3. Antigen-Antibody reaction testing by precipiting ring. Ouchterlony test.
4. Quantitative assay of Immunoglobins in plasma.(IgG,IgM)

Serology: Paper-IX, Unit-17
(Theory – 50)

1. Collection and preparation of specimen used in serological laboratory.
2. Principle of sero-diagnostic tests, precipitation, flocculation, agglutination, neutralization and coagulation.
3. Serological test for syphilis (STS) and VDRL, CRP, RPR test.
4. WIDAL test for Salmonella typhi.
5. Serodiagnosis test for AIDS, Rubella, Toxoplasmosis, Leishmaniasis, Trypanosonsiosis. TORCH panel test.
6. Immunological test for pregnancy.(direct and indirect)
7. Intradermal hypersensitivity test – Montouxe test.
8. ASO test.

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Serology: Paper-IX, Unit-18
(Practical – 50)

1. Study of precipitation, agglutination and coagulation test.
2. VDRL test, WIDAL test, RPR, ASO test.
3. CRP test, RA test, AIDS test, STS test.
4. Immunological test for pregnancy.(direct and indirect)
5. Montouxe test.

Clinical Pathology: Paper – X, Unit – 19
(Theory – 50)

1. Collection of urine and stool specimen, types of urine and stool specimen and preservation of urine and stool.
2. Routine examination of urine – physical and Microscopic examination.
3. Chemical test of urine for glucose, protein, Ketone bodies, bilirubin, urobilinogen & blood.
4. Laboratory investigation, Serous fluid and Gastric juice.
5. Collection and processing of CSF and its laboratory investigation.
6. Routine test for stool and occult blood test.

Clinical Pathology: Paper – X, Unit – 20
(Practical – 50)

1. Physical and Microscopic examination of Urine.
2. Bio-chemical estimation of glucose in urine.
3. Bio-chemical estimation of protein and ketone bodies in urine, bile salt, bile pigment, urobilinogen and blood in urine.
4. Laboratory testing of CSF, Serus fluid, Gastric juice, and Synovial fluid.
5. Collection and processing of CSF and its laboratory investication.
6. Routine test and microscopical test for stool and occult blood test.

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Clinical Bio-chemistry: Paper – XI, Unit – 21
(Theory – 50)

1. Specimens processing for biochemical analysis – preparation of serum specimen, protein free filtrate and urine.
2. Principles of Immuno chemistry – RIA & ELISA.
3. Determination of glucose, urea,creatinine, uric acid, bilirubin, Triglyceride, cholesterol and Phospholipids, LDL,VLDL,HDL, Troponine T test in blood.
4. Liver function tests. (Total protein, Albumin, Globulin ratio, ALP, ALT,AST, conjugated and unconjugated bilirubin)
5. Gastric function tests: Free acidity, Total acidity, total acidity, gastric pH, gastric enzyme analysis.

Clinical Bio-chemistry: Paper – XI, Unit – 22
(Practical – 50)

1. Preparations of plasma, serum, and protein free filtrate from blood for biochemical analysis.
2. Determination of Blood glucose, total protein in serum, blood urea, blood creatinine, serum uric acid, serum TG, blood cholesterol and blood Phospholipids and Ketone bodies.
3. Estimation of Hepatitis – A, B, C, E.
4. Experiment on Glucose tolerance test.

Cytotechnology & Histotechnology: Paper-XII, Unit-23
(Theory - 50)

1. Equipments used in Cytotechnology and Histotechnology.
2. Specimen preparation in Cytotechnology and Histotechnology –fixation, dehydration, clearing, embedding, section cutting, mounting staining.

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3. Stain preparation. Haematoxylin, eosin, trichrome stain, PAS stain.
4. Techniques followed in routine Haematoxylin – Eosin staining, Trichrome staining, PAS staining, Geimsa staining.
5. Idea about frozen section techniques and automation of biotechnology laboratory.

Cytotechnology & Histotechnology: Paper-XII, Unit-24
(Practical – 50)

1. Tissue collection and fixation.
2. Dehydration of collected tissue sample in the graded alcohol.
3. Stain preparation – Haematoxylin, eosin, PAS, Trichrome, iron haematoxylin.
4. Staining techniques using above stains.
5. Preparation of specimen for cytological evaluation by **papaniculas** staining, crystal violet staining.
6. Characterization of benign and malignant cells.

