AN OUTLINE OF THE COURSE OF STUDY

BACHELOR LEVEL ENTRANCE EXAMINATION

B. Optometry B. Pharmacy BAMS BASLP BDS BNCN	BNHN BNPN BPH B. Sc. MLT B. Sc.MIT B. Sc. Nursing	MBBS (Bachelor of Medicine & Bachelor of Surgery)

INSTITUTE OF MEDICINE

1972

This document is an outline to facilitate the candidates for the preparation of entrance examination. However, it may not cover all the questions in different subjects of the bachelor level entrance examination.

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Marks Distribution in Entrance Examination

Program	Subject	Full Marks
MBBS BASLP B.Sc. Nursing BDS	Zoology 30 Botany 20 Chemistry 30 Physics 20	100
BPH	Zoology 15 Botany 10 Chemistry 15 Physics 10 General Health 50	100
B.Sc. MLT B.Sc. MIT B. Optometry B. Pharmacy	Zoology 15 Botany 10 Chemistry 15 Physics 10 General Health 25 Specific Subject 25	100
BNHN BNCN BNPN	Nursing Problem solving 50 Nursing core subjects 40 Specific subject 10	100
BAMS	Zoology 20 Botany 20 Chemistry 20 Physics 15 Ayurvedic Science 25	100

BACHELOR LEVEL PROGRAMS

MBBS, BDS, BASLP and B.Sc. Nursing

Eligibility:
Candidates having passed and secured fifty percent mark in the PCL General Science (I.Sc. or 10+2) program with biology and other prerequisite subjects are eligible to apply for Bachelor of Medicine and Bachelor of Surgery (MBBS), Bachelor of Dental Surgery (BDS), Bachelor of Science in Nursing (B.Sc. Nursing) & Bachelor in Audiology & Speech Language Pathology (BASLP).

Entrance examination paper:

The entrance examination will consist of a single paper with 100 multiple choice questions (MCQ) on Zoology (30), Botany (20), Chemistry (30) and Physics (20). One mark is allocated to each MCQ. Each MCQ will have four options, of which the most appropriate answer is to be answered. There is no system of negative marking.

The full marks of the paper will be 100 and the duration of examination will be 2 hours. The pass marks is 50% (fifty per cent).

A brief outline of course of study is as follows.

PHYSICS

Unit I. Mechanics:
1. Fundamental physical quantities. Units and dimensions vectors addition and subtraction. Scalar and vector products of two vectors.
2. Kinematics: velocity and speed, acceleration – velocity time graph: equation of motion with uniform acceleration: projectile motion. Newton's laws of motion. Principle of conservation of linear momentum, work done by constant and variable force, energy and power. potentioal and kinetic energy, conservative and non-conservative forces, conservation of energy, renewable and non-renewable sources of energy, elastic and inelastic collision.
3. Circular motion: Centripetal force, centrifugal force and its applications.
4. Gravitation: Newton's laws of gravitation, variation of acceleration due to gravity, gravitational field intensity, gravitational potential, potential energy in a gravitational field, geostationary satellites, orbital velocity, praking orbits, potential and kinetic energy of satellites, escape velocity.
5. Rotational motion: Kinetic energy due to rotational motion, torque and couple, work done by a torque, moment of inertia; angular momentum and its conservation, K.E. of a rolling object.
6. Simple Harmonic Motion: simple pendulum, oscillating systems, spring and mass, P.E. and K.E. in oscillating systems.
7. Elasticity: molecular theory, stress, strain, Hook's law, Young's, shear and bulk modulii, energy stored in a stretched wire, force in a bar due to contraction or expansion.
8. Surface tension: molecular theory of surface tension, surface energy, excess pressure inside a spherical liquid surface, angle of contact and capillary action.
9. Viscosity: streamline, & turbulent flows, velocity gradient, Newton's formula, coefficient of viscosity, Poiseuille's formula, Stoke's law, methods of determination of coefficient of viscosity.

Unit II. Heat & Thermodynamics:
1. Heat & temperature: thermal equilibrium heat capacity, principle of calorimetry, cooling laws, latent heat, thermal expansion of solid, liquid and gas, thermal stress, barometric correction, absolute temperature, kinetic theory of gases, ideal gas equation.

2. Transmission of heat: conduction, temperature gradient, conductivity, convection, radiation, black body, Wien's displacement law, Stefan's law, Kirchhoff's law.
3. Hygrometry: relative and absolute humidity, phase diagram and triple point.
4. Thermodynamics: heat and work, internal energy, first law of thermodynamics, heat capacities of a gas, isothermal, isobaric, isoscoric and adiabatic processes, second law of thermodynamics, Carnot's cycles, entropy.

