
**SYLLABUS
FOR
ENTRANCE TEST
2011**



**UNIVERSITY OF HEALTH SCIENCES
LAHORE, PAKISTAN**

STRUCTURE OF ENTRANCE TEST PAPER 2011

Sr.#	Subject	No. of Questions
1.	PHYSICS	44
2.	CHEMISTRY	58
3.	ENGLISH	30
4.	BIOLOGY	88
TOTAL		220

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PHYSICS

STRUCTURE OF THE SYLLABUS (2011)

F.Sc. and Non-F.Sc.

TABLE OF CONTENTS

1. Physical Quantities and Units
2. Forces
3. Fluid Dynamics
4. Light
5. Waves
6. Deformation of Solids
7. Ideal Gases
8. Heat and Thermodynamics
9. Electronics
10. Current Electricity
11. Magnetism and Electromagnetism
12. Modern Physics
13. Nuclear Physics

1. PHYSICAL QUANTITIES AND UNITS:

Learning Outcomes

- Understand what is physics.
- Understand that all physical quantities consist of a numerical magnitude and a unit.
- Recall the following base quantities and their units; mass (kg), length (m), time (s), current (A), temperature (K), luminous intensity (cd) and amount of substance (mol)
- Describe and use base units and derived units.
- Dimensional units of physical quantities.

2. FORCES:

Learning Outcomes

- Show an understanding the concept of weight.
- Show an understanding that the weight of a body may be taken as acting at a single point known as its centre of gravity.
- Weightlessness in an elevator.
- Define and apply the moment of force.

3. FLUID DYNAMICS:

Learning Outcomes

- Concept of viscosity.
- Understand the terms steady (Laminar, streamline) flow, incompressible flow, non-viscous flow as applied to the motion of an ideal fluid.
- Appreciate the equation of continuity.

$$A_1V_1 = A_2V_2 \text{ for the flow of an ideal and incompressible fluid.}$$

- Understand Bernoulli's equation

$$P + \frac{1}{2}\rho v^2 + \rho gh = \text{Constant}$$

- Understand that the pressure difference can arise from different rates of flow of a fluid (Blood flow).

4. LIGHT:

Learning Outcomes

- a) Understand interference of light.
- b) Understand diffraction of light.
- c) Describe the phenomenon of diffraction of X-rays by crystals and its use.
- d) Understand polarization of light.
- e) Concepts of least distance of distinct vision.
 - Short sightedness, long sightedness.
- f) Understand the terms magnifying power and resolving power
($R = \frac{1}{\alpha_{\min}}$, $R = \frac{\lambda}{\Delta\lambda}$) of optical instruments.
- g) Derive expressions for magnifying power of simple microscope and compound microscope.
- h) Understand the principle of optical fibres, types and its application.

5. WAVES:

Learning Outcomes

- a) Understand the simple harmonic motion with examples.
- b) Explain energy in simple harmonic motion.
- c) Describe practical examples of free and forced oscillations.
- d) Understand the resonance with its applications.
- e) Understand and describe Doppler's effect and its causes. Recognize the application of Doppler's effect.
- f) Understand Ultrasound with its uses in scanning.
- g) Show an understanding speed of sound in different media.
- h) Audioable frequency range.

6. DEFORMATION OF SOLIDS:

Learning Outcomes

- a) Appreciate deformation caused by a force and that is in one dimension.
- b) Understand tensile or compressive deformation.
- c) Understand the terms stress, strain young's modulus and Bulk modulus.
- d) Energy stored in deformed material.

7. IDEAL GAS:

Learning Outcomes

- Recall and use equation of state of an ideal gas $PV = nRT$.
- State the basic assumptions of Kinetic theory of gases.
- Derive gas laws on the basis of kinetic theory of gases.
- Understand pressure of gas $P = \frac{2}{3} N_0 < \frac{1}{2} mv^2 >$.

8. HEAT AND THERMODYNAMICS:

Learning Outcomes

- Understand the term thermal equilibrium.
- Concepts of temperature and temperature scales.
- Compare the relative advantage and disadvantage of thermocouple, thermometer and mercury thermometer.
- Understand laws of thermodynamics.
- Show an understanding the term internal energy.

9. ELECTRONICS:

Learning Outcomes

- Logic gates:
 - OR gate, AND gate, NOT Gate, NOR gate and NAND gate.
- Understand the basic principle of Cathode Ray Oscilloscope and appreciate its use.

10. CURRENT ELECTRICITY:

Learning Outcomes

- State Ohm's law and solve problems $V = IR$
- Combinations of resistors.
- Show an understanding of a capacitor.
- Combinations of capacitors.