Clinical Endocrinology and Andrology: Paper –XIII, Unit-25
(Theory - 50)

1. Information on pituitary-gonadal axis, pituitary –thyroid axis, pituitary – Adrenocortical axis, feed back system. Information on pancreatic hormones.
2. Hormonal disorders in Diabetes mellitus and insipidus, hypertension, goiter, obesity and infertility.
3. Techniques followed in hormone assay – ELISA / RIA cross reaction, inter assay, intra assay variation.

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4. Spermatogenesis and its hormonal control, semen physiology, sperm count, sperm motility, sperm morphology, fructose estimation of semen. Sperm viability test.
5. Primary idea on Assisted Reproductive Technology (ART).
6. Acid phosphatase in semen.

Clinical Endocrinology and Andrology: Paper –XIII, Unit-26
(Practical – 50)

1. Hormone assay by ELISA reader – Estrogen, Testosterone, T_3 and T_4, LH, FSH, PRL, Insulin, Glucagon, Glucocorticoids, GH.
2. Sperm count, sperm motility, sperm morphology, fructose assay in semen, Acid Phosphatase in semen. Sperm viability test.

Clinical Microbiology: Paper –XIV Unit -27
(Theory - 50)

1. Specimen collection and handing in microbiological laboratory; safety regulation of the laboratory, basic laboratory procedures of diagnostic laboratory.
2. Microscopic examination techniques, culture media and quality control in microbiology.
3. Diagnostic bacteriology – Grouping, characteristics of common pathogen bacteria.
4. Laboratory diagnosis of mycotic infections.
5. Virology of following diseases: Influenza, measles, Rabies, Kalazar, Swain-flu.

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Clinical Microbiology: Paper –XIV Unit -28
(Practical – 50)

1. Sterilization techniques and cleaning of glassware.
2. Preparation of culture media, biochemical test for bacterial differentiation.
3. Examination of skin scapper fungi and Acid fast bacilli and examination of sputum for Acid fast bacilli.
4. Biochemical test for bacterial differentiation.
5. Gram staining: (gram positive and gram negative)

Blood Transfusion and Blood Bank: Paper- XV, Unit-29
(Theory - 50)

1. Principles of blood grouping.
2. Blood transfusion in total or in fractionated part. Blood group antigen: their importance in blood transfusion.
3. Condition of blood transfusion, basic principles followed for such case.
4. Disorders of mismatched blood transfusion, Transmission of diseases in relation to blood transfusion (HIV, Hepatitis, Jaundice, Malaria, Syphilis).
5. Introduction of blood collection and basic concept for storage of blood and it's transportation.
6. Preparation of reagents for blood Banking.
7. Fractionation of blood storage.
8. Donor's selection.

Blood Transfusion and Blood Bank: Paper- XV, Unit-30
(Practical - 50)

1. Reagent Preparation of Blood Bank.
2. Determination of Blood groups.(forward grouping and reverse grouping)
3. Determination of cross matching by blood group testing techniques, Coomb's test.(direct and indirect)

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4. Fraction collection from Blood and it's storage.
5. Pre-transfusion blood screening:

Research Methodology and Medical Statistics: Paper – XVI, Unit – 31 (Theory – 50)

1. Concepts of Research and it's types.
2. Concepts of hypothesis.
3. Basic idea about Project formation.
4. Data collection.
5. Experimental design.
6. Mean, median, mode, SEM, SD.
7. 't' test.

Research Methodology and Medical Statistics: Paper – XVI, Unit – 32 (Practical – 50)

1. Assignment for project formulation. (at list one)
2. Problem solving on mean, median, SEM, SD.
3. Problem solving on't' test: match group, single group study, population mean study.

Computer Application Including MS-Office: Paper – XVII, Unit - 33 (Theory - 50)

1. Study on various components of a personal computer, hardware and software.
2. Computer Applications in pathological laboratory to recording and data presentation.

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3. Basic knowledge and utility in multimedia in laboratories.
4. Application of the digital computer in patient maintaining, Basic knowledge on MS-office, Floppy recording, Storage of data in pathological laboratory.