Unit III. Waves & Optics:
1. Reflection at plane and curved surfaces: refraction at plane surfaces, refractive indices, lateral shift, critical angle, total internal reflection and its applications including optical fiber, refraction through prism, converging and diverging lenses, lens maker's formula and combination of lenses, defects of vision, correcting lenses.
2. Dispersion of light: white light spectrum, dispersive power, chromatic aberration, achromatic combination of lenses, optical instrument: spectrometer, visual angle, angular magnification, simple and compound microscope, prism binoculars, astronomical and terrestrial telescopes.
3. Photometry: luminous flux, luminous intensity, illuminance, Lambert's consine law and photometers.
4. Wave motion: free, damped and forced oscillation, resonance, longitudinal and transverse wave motion, Progressive wave: velocity of transverse wave in a stretched string, velocity of a longitudinal wave in a fluid, velocity of sound in air, Laplace's correction, effect of temperature, pressure and humidity on the velocity of sound, principle of superposition: stationary waves, waves in pipes, strings and rods, intensity and intensity level, loudness, pitch and quality, noise pollution; beats, Doppler's effect, electromagnetic waves: electromagnetic spectrum, Huygen's wave theory, reflection and refraction of light wave, interference of light, coherent sources, optical path difference, phase difference, constructive and destructive interference, Young's double slits experiment; diffraction of light: Fresnel and Fraunhoffer diffraction, Single slit Fraunhoffer diffraction, Polarization of light; Malus' law, Brewster's law and Polaroid.

Unit IV. Electricity & Magnetism:
1. Electrostatics: electrostatic field: Coulomb's law, electric field, electric flux, Gauss's theorem, potential energy, electric potential, potential gradient, action of points, Van de Graafs generator, capacitors, combination of capacitors, action of dielectric, relative permittivity and dielectric strength, energy of a charged capacitor, charging and discharging of capacitors.
2. Electric current: metallic conduction, potential difference, Ohm's law, Ohmic and non-Ohmic conductors, resistance: resistivity, combination of resistors, Kirchhoffs laws and its application, heating effect of electric current, Joule's laws, thermoelectric effect, thermocouple, chemical effect of electric current, electrolysis, Faraday's laws.
3. Magnetic field: lines of forces, magnetic field due to current, Biot Savart law, Helmholtz coils, magnetic moment of current loop, Ampere's theorem, force on conductor: force on moving charges, Hall effect, magnetic materials, magnetization, susceptibility, permeability, domain theory, hysteresis, dia, para, and ferro-magnetism.
4. Electromagnetic induction: self induction, mutual induction, energy stored in magnetic field of a coil, A.C. and D.C. generator, RMS value and peak value of the A.C. current; A.C. through L.R. and C in series: power in A.C. circuit; transformer.

Unit V. Modern Physics:
1. Electron: Millikan's oil drop experiment, gaseous discharge, cathode rays; motion of electron in electric field and magnetic field, thermionic emission of electrons, specific charge of electron (e/m), cathode ray oscilloscope, photons: photoelectric effect.

2. Atoms: Bohrs theory of H-atom; energy levels; excitation and ionization energies; production of laser; its properties and uses, production of X-rays; properties and uses of X-rays; de Broglie's wave, Nucleus: atomic number; mass number and isotopes; mass energy relation; mass defect and binding energy. Radioactivity: properties of alpha, beta and gamma rays, G.M. tube; absorption of beta particles and gamma rays; laws of radioactive disintegration; half-life and mean-life; artificial disintegration; nuclear reaction; nuclear fission and fusion; radio isotopes; radiation hazards and safety measures.

3. Electronics: conductor, semiconductor and insulator, junction diode, rectifier, transistor, CE amplifier.

CHEMISTRY

Unit I. General & Physical Chemistry:

1. **Language of Chemistry**
   Symbols and formulae, atoms and molecules, elements and compounds

2. **States of Matter**
   Molecular interpretation of three states of matter
   Gaseous state: Gas laws: Goyle's Law; Charles' Law, Kelvin scale of temperature; universal gas constant; Dalton's Law of partial pressure, Graham's law of diffusion, kinetic theory of gases (no derivation), deviation of real gas from ideal behaviour, calculations involving gas laws.
   Liquid state: properties of liquids, solution, concentration of solution, concept of molarity, solubility, effect of temperature on solubility, solubility curve, viscosity and surface tension.
   Solid state: Properties of solids, classification of solids based on different binding forces, crystals, crystal latrice, seven types of crystal systems.

3. **Laws of Stoichiometry and Avogadro's Hypothesis**
   Laws of stoichiometry: Law of conservation of mass, law of constant proportions, law of multiple proportions, law of reciprocal proportions, Gay Lussac's law of gaseous volumes, chemical calculations based on stoichiometry. Atomic and molecular masses, empirical and molecular formula, Avogadro's hypothesis, important deductions from Avogadro's hypothesis, Avogadro's number, mole concept, determination of chemical formulae from percent composition, problems based on chemical equations.

4. **Atomic Structure:**
   The subatomic particles, the electrons and nucleons (protons and neutrons), their masses and charges, the atomic mass unit, Dalton's atomic theory, Rutherford's experiment, Bohr's model, interpretation of hydrogen spectra on the basis of Bohr's model, elementary idea of quantum mechanical model of atom, de Broglie relation, Heisenberg uncertainty principle, quantum numbers, atomic orbital, shapes of s and p orbitals, Pauli's exclusion principle, Hund's rule of maximum multiplicity; Aufbau principle, quantum designation of electrons, electronic configuration of atoms in the ground state up to Z=30, Isotopes and fractional atomic weights, nuclear fission and fusion, radioactive disintegration and half life.

5. **Chemical Bonding**
   Valency, octet rule, chemical bonds and Lewis structure, ionic bonds, covalent bond, electronegativity and ionic character of covalent bond, coordinate covalent bond, idea of metallic bonds, intermolecular forces, van der Waal's forces, hydrogen bonding, importance of hydrogen bonding, VSEPR theory and shapes of BeF_2, BF_3, CH_4, H_2Q, NH_3, PF_5, and SF_6.

6. **Oxidation & Reduction**
   Electronic concept of oxidation and reduction reactions, oxidation number, balancing redox reactions by oxidation number and ion-electron methods.

7. **Periodic Table**

Mendeleev's periodic table, modern periodic law and long form of periodic table, types of elements on the basis of periodic table, periodic trends in ionization energy, electron affinity, atomic radii, electronegavity and valency.

8. **Acids, Bases and Salts**
Classical definition, Arrhenius concept of acids, bases and salts, Bronsted-Lowry concept, Lewis concept, hydrogen ion concentration and pH, calculation of pH of strong acids, neutralization, hydrolysis of salts.

9. **Volumetric Analysis**
Equivalent weight of elements and compounds (acids, bases and salts), standard solution, primary and secondary standards, different ways of expressing concentration of solution, normality eqution, titration based on neutralization and redox reactions, indicator, titration curve and selection of acid base indicator, solving problems on acidimetry and alkalimetry involving normality and molarity.

10. **Electrochemistry**
Electrolytic and metallic conduction, Arrhenius theory of ionization, Faraday's laws mechanism of electrolysis and criteria of product formation electrode potential, standard electrode potential, EMF of a galvanic cell and the use of electrode potential to predict a chemical reaction, commercial batteries.

11. **Chemical Kinetics**
Rate of reaction, rate law and rate constant, order and molecularity, half life period, factors affecting the rate of reaction (particle size, concentration, temperature and catalyst, concept of activation energy and idea of photochemical reaction.

12. **Chemical Equilibrium**
Equilibrium in physical processes, features of dynamic equilibrium, equilibrium constant, K_p and K_c, relation between K_p and K_c, LeChatelier's principle: effect of pressure, concentration, temperature and catalyst on chemical equilibrium, equilibrium involving ions, ionization of weak electrolytes (Ostwald's dilution law), degree of ionization and ionization constant, solubility and solubility product, common ion effect and their applications.

13. **Chemical Thermodynamics**
Language of thermo-chemistry, standard heats of formation and combustion, heat of neutralization, Hess's law, energy changes in chemical reactions, spontaneous processes, second law of thermodynamics, entropy and its physical concept, entropy and criteria of spontaneity in terms of entropy change of universe, entropy change in phase transformations, Gibb's free energy and the direction of chemical change, standard free energy change and equilibrium constant, free energy and useful work.

Unit II. Inorganic Chemistry:
1. **Non-metals**
Hydrogen: Unique position in periodic table, isotopes, preparation, properties and uses.
Oxygen and ozone: Preparation, properties and uses of oxygen, classification of oxides, preparation, properties and uses of ozone, structure of ozone, hole in the ozone layer.
Water: Structure of water, solvent properties of water, hard and soft water, detergents and water pollution, heavy water.
Carbon: Allotropes of carbon including fullerence, preparation, properties and uses of CO and CO_2, poisoning by CO.
Nitrogen: Nitrogen cycle, preparation, properties and uses of nitrogen, preparation, properties and uses of ammonia, principle of manufacture of ammonia by Haber process, structure of ammonia, principle of manufacture of nitric acid by Ostwald process, properties and structure of and uses of nitric acid, structure of oxides of nitrogen.
Salphur: Allotropes of sulphur, preparation, properties and uses of H_2S, SO_2, principle of manufacture of sulphuric acid by contact process properties and uses of sulphuric acid, sulpher dioxide and year pollution, acid rain

Phosphorus: Allotropes of phosphorus, phosphien and phosphate fertilizer.

Halogen and halogen acids: Preparation, properties and uses, comparative study of HCL, HBr and HI, test of halides and tincture of iodine.

Noble gases: Introduction, isolation and uses of noble gases, compounds of xenon – xenon fluorides.

2. Metals

Metals and metallurgy: Introduction, distinction between metals and non-metals, metalloid, electrochemical series and occurrence of metal, metallurgical principle and metallurgical terms.

Alkali and alkaline earth metals: Pariodic discussion, general characteristics of alkali and alkaline earth metals, principle of extraction of sodium (Down's process), properties and uses of sodium, principle of manufacture of sodium carbonate, sodium hydroxide, and their properties and uses, biological importance of sodium and potassium, preparation, properties and uses of quicklime, plaster of Paris and bleaching powder, chemistry of magnesium hydroxide and Epsom salt.

Coinage metals: Introduction, occurrence, extraction and properties of copper, chemistry of compounds of copper and silver (CuO, Cu_2O, $CuSO_4$, $5H_2O$, $AgNO_3$, and $AgCl$), purity of gold (carats and fineness).

Heavy metals: (zinc, iron, mercury and lead): Occurrence, extraction and properties of zinc, iron and mercury, manufacture of steel, heat treatment of steel, stainless steel, rusting of iron, galvanization, chemistry of compounds of iron, zinc and mercury and lead ($FeCl_3$, $FeCl_3$, $6H_2O$, $FeSO_4$, $7H_2O$, Zno, $ZnSO_4$, $7H_2O$, Hg_2Cl_2, $HgCl_2$, PbO. and Pb_3O_4), Mercury pollution and mercury poisoning.

Unit III. Organic Chemistry:

1. Organic Chemistry: some basic principles

Introduction: Definition, sources and importance of organic compounds, detection of N, S and halogens in organic compounds.

Bonding in organic compounds: Tetracovalency of carbon, hybridization (sp, sp^{-2}, sp^3), sigma and pi - bonds.