Computer Application Including MS-Office: Paper – XVII, Unit - 34 (Practical – 50)

1. Operation of personal computer.
2. Data storage, reporting, data presentation in computer.
3. Application of MS-office in pathological laboratories.

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Project
Paper – XVIII
FM : 100 Marks

Internship : 6 Months
Report submission & evaluation : 200 Marks

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RECOMMENDED BOOKS

1. Better pronunciation, O Conner.
2. Guide of patters and usages in English, A S Hornby
3. English Vocabulary in use, Michael Mc Carth and Felicity O ' Dell
4. Hand Book of Practical Communication skills, Chrissie Wright.
5. History of Science, Samarendra Nath Sen.
6. Science and Society in Ancient India, D P Chattopadhyay.
7. Environment and Health, Goutam Pal.
8. Preventive and Social Medicine, Park and Park.
9. Fundamentals of Human Anatomy, Dr. N Chakraborty and Dr. D Chakraborty.
10. Anatomy, Gray
11. Clinical Anatomy for Medical students, Snell
12. Human Anatomy, Dutta
13. Essentials of Anatomy, Singh.
14. Concise Medical Physiology, Choudhury.
15. Text book of Medical Physiology, Guyton.
16. Review of Medical Physiology, Ganong.
17. Biochemistry, D Das.
18. Biochemistry for students, Malthotra.
19. Review of Biochemistry, Harper.
20. Biophysics, D.Das.
21. Biophysics, R.N.Roy.
22. TB of Medical Parasitology, Panikar.

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23. Medical Parasitology, Bhatia.
24. Text book of Pathology, N. C. Deb & T. K. Roy.
25. Practical Pathology, P. Chakraborty.
26. Medical Laboratory Technology, K. L. Mukherjee.
27. Basic Pathology, Kumar.
28. Practical Pathology, Parulekar.
29. Introduction Medical Laboratory Technology, Baker.
30. Modern Blood Banking & Blood Transfusion Practical, Harmening.
31. Text Book of Modern Immunology, Dasgupta.
32. Essential Immunology, Roitt.
33. Hand Book of Ultrasound, Garkal.

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VIDYASAGAR UNIVERSITY

Paramedical Courses

Diploma in
Opthalmic Clinical Assistance
w.e.f. 2014-2015

REVISED

Vidyasagar University
Midnapore 721 102
West Bengal

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Total course duration is of 2 years and divided into 4 semesters and each semester is of 6 month duration. In last semester, training programme in different Hospitals and Clinics has been introduced.

Class lectures allotted for

Theoretical : 50 marks – 50 Lectures (1 hr. lecture)
Practical : 50 marks – 50 hrs.

Time Allotted for examination:

Theoretical Paper : 50 marks - 02 hrs.
Practical Paper : 50 marks – 04 hrs.

Each theoretical paper – (40 marks written + 10 marks internal)

Marks distribution – semester wise:

SEMESTER	MARKS ALLOTTED FOR THEORETICAL PART	MARKS ALLOTTED FOR PRACTICAL PART	TOTAL MARKS
1st semester	200	100	300
2nd semester	200	100	300
3rd semester	200	100	300
4th semester	200	100	300
Total Marks :			1200

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COURSE STRUCTURE

1st semester

Paper – I (Theoretical) : F.M. – 100
Group A (FM – 50) – General Anatomy
Group B (FM – 50) - General Physiology

Paper – II (Theoretical) : F.M. – 100
Group A (FM – 50) – Ocular Anatomy including Ocular Physiology
Group B (FM – 50) - Environmental Science

Paper – III (Practical) : F.M. – 100
Group A (FM – 50) – General Anatomy including Ocular Anatomy
Group B (FM – 50) - General Physiology including Ocular Physiology.

2nd Semester

Paper – IV (Theoretical) : F.M. – 100
Group A (FM – 50) – Visual Optics.
Group B (FM – 50) - Pharmacology including Ocular Pharmacology.

Paper – V (Theoretical) : F.M. – 100
Group A (FM – 50) – Microbiology & Biochemistry
Group B (FM – 50) - Ophthalmic Lens and Dispensing Optics.