Electronic displacement in covalent bond: inductive effect, electromeric effect, mesomeric effect and resonance.

Fission in covalent bond: Hemolytic and heterolytic fission, electrophiles and nucleophiles, carbocation and carbonions.

Formula of organic compounds: Empirical, molecular and structura, functional groups, homologous series, isomerism (structural & stereoisomerism), nomenclature of organic compounds.

2. Hydrocarbons

Classification of hydrocarbons, sources of hydrocarbons, nomenclature.

Alkanes: Nomenclature, preparation, properties and uses of alkanes, octane number, preparation and properties of methane.

Alkenes: Nomenclature, preparation, properties and uses of alkenes, Markovnikov's rule and peroxide effect, preparation, properties and uses of ethane.

Alkynes: Preparation, properties and uses of ethyne, acidic character of ethyne.

3. Organic halogen compounds

Alkyl halides: Nomenclature, nature of C-X bond, properties and uses of alkyl halides.

Chloroform: Preparation, properties and uses.

4. Alcohols

Classification, nomenclature, distinction between 1^0, 2^0 and 3^0 alcohols, industrial preparation of ethanol (hydration of ethane and fermentation) prpperties of alcohols.

5. Ethers

Nomenclature, important methods of preparation of diethyl ether, chemical and physical properties and uses of diethyl eather.

6. **Carbonyl compounds**
   Structures and nomenclature, preparation, properties and uses of formaldehyde, acetaldehyde and acetone, aldol condensation, Cannizzaro reaction.
7. **Carboxylic Acids**
   Structures and nomenclature, preparation, properties and uses of formic and acetic acid, derivatives of carboxylic acid: acid chlorides, acid anhydrides, ester and amides.
8. **Amines**
   Structures, classification, nomenclature, distinction and separation of primary, secondary and tertiary amines, chemical and physical properties and uses of ethylamine.
9. **Aromatic Hydrocarbons**
   Benzene: Structure of benzene, nomenclature and structure of substituted benzene, properties and uses of benzene.
   Aniline: Preparation, properties and uses.
   Nitrobenzene: Preparation, properties and uses.
   Phenol: Preparation, properties and uses.
10. **Carbohydrates, proteins, nucleic Acids, and Lipids**
    Carbohydrates: Classification of carbohydrates, structures of glucose and fructose, functions of carbohydrates.
    Protein: Amino acids and peptide bonds, classification of proteins, denaturation and hydrolysis of protein, functions of proteins.
    Nucleic acids: Types and constituents of nucleic acids, functions of nucleic acids.
    Lipids: Lipids and triglycerides, phospholipids.
11. **Polymers, Pesticides, Dyes and Drugs**
    Polymers: Polymerization (addition and condensation), classification of polymers, and some important synthetic polymers (polyethylene, PVC, polystyrene, Teflon, polyester, Terylene (Dacron), nylon 66.
    Pesticides: Introduction, DDT, Malathion and pheromones.
    Dyes: Classification of dyes with examples (based on chemical constitution and mode of application).

Drugs: General introduction to drugs: Antiseptic, analgesic, antipyretic, antacids, and tranquilizers.

Botany

Unit I. Structure, reproduction and Economic Importance of:
Bacteria, Virus and Lichens.
Unit II. Structure, reproduction and economic Importance of:
   1. Algae: Nostoc and Spirogyra
   2. Fungi: Mucor and Agaricus
   3. Broyophyta: Marchania and Funaria
   4. Pteridophyta: Fern (Pteridium)
   5. Gymnosperm: Pinus and Cycas

Unit III. Plant Morphology:
   1. Parts of a typical flowering plant (Mustard)
   2. Leaf: morphology and modification
   3. Root: Regions of root, Types amd Modification
   4. Stem: Types and Modification
   5. Flower: Parts
   6. Fruits: Types
   7. Seeds: Dicot, Monocot

Unit IV. Taxonomy of Angiosperms:
1. Basic concept of taxonomy and binominal nomenclature
2. Characteristics and Economic importance of the following families:
   Cruciferae, Solanaceae, Gramineae and Liliaceae

Unit V. Plant Anatomy:
Types of tissues, Primary internal structure of root, stem and leaf of monocoat and dicot, Secondary growth of dicot stem

Unit VI. Plant Physiology:
1. Water relations (difussion, osmosis, absorption, transpiration and ascent of sap)
2. Photosynthesis
3. Respiration
4. Growth hormones

Unit VII. Cell Biology:
1. Cell as a unit of life, structure of prokaryotic and eukaryotic cell, cell organelles and their function.
2. Biochemically important molecules (carbohydrates, proteins, amino acids nucleic acid and lipids)
3. Cell division (Mitosis, meiosis and their significance)

Unit VIII. Genetics:
1. Mendelism, Mendel's Laws of Inheritance
2. Concept of incomplete dominance and co-dominance
3. Genetic materials (RNA and DNA) gene pool, crossing over, sex linked inheritance and mutation.

Unit IX. Developmental Biology:
1. Reproduction and development in angiosperms
2. Vegetative propagations
3. Micro and mega-sporogenesis, micro and megagametogenesis
4. Pollination, fertilization and development of dicot and monocot embryo.

Unit X. Ecology and Biodiversity Conservation:
1. Plant adaptation (hydrophytes, mesophytes and xerophuytes)
2. Types of forest in Nepal
3. Biodiversity conservation, endangered species of plants and wildfire, causes of extinction
4. Abiotic and biotic factors, food chain, food web, trophic level, pond and grassland ecosystems.
5. Ecological imbalances and its consequences:
   a. Green house effect
   b. Depletion of ozone layer
   c. Acid rain
   d. Pollution: Air, Water, Soil, their sources of pollution, effects and control measures.

Unit XI. Application of Biology:
1. Introduction of biotechnology
2. Principles of plant and animal breeding
3. Biofertilizers
4. Antibiotics, Vaccines
5. Tissue and Organ transplantation
6. Test tube baby

7. Fermentation
8. Genetic engineering and tissue culture.

Zoology

Unit I. Introduction:
1. Scope and branches of biology, its relation with other subjects
2. Life and its origin, Oparin and Halden's theory, Miller Urey Experiments
3. Life components (Organic and inorganic)

Unit II. Animal Diversity and their classification:
General characteristics and its classification up to class with examples of the following: Protozoa, Porifera, Coelenterata, Platyhelminthes, Aschelminthes, Annelida, Arthropoda, Mollusca, Echinodermata and chordata.

Unit III. Biology of the following:
1. Plasmodium vivax: Habit and habitat, structure (Sporozoite), Life-cycle and control of malaria
2. Paramecium Caudatum: Habit and habitat, structure, reproduction (Binary fission and conjugation with its significance)
3. Pheretima posthuma: Habit and habitat, structure, digestive, nervous and reproductive system and economic importqance of earthworms.
4. Rana tigrina: Habit and habitat, structure, digestive, nervous, respiratory, circulatory, excretory and reproductive systems. Histology of the related organs.
5. Mammal (Rabbit / Man): Skin, respiratory, digestive, nervous, circulatory, excretory and reproductive systems. Histology of the related organs, human blood groups and sense organs (Eye and Ear)

Unit IV. Human Diseases:
1. Socially significant: Drug abuse, Alcoholism and smoking.
2. Communicable: Typhoid, tuberculosis, Ascariasis, Girardiasis and AIDS.
3. Non-communicable: Cancer.

Unit V. Babbitt Bones:
Appendicular and axial

Unit VI. Endocrinology of Mammal:
Pituitary, thyroid and parathyroid, adrenal, islets of langerhans

Unit VII. Animal Tissues:
Epithelial, Connective, Muscular and Nervous.

Unit VIII. Animal Behavior:
1. Reflex action
2. Taxes
3. Leadership
4. Migration of fishes and birds: Habit and habitat, structure, digestive, nervous and reproductive.

Unit IX. Animal Adaptation:
1. Aquatic
2. Amphibians
3. Terrestrial
4. Volant (aerial)

5. Desert and parastitic

Unit X. Evolution:
1. Definition, Organic evolution
2. History, theories of organic evolution (Lamarckism, Darwinism, Neo-Darwinism)
3. Evidence of organic evolution (morphological, embryological, anatomical, palentological, chemical and genetical)
4. Human evolution.

Unit XI. Developmental Biology:
Development of frog (Embryonic and post embryonic development)

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BPH

Bachelor in Public Health (BPH) is a 4-year academic program and prepares students for executing the roles in public health sectors.

Eligibility:
Candidates having passed and secured fifty percent mark in the PCL General Science (I.Sc. or 10+2) program with biology and other prerequisite subjects OR in PCL Health Science are eligible to apply for Bachelor in Public Health (BPH). For number of seats, refer to the detailed notice.

Entrance examination paper:

The entrance examination will consist of a single paper with 100 multiple choice questions (MCQ) on General Health (50), Zoology (15), Botany (10), Chemistry (15) and Physics (10). One mark is allocated to each MCQ. Each MCQ will have four options, of which the most appropriate answer is to be answered. There is no system of negative marking.

The full marks of the paper will be 100 and the duration of examination will be 2 hours. The pass marks is 50% (fifty per cent). Separate merit lists will be prepared for candidates from General Science Stream and those from the Health Science Stream.

A brief outline of course of study is as follows.

General Health

The purpose of this section of the science part is to evaluate the basic concepts of General Health Science so as to find out the abilities of students to follow the first year curriculum of the program. Topics related to areas mentioned below form the main basis of the test. The areas are: human body and its systems, including structure and functions; health; epidemiology; infections caused by microbes, parasites, helminths, protozoa, cestodes, arthopodes; environment, green house effect; air-borne diseases; effects of smoking and alcohol; drug abuse; nutrition and food-related illness; water and water borne diseases; AIDS; family planning and maternal/child health; functions of international health agencies; modes of transmission of diseases; preventive measures; health education; community participation; primary health care; National Health Policy of Nepal Government.

General Science

This part intends to test the knowledge of physics, chemistry, zoology and botany studied during the proficiency certificate level (PCL) or 10+2 programs.

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B.Sc.MLT

The Bachelor in Medical Laboratory Technology Pogramme (BMLT) is a 4-year academic program at the Institute of Medicine (IOM).

Eligibility:
Candidates having passed and secured fifty percent mark in the PCL General Science (I.Sc.

or 10+2) program with biology and other prerequisite subjects <u>OR</u> in PCL Health Science (Health Laboratory) are eligible to apply for Bachelor of Science in Medical Laboratory Technology (B.Sc. MLT). For number of seats, refer to the detailed notice.