Paper – VI (Practical) : F.M. – 100
Group A (FM – 50) – Ophthalmic Lens and Dispensing Optics.
Group B (FM – 50) - Microbiology & Biochemistry

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3rd Semester

Paper – VII (Theoretical) : F.M. – 100
Group A (FM – 50) – Ocular Disease – Part - I
Group B (FM – 50) - Ocular Disease – Part - II

Paper – VIII (Theoretical) : F.M. – 100
Group A (FM – 50) – Surgical and Ophthalmic Instrumentation
Group B (FM – 50) - Clinical Refraction - Basic

Paper – IX (Practical) : F.M. – 100
Group A (FM – 50) – Diagnosis and Management of Ocular diseases
Group B (FM – 50) - Clinical Refraction & Instrumentation

4th Semester

Paper – X (Theoretical) : F.M. – 100
Group A (FM – 50) – Clinical Refraction (Applied)
Group B (FM – 50) - Visual Rehabilitation & Visual Aids

Paper – XI (Theoretical) : F.M. – 100
Group A (FM – 50) – Medical Law ethics, Community Eye Care and Hospital Procedure
Group B (FM – 50) - Principles of Ward work & Operation Theatre

Paper – XII (Practical) : F.M. – 100
Group A (FM – 50) – Refraction Work & Skill Development
Group B (FM – 50) - Training Programme

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COURSE IN DETAILS

1st Semester
Paper -I (theoretical) : F.M. - 100

Group - A: General Anatomy. FM - 50: Number of lectures -50.

1. The skeleton - Axial and appendicular Structure; structure of bones, types, blood and nerve supply of bones.
2. Skull- Cranial and facial bones.
3. Nervous system: - Anatomical idea of cerebrum, cerebellum, diencephalon, cranial nerves, brain stem, spinal cord etc.
4. Muscular system: - Facial muscles, upper limb and bower limb muscles, trunk muscles etc.
5. Joints synovial, firms, cartilaginous joints and movement of joints.
6. Cardio-vascular system: - Anatomy of heart; blood supply of cardiac muscles, cardiac valves etc.
7. Sensory system: - Anatomy structure of skin, ear, eye, nose, tongue.
8. Respiratory system; - Anatomy of air passage, lungs.
9. Digestive system: - Anatomy of G.I tract and major gastric glands.

General Physiology FM- 50: Number of lectures- 50.

1. Biophysical & Biochemical aspect of Physiology:- Diffusion, osmosis, buffers, colloids, dialysis, ultra filtration, chromatography, electrophoresis, ultracentrifugation, radioactivity, radioimmunoassay, enzyme linked immunoassay- principles, application in biological fields.

2. Cardio-vascular system;
   a) Cellular and cellular elements of blood, features, formation and function.
   b) Haemoglobin- structure function relationship.
   c) Blood coagulation mechanism.
   d) Anemia, thalassemia.

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e) Primary and secondary parameters of haematopoietic system- ESR, WBC, RBC, MCV, MCH, MCHC etc.
f) Ultra structure & function of artery and vein.
g) Blood circulation through heart, cardiac cycle, heart rate regulation, blood pressure regulation, ECG, special functional tissues of heart.

3. Muscular Physiology: Microscopic structure of skeletal, smooth and cardiac muscles; muscle contraction mechanism, types, sarcotubular system, red and pale muscle fibers.

4. Neurophysiology: Structure of neurons: synapse structure and function, signal transduction through nerve fiber.
Autonomic nervous system - Sympathetic & parasympathetic- origin, course and functions, structure and function of cerebrum, hypothalamus, thalamus, pyramidal nerve tract.

5. Endocrine system: Endocrine glands- types, location, structure and function of anterior pituitary, posterior pituitary, thyroid, pancreas, adrenal.

Paper - II

Group A: Ocular Anatomy including Ocular Physiology
FM -50; Number of class lectures- 50

Ocular Anatomy:

1. Ocular Embryology: - Embryological development of various structure of eye ball and accessory structure of eyeball.
2. Anatomy of orbit: - Boney orbit. Orbital fascia, orbital nerves.
3. Anatomy of diff. Layers of eyeball - cornea, structure of lens, sclera, anterior chamber, retina.
4. Anatomy of ocular glands: - Lachrymal glands, conjunctival glands, nerve supply, blood supply.
5. Anatomy of ocular structure – Structure of lids, pupillary collar muscle.