Entrance examination paper:

The entrance examination will consist of a single paper with 100 multiple choice questions (MCQ) on Zoology (15), Botany (10), Chemistry (15), Physics (10), General Health (25) and specific subject (25). One mark is allocated to each MCQ. Each MCQ will have four options, of which the most appropriate answer is to be answered. There is no system of negative marking.

The full marks of the paper will be 100 and the duration of examination will be 2 hours. The pass marks is 50% (fifty per cent). Separate merit lists will be prepared for candidates from General Science Stream and those from the Health Science Stream.

A brief outline of course of study is as follows.

General Health

The purpose of this section is to evaluate the basic concepts of General Health Science so as to find out the abilities of students to follow the first year curriculum of the program. Topics related to areas mentioned below form the basis of the entrance test: human body, including structure and functions; health; epidemiology; infections related to microbes, parasites, helminths, protozoa, cestodes, arthopodes; environment, green house effect; air- borne diseases; effects of smoking and alcohol; drug abuse; nutrition and food related illness; water and water-borne diseases; AIDS; family planning and maternal/child health; functions of international health agencies; modes of transmission of diseases; preventive measures; health education; community participation; Primary Health Care; National Health Policy of Nepal Government.

Specific subject

Classification of bacteria; bacterial growth and growth factors; normal bacterial flora of human body; culture and sensitivity tests; principles and process of staining; classification and investigations of fungal infections; properties of virus; principles and procedures of ELISA and CFT; counting of blood cells, ESR, Hb; blood parasites; blood banking and ABO grouping and Rhesus typing; principles and estimation of blood sugar, protein, bilirubin, urea; principles and procedure of preservation and fixation of tissues; microtomes; cytological specimens; record-keeping of investigations; stool and urine examination; CSF examination for protein, sugar and cell counts.

General Science

This section intends to test the knowledge of physics; chemistry, zoology and botany studied during the proficiency certificate level (PCL) or 10+2 programs.

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B.Sc. MIT

Bachelor of Science in Medical Imaging Technology (B.Sc. MIT) is a 4-year academic program at the Institute of Medicine (IOM).

Eligibility:
Candidates having passed and secured fifty percent mark in the PCL General Science (I.Sc. or 10+2) program with biology and other prerequisite subjects <u>OR</u> in PCL Health Science (Radiography) are eligible to apply for Bachelor of Science in Medical Imaging Technology (B.Sc. MIT). For number of seats, refer to the detailed notice.

Entrance examination paper:

The entrance examination will consist of a single paper with 100 multiple choice questions (MCQ) on Zoology (15), Botany (10), Chemistry (15), Physics (10), General Health (25) and specific subject (25). One mark is allocated to each MCQ. Each MCQ will have four options, of

which the most appropriate answer is to be answered. There is no system of negative marking.

The full marks of the paper will be 100 and the duration of examination will be 2 hours. The pass marks is 50% (fifty per cent). Separate merit lists will be prepared for candidates from General Science Stream and those from the Health Science Stream.

A brief outline of course of study is as follows.

General Health

The purpose of this section is to evaluate the basic concepts of General Health Science so as to find out the abilities of students to follow the first year curriculum of the program. Topics related to areas mentioned below form the basis of the entrance test: human body, including structure and functions; health; epidemiology; infections related to microbes, parasites, helminths, protozoa, cestodes, arthopodes; environment, green house effect; air- borne diseases; effects of smoking and alcohol; drug abuse; nutrition and food related illness; water and water-borne diseases; AIDS; family planning and maternal/child health; functions of international health agencies; modes of transmission of diseases; preventive measures; health education; community participation; Primary Health Care; National Health Policy of Nepal Government.

Specific subject

Introduction to radiography and radiotherapy; history, production, properties and uses of X-rays; simple unit of measurement of X-ray and R-rays; biological effect of radiation; general principles of radiation protection.

General knowledge of ultrasonogram (USG), computerised tomography (CT), magnetic resonance imaging (MRI), isotopes, isotope scanning, radioactivity, X-ray tube and X-ray film & processing.

General Science

This section intends to test the knowledge of physics, chemistry, zoology and botany studied during the proficiency certificate level (PCL) or 10+2 programs.

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B. Pharmacy

Bachelor in Pharmacy (B. Pharmacy) is a 4-year academic program at the Institute of Medicine (IOM).

Eligibility:
Candidates having passed and secured fifty percent mark in the PCL General Science (I.Sc. or 10+2) program with biology and other prerequisite subjects OR in PCL Health Science (Pharmacy) are eligible to apply for Bachelor in Pharmacy (B. Pharmacy). For number of seats, refer to the detailed notice.

Entrance examination paper:

The entrance examination will consist of a single paper with 100 multiple choice questions (MCQ) on Zoology (15), Botany (10), Chemistry (15), Physics (10), General Health (25) and specific subject (25). One mark is allocated to each MCQ. Each MCQ will have four options, of which the most appropriate answer is to be answered. There is no system of negative marking.

The full marks of the paper will be 100 and the duration of examination will be 2 hours. The pass marks is 50% (fifty per cent). Separate merit lists will be prepared for candidates from General Science Stream and those from the Health Science Stream.

A brief outline of course of study is as follows.

General Health
The purpose of this section is to evaluate the basic concepts of General Health Science so as to find out the abilities of students to follow the first year curriculum of the program. Topics related to areas mentioned below form the basis of the entrance test: human body, including structure and functions; health; epidemiology; infections related to microbes, parasites, helminthes, protozoa, cestodes,

arthropod's; environment, green house effect; air-borne diseases; effects of smoking and alcohol; drug abuse; nutrition and food related illness; water and water-borne diseases; AIDS; family planning and maternal/child health; functions of international health agencies; modes of transmission of diseases; preventive measures; health education; community participation; Primary Health Care; National Health Policy of Nepal Government.

Specific subject

Different branches of pharmacy; sources of drugs and drug information; physical & chemical property of drugs; additives; dosage forms; rational dispensing; responsibilities of hospital pharmacists; organisation of a hospital pharmacy; processes involved in industrial pharmacy; quality control processes; drug legislation; medicinal plants; mode of action, adverse effects & precaution of commonly used drugs; vaccines & sera.

General Science

This section intends to test the knowledge of physics, chemistry, zoology and botany studied during the proficiency certificate level (PCL) or / 10+2 programs.

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B. Optometry

Bachelor in optometry (B. Optom) is a 4-year bachelor program consisting of studies in the basic physical and life sciences, the optometric sciences including optics, ocular anatomy and physiology, visual science, ophthalmic optics, ocular pathology and diseases of the eye and visual system. The final year of the optometry course consists of a clinical training program where emphasis is placed on the clinical application of the studies in the first two years to the management of patients with real visual problems.

Eligibility:

Candidates having passed and secured fifty percent mark in the PCL General Science (I.Sc. or 10+2) program with biology and other prerequisite subjects OR in PCL Health Science (General Medicine or Ophthalmology) are eligible to apply for Bachelor in Optometry (B. Optom). For number of seats, refer to the detailed notice.

Entrance examination paper:

The entrance examination will consist of a single paper with 100 multiple choice questions (MCQ) on Zoology (15), Botany (10), Chemistry (15), Physics (10), General Health (25) and specific subject (25). One mark is allocated to each MCQ. Each MCQ will have four options, of which the most appropriate answer is to be answered. There is no system of negative marking.

The full marks of the paper will be 100 and the duration of examination will be 2 hours. The pass marks is 50% (fifty per cent).

A brief outline of course of study is as follows.

General Health

This section intends to evaluate the basic concepts of general health science so as to find out the abilities of students to follow the first year curriculum of the program. Topics related to areas mentioned below form the main basis of the entrance test: human body and its systems including structures and functions; health; epidemiology; infections related to microbes, parasites, helminths, protozoa, cestodes, arthropods; environment; nutrition and food related illness and National Health Policy of Nepal Government.

Specific Subject

Common Eye Diseases; Xerophthalmia, Trachoma; Refractive Error, Myopia, Hypermetropia, Astigmatism.

General Science

This section intends to test the knowledge of physics, chemistry, zoology and botany studied during the proficiency certificate level (PCL) or 10+2 programs.

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BAMS

The Bachelor of Ayurvedic Medicine and Surgery (BAMS) is an entirely Ayurvedic academic program of $4^{1}/_{2}$ years duration and has in addition one year of compulsory rotating internship. The curriculum is designed into 3 professionals of 18 months each. All the teaching-learning activities take place at the Ayurveda Campus, Kirtipur and Ayurved Hospitals (Naradevi and Kirtipur).

Eligibility:
Candidates having passed and secured fifty percent mark in the PCL General Science (I.Sc. or 10+2) program with biology and other prerequisite subjects OR in PCL Health Science (Ayurveda) OR Uttar Madhayma with English, Physics, Chemistry and Biology are eligible to apply for Bachelor of Ayurvedic Medicine and Surgery (BAMS). For number of seats, refer to the detailed notice.

Entrance examination paper:

The entrance examination will consist of a single paper with 100 multiple choice questions (MCQ) on Zoology (20), Botany (20), Chemistry (20), Physics (15) and specific subject (25). One mark is allocated to each MCQ. Each MCQ will have four options, of which the most appropriate answer is to be answered. There is no system of negative marking.
The full marks of the paper will be 100 and the duration of examination will be 2 hours. The pass marks is 50% (fifty per cent).

A brief outline of course of study is as follows.

General Science
The questions included are from Physics, Chemistry, Botany and Zoology of the PCL in Traditional and General Medicine or I.Sc. or 10+2 of T.U. or other Universities recognised by T.U.