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Ocular physiology:

1. Structure and function of Retina, Cornea, Lens, pupil.
2. Ocular movement - Monocular, binocular movement.
3. Physiology of Accommodation of eye.
4. Physiology of color vision & color blindness.
5. Visual acuity, light and dark adaptation, binocular vision.
6. Optic nerve tract.
7. Electrophysiology of eye - ERG, EOG, VER.

Group B: Environmental Science:
FM- 50; Number of class lectures-50

1. Component of environment, macro and micro environment.
2. Air pollution of environment. Air pollutants, source, effects of gaseous and particulate pollutants on human health, green house effect.
3. Water pollution of environment. Thermal pollution of water, solid waste disposal to water, Metallic pollution of water (Arsenic, Fluoride, Lead), Eutriphication - control.
4. Light pollution, noise pollution, source, effects on community health and management, radiation pollution, effects and control.
5. Environmental awareness programme, Non-conventional energy source, pesticide pollution.
6. Industrial hazards on eye and their prevention- Industrial injuries/ accidents and foreign bodies, U.V., Infrared and other radiation injuries, thermal injuries.

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Paper -III (Practical)

Group A: General Anatomy including Ocular Anatomy; FM: 50; Practical hours: 50 Hrs.

1. Identification of organ and viscera.
2. Identification of skull, skull bones, base of skull, orbit.
3. Identification of different components of eye ball.
4. Histology of cornea, lens, retina.
5. Identification of different ocular muscles.

Group B: General Physiology including Ocular Physiology
FM: 50; Practical hours: 50 Hrs.

1. Identification of histological slides of Cerebrum, Cerebellum, Spinal cord, Blood vessels (artery and vein), Liver, Skin, Tongue.
2. Haemoglobin estimation.
3. Blood film preparation and differential count.
4. Total count of RBC and WBC.
5. Determination of blood group.
6. Determination of blood pressure, ECG wave identification.
7. Visual field measurement by perimeter.
8. Color blindness testing
9. Light reflex study.
10. Identification of different waves of ERG.

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2nd Semester

Paper IV (Theoretical)

Group A: Visual Optics
FM: 50; Number of Class lectures: 50

1. Wave length and frequency of light
2. Geometrical path length and optical path length of rays, concept of divergence and convergence.
3. Refraction by concave and convex, focal point, image point.
4. General concept of eye as a refracting apparatus.
5. The corneal and lenticular system.
6. Optical resolution of eye.
7. Visual angles, visual axes, visual acuity.
8. Optical aberration of eye.
9. Emmetropia and Ametropia.
10. Symmetric and reduced eye and their properties.

Group B: Pharmacology including Ocular Pharmacology (Theoretical): FM: 50 : Number of Class lectures: 50

1. Nature of drug, drug administration-General and ocular.
2. Bioavailability of Drug.
3. Drug metabolism or Biotransformation, Pharmacodynamics, Drug toxicity.
4. Preparation and packaging of ophthalmic drugs.
5. Ophthalmic diagnostic drugs.
6. Ophthalmic drugs - Antibiotics, Corticosteroids, anesthetics, vesoelastics agents, antiglaucomic drugs, drugs for dry eye, ophthalmic prescriptions.

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Paper V: Theoretical

Group A: Microbiology and Biochemistry: FM: 50: Number of Class lectures: 50

1. Elementary idea of Virus, replication, Herpes virus, HIV etc.
2. Bacterial culture, Pathogenic mechanism common to external ocular infection process.
3. Classification of Carbohydrates, glycolysis, TCA cycle, glycogen metabolism, blood sugar level.
4. Classification of proteins, amino acids.
5. Classification of lipids - Oxidation, Ketogenesis.
6. Function of vitamins and minerals.
7. Biochemical composition of cornea, nutrients supply to cornea.
8. Chemical composition of tears.
9. Biochemical composition of lens, lens protein, lens metabolism, cataract - Biochemical defects.
10. Biochemistry of visual protein - Rhodopsin and Iodopsin.