Specific subject
Origin, Definition, Goal of life, Charak, Susruta, Bagbhata, Kashap, Samhitas, Eight major spe-cialities, Aim, Panch-Maha-Bhootas, Tridosha, mansdosha, Dhatu, Upadhatu, Malas, Shros-tasmi, Agnis, Samprapti, Health, Diseases, Types and properties of Vata, Pitta and Kapha, Prakrite, Sharir, Drabyaguna - Definition, Importance, Padartha, Rasa, Guna, Briya, Bipak, Pradhaba, Karma, Drabya, Technicalities - Dipan, Auulomau, Grahi, Rasayana, Bajikarana, etc; classification of drabyas; Different Gonas - Trikatu, Astabarya, Panchkol, Dasmool, etc. General and specific knowledge of common and important drabyas, Jantabya, drabya, Bisakta drabya.
Rasa Shastra - Definitions, Rasausadhi, Kastausadhi, Puta, Yantras, Parad and doshes, Gandhak, Abhrak, Godanti, Yasad, Loha, Mandur, Mriya Sringa, Shilajit,Ratna, Babal, Bikha, Batsanabha, Kalka, Churna, Hima, Phanta, Seeta, Aasaba, Arista, Kwatha, Bati, Abaleha, Gulu.
Kayachikitsa-Definition, Panch-nidan, Diagnosis and management of common diseases - Praba-hika, Grahani, Arsa, Pandu, Kamala, Kas, Swas, Chhardi, Daha, Apasmar, Vatabyadhi, Gulma, Asmari, Aambat, Mutrakrisha, Amla pitta etc.
Shalya Shalakya - Definition, yantra, Shastra, Vrana, Sopha, Vidradhi, Asta bioha Shastra Karma, Tri bidha karma, Kshara Karma, Arsa, Bhagandar, Astibhanga, Vriptthi, Pratishya, Pinas, Suryabarta, Anant vata,Rohini, Galasundhi, arma Sraba, Pothaki, Abhisyandi, Nakulandha, Linga, nasha, etc.Stri Roga, Prasuti and Balroga - Definition, Aartaba, types, Pradar, Youibyapat, Garbha-dhan, Douhrid, Nagodar, Mudhagarva, Sutika-roga, Kshirao, Annodar, Jat Karma, Rakshya-karma, Importance of stanya pan, Dhatri, Fakka, Krimi etc.
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BN (Bachelor of Nursing)

The Bachelor of Nursing (BN) program that prepares nurses for carrying out the role of care provider, manager, educator and researcher, is a two-year academic program having three major tracks: **Hospital Nursing (BN-HN), Community Nursing (BN-CN) and Psychiatric Nursing (BN-PN).**

Eligibility:

Candidates having passed and secured fifty percent mark in the PCL Nursing and have two years of work experiences. For number of seats, refer to the detailed notice.

Entrance examination paper:

The entrance examination will consist of a single paper with 100 multiple choice questions (MCQ) on Nursing Problem solving (50), Nursing core subjects (40) and Specific nursing subject (10). One mark is allocated to each MCQ. Each MCQ will have four options, of which the most appropriate answer is to be answered. There is no system of negative marking.

The full marks of the paper will be 100 and the duration of examination will be 2 hours. The pass marks is 50% (fifty per cent).

A brief outline of course of study is as follows.

Nursing Problem Solving:

The purpose of this part is to evaluate the ability to:

Apply intellectual reasoning in <u>understanding patients/clients</u>, and critically analyse and make judgment to solve problems relating to patients/clients.

Hospital Nursing/Community Nursing:

The purpose of this part is to evaluate the prerequisite knowledge necessary to follow the <u>Bachelor in Nursing - Hospital Nursing</u> or <u>Bachelor in Nursing - Community Nursing</u> tracks.

General topics of study are the same for all the tracks. However, more items will be included from topics relevant to Community Nursing for those applying for Community Nursing, from topics related to Hospital Nursing for candidates applying for Hospital Nursing and from topics related to Hospital Nursing as well as Psychiatric Nursing for candidates applying for Hospital Nursing (Major in Psychiatric Nursing).

Some topics of relevance for nursing part of the paper are given below:

<u>**INTEGRATED SCIENCE**</u>

Microbiology:

<u>Characteristics and classification of living cells</u>: <u>growth</u> of cells and factors affecting cellular growth; cell <u>reproduction</u>, <u>pathogenic</u> and nonpathogenic organisms; <u>parasites</u>; concept of <u>infection, disinfection and sterilization.</u>

Pharmacology:

<u>Pharmacokinetics</u>; absorption, distribution, metabolism and excretion of drugs. <u>Actions and side effects of common drugs related to infectious diseases</u>, circulatory system, respiratory system, alimentary system, urinary system, endocrine system, nervous system, eye, ear, nose and throat.

Human Biology:

<u>Anatomy and Physiology</u> of different body systems and organs.

<u>**APPLIED SCIENCE:**</u>

Body mechanics, friction, capillary, gravity and centre of gravity, Newton's law, force; transfer of heat, measurement of heat; mathematical concepts in nursing, e.g. percentage, fraction, ratio, proportion, decimal; fluid and electrolyte; osmosis, diffusion, acid-base balance; rehydration therapy; X-ray and ultra-sound.

Sugar, protein, bilirubin, urea; principles and procedure of preservation and fixation of tissues; microtomes; cytological specimens; record-keeping of investigations; stool and urine examination; CSF examination for protein, sugar and cell counts.

<u>**NURSING**</u>

Fundamentals of nursing:

Nursing process; basic needs of patient; nursing procedures; recording and reporting; first-aid treatment.

Medical/Surgical Nursing:

Developmental needs and tasks of adult; common medical and surgical problems; application of nursing process; common diagnostic procedures; pre-operative and post-operative care.

Maternal and child health:

Fetal and placental development; male and female reproductive system; antenatal care and examination; management of high risk mother; management of normal and abnormal labour; postnatal care and breast feeding; growth and development of child from birth to adolescence; developmental needs of child: common childhood illness and their management.

Community Health Nursing:

Concept of primary health care: epidemiological concepts and approaches: nutrients and their deficiencies: health education: communication: immunization: communicable diseases; health indicators and family planning.

Leadership and Management:

National health plan; management of health services, supervision and evaluation; leadership styles; personnel and professional development.

Social Psychology:

Motive; emotion; learning; personality; mental health, signs and symptoms of mental health and illness; assessment of mental health; tradition; superstition; culture and influence of culture on health.

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