Group B: Ophthalmic Lens and Dispensing Optics
FM: 50, Number of Class Lectures: 50

1. Characteristics of lens; Spherical lens, Plano-cylindrical and Spherocylindrical lenses, power of lenses, aberration of lens.
2. Spectacle lens; Characteristics of lens materials.
3. Lens type; single vision, bifocal, progressive bifocal.
4. Lens coating: Antireflection, protective and color coating.
5. Spectacle frame: Frame material and types, frame measurement and selection.
6. Lens selection criteria.
7. Facial measurement.
8. Pediatric dispensing.
9. Eye protection: Industrial, sports eye protection.
10. Occupational dispensing.

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Paper VI (Practical)

Groyp A: Ophthalmic lens and Dispending Optics
FM: 50: Practical hours: 50 Hrs.

1. Determination of Meridean and Optical centre of Ophthalmic Lens.
2. Neutralization - Manual and help of lensometer.
3. Identification of lens - Spherical, cylindrical and spherocylindrical lenses.
4. Lens scofacing and edging.
5. Frame measurement and frame selection.
6. Pediatric dispensing.
7. Facial measurement.

Group B: Microbiology and Biochemistry: FM: 50.

PART - A: Microbiology

1. Gram staining of bacteria.
2. Slide identification of non-virulent bacteria, fungi, protozoa.
3. Preparation of common stains used in Microbiology.
4. Sterilization.

PART- B: Biochemistry

1. Qualitative testing of Biochemical components in fluid - Glucose, Fructose, Lactose, Sucrose, Albumin, Globulin, Peptone, Cholesterol, Glycerol, Acetone, Bile salts, Bile pigments, Urea, Uric acid.
2. Qualitative study of Glucose, Fructose, Lactose in specific solution.

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3rd Semester

Paper VII (Theoretical)

Group A: Optical Disease
Part-I, FM: 50, Number of Class Lectures: 50

1. Anterior segment Ocular diseases
2. Disease of eyelids.
3. Disease of Lachrymal apparatus - dry eye, disease of lachrymal gland; Disease of lachrymal passages.
4. Disease of conjunctiva - conjunctivitis.
5. Disease of cornea -Inflammation of cornea, Keratitis, Vascularization of cornea, Opacity of cornea, corneal degeneration, dystrophy, injuries.
6. Disease of sclera.
7. Disease of iris.
8. Disease of Choroid - congenital anomalies, tuberculosis, degenerative diseases.
9. Glaucoma - Types, causes, surgery.
10. Diseases of lens.

Group B: Ocular disease;
Part II, FM- 50, Number of Class Lectures – 50

1. Posterior segment-Ocular diseases.
2. Diseases of vitreous humor.
3. Diseases of retina.
4. Diseases of optic nerve.
5. Symptomatic disturbance of visual function- night blindness, day blindness, defects in color vision, word blindness.
6. Neuro eye disease - Neuritis, Nystagmus. disorders of Chiasma.

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Paper VIII (Theoretical)

Group A: Surgical and Ophthalmic Instrumentation
FM:50; Number of lectures: 50

1. Orientation and knowledge development of operation theatre and theatre discipline.
2. Surgical team concept, Anesthesia - local and general.
3. Operation theatre administration.
4. Drug administration of eye.
5. Lacrimal syringing and Schiotztonometry.
6. Preoperative and postoperative care of eye.
7. Administration of Retro bulbar and facial anesthesia.
8. Perimeter and gonioscope, Keratometer, tonometry, biometry.
9. Color vision checking, field charting,
10. Retinoscope.
11. Low vision aids.

Group B: Clinical Refraction – Basic
FM: 50; Number of class lectures: 50

1. Objective and subjective refractions.
2. Retinoscopy.
3. Refractive errors in children.
4. Refractiometry.
5. Keratometry.
6. Computer assisted test.
7. Tachometry.
8. A- Scan and B- Scan.
9. Practice of Refraction skills.
10. Orthotics' and contact lens fittings.
11. Low Vision Aids.
12. Refractive errors and correction.

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Paper IX (Practical)

Group A: Diagnosis and Management of Ocular diseases

1. Diagnosis of Ocular diseases - Anterior segment and Management: Conjunctivitis, Disease of cornea, Sclera, Choroid, Lachrymal Apparatus, Glaucoma, surgical procedure for glaucoma, laser surgery, cataract.
2. Ocular disease - Posterior segment: Disease of retina, Optic nerve. Visual field defects, Night and day brightness, Injury of retina, Intracranial pressure measurement.

Group B: Clinical Refraction and Instrumentation

1. Practical work on Refractometer, fociometer.
2. Maintenance of Ophthalmic equipment.
3. Practice of Refraction skills.
4. Experiment on Tonometer, Orthoptic instruments, Perimeter, USG.
5. Practice of Retinoscopy, Slit Lamp.
6. Assessment of Color Vision anomalies.
7. Identification of Clinical cases and maintenance of Patients' records.

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4th Semester

Paper X

Group A: Clinical Refraction (Applied)
FM : 50, Number of class lectures : 50

1. Assessment of children vision & pediatric evaluation, diagnosis and management.
2. Strabismus and Ambhyopia.
3. Evaluation and diagnosis and optometric managem.ent of children with mental retardation, CP, dyslexia, multiple sensor motor handicaps.
4. Visual disorder in senior citizen: Evaluation, diagnosis and management.
5. Refraction in special cases.
6. Patient with low vision.
7. Patient with anisometropia.
8. Monocular and binocular subjective, refraction.

Group B: Visual Rehabilitation and Visual Aids
FM : 50, Number of class lectures : 50

Visual Rehabilitation

1. Approach to a patient with visual impairment (integrated education and inclusive education).
2. Orientation and mobility with practical.
3. Daily living activities.
4. Concept formation with practical, special note on how to teach geography, history, biology to the visually impaired.
5. Graft for the visually impaired.
6. Community based rehabilitation.
7. Games for the blind.
8. Computer for the blind.

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Visual Aids:

1. Optics of Gailian & Keplarian telescope- advantage / disadvantage, significance of exit & entrance of pupil
2. Optics of spectacle magnifier / determination / calculation/ advantage / disadvantage.
3. Optics of stand magnifier, significance of equivalent viewing distance and calculations.
4. Telescope distance / near / telemicroscope / monocular/ binocular / bioptic.
5. Determination of decentration of lenses / prism / calculation / lebenson's formula / simple diotric formula.

Paper- XI:

Group – A : Medical Law & Ethics : Community Eye Care and Hospital Procedure
FM : 50, Number of class lectures : 50

Medical Law & ethics: General concept.

Community eye care: Eye screening program; Blind person and his problems, rehabilitation of the blind; Health education in field of eye care organization of eye camps; Eye donation motivation.

Hospital procedure: Registration of patient; Counseling & forwarding to specialist; Assistant to physician at the time diagnosis; Report preparation; Skill development to assist the patient and its proper nursing.

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Group B: Principles of Ward Work and Operation Theatre
FM : 50, Number of class lectures : 50

Operation theatre:

1. True theatre and theatre discipline; 2. Surgical team concept; 3. Theatre asepsis; 4. Anesthesia - Local & General; 5. Ocular Pharmacology; 6. Theatre administration.

Ward work: Knowledge development:

1. Common disease of eye; 2. Ocular Emergencies, management; 3. Recognition of post operative complications, Medical Emergencies; 4. Maintenance of records; 5. Ward administration; 6. Ocular Pharmacology.

Paper - XII (Practical):

Group – A : Refraction Work and Skill Development.

Refraction work:

1. Practice of retionscopy - distance & dynamic; 2. Practice of direct opthalmoscopy; 3. Assessment and Methods of strabismus.

Skill development:

1. Patient care; 2. Assisting Doctors; 3. Effective Human Relation Skill; 4. Demonstrating values & culture; 5. Managing Medical and ophthalmic Emergencies.

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Group - B: TRAINING PROGRAMME

1. Record: General clinical optometry works up. Patient's Address, Age, Sex, Occupation.
2. Chief complains.
   Secondary / associated complains:
3. Ocular history, Family ocular history, Allergy history, Systemic illness, General Feature Family Systemic History.
4. Examination: Visual Acuity. Retinoscopy (Static retinoscpoy), Cyclopentolate / Tropicamide / Atropine.
5. Acceptance & Lens power. Diagnosis, Counseling, Primary diagnosis any external Eye diseases.
6. Laboratory Note Book.
7. Viva -Voce

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