11. MAGNETISM AND ELECTROMAGNETISM:

Learning Outcomes

- a) Magnetic field due to current in
 - i) Straight wire
 - ii) Solenoid
- b) Understand Magnetic Resonance Imaging (MRI)

12. MODERN PHYSICS:

Learning Outcomes

- a) Principle of production of X-rays by electron bombardment on metal target.
- b) Describe main features of X-ray tube.
- c) Use of X-rays in imaging internal body structures.
- d) Show an understanding of the purpose of computed tomography or CT scanning.
- e) Show an understanding of the principles of CT scanning.
- f) Understand laser principle and its type (Helium – Neon Laser).
- g) Describe the application of laser in medicine and industry.

13. NUCLEAR PHYSICS:

Learning Outcomes

- a) Understand Radioactivity.
- b) Understand Radioactive decay.
- c) Radio Isotopes and their biological uses.
- d) Nuclear radiation detectors
 - GM tube, Wilson cloud chamber.
- e) Radiation hazards and biological effect of radiation.

Table of Specification (PHYSICS-2011)
F.Sc. and Non-F.Sc.

Sr. No	Topic	MCQs
1.	Physical Quantities and Units	02
2.	Forces	02
3.	Fluid Dynamics	03
4.	Light	04
5.	Waves	04
6.	Deformation of Solids	02
7.	Ideal Gases	02
8.	Heat and Thermodynamics	03
9.	Electronics	02
10.	Current Electricity	03
11.	Magnetism and Electromagnetism	03
12.	Modern Physics	07
13.	Nuclear Physics	07
Total		44

CHEMISTRY

STRUCTURE OF THE SYLLABUS (2011)

F.Sc. and Non-F.Sc.

TABLE OF CONTENTS

A. Physical Chemistry

1. Fundamental Concepts
2. States of Matter
3. Atomic Structure
4. Chemical Bonding
5. Chemical Energetics
6. Solutions
7. Electrochemistry
8. Chemical Equilibrium
9. Reaction Kinetics

B. Inorganic Chemistry

1. Periods
2. Groups
3. Transition elements
4. Elements of Biological Importance

C. Organic Chemistry

1. Fundamental Principles
2. Hydrocarbon
3. Alkyl Halides
4. Alcohols and Phenols
5. Aldehydes and Ketones
6. Carboxylic Acid
7. Amino Acids
8. Macromolecules
9. Environmental Chemistry

A. PHYSICAL CHEMISTRY

1. FUNDAMENTAL CONCEPTS:

In this topic, candidate should be able to:

- a) Define relative atomic, isotopic, molecular and formula masses, based on the ^{12}C scale.
- b) Explain mole in terms of the Avogadro's constant.
- c) Apply mass spectrometric technique in determining the relative atomic mass of an element using the mass spectral data provided.
- d) Calculate empirical and molecular formulae, using combustion data.
- e) Understand stoichiometric calculations using mole concept involving.
 - i) Reacting masses
 - ii) Volume of gases

2. STATES OF MATTER:

In this topic, candidate should be able to:

- a) Understate gaseous state with reference to:
 - i) Postulates of kinetic molecular theory
 - ii) Deviation of real gases from ideal behavior
 - iii) Gas laws: Boyle's law, Charles law, Avogadro's law and gas equation ($PV=nRT$) and calculations involving gas laws.
 - iv) Deviation of real gases from ideal behaviour at low temperature and high pressure
 - v) Causes of deviation from ideal behaviour
 - vi) Conditions necessary for gasses to approach ideal behaviour
- b) Discuss liquid state with reference to:
 - Evaporation, vapour pressure, boiling and hydrogen bonding in water
- c) Explain the lattice structure of a crystalline solid with special emphasis on:
 - i) Giant ionic structure, as in sodium chloride.
 - ii) Simple molecular, as in iodine
 - iii) Giant molecular, as in graphite; diamond; silicon(IV) oxide
 - iv) Hydrogen-bonded, as in ice
 - v) Metallic as in Cu and Fe.
- d) Outline the importance of hydrogen bonding to the physical properties of substances, including NH_3 , H_2O , $\text{C}_2\text{H}_5\text{OH}$ and ice.
- e) Suggest from quoted physical data the type of structure and bonding present in a substance

3. ATOMIC STRUCTURE:

In this topic, candidate should be able to:

- a) Identify and describe the proton, neutron and electron in terms of their relative charges and relative masses
- b) Discuss the behaviour of beams of protons, neutrons and electrons in electric fields
- c) Calculate the distribution of mass and charges within an atom from the given data
- d) Deduce the number of protons, neutrons and electrons present in both atoms and ions for a given proton and nucleon numbers/charge.
- e)
 - i) Describe the contribution of protons and neutrons to atomic nuclei in terms of proton number and nucleon number
 - ii) Distinguish between isotopes on the basis of different numbers of neutrons present
- f) Describe the number and relative energies of the s, p and d orbitals for the principal quantum numbers 1, 2 and 3 and also the 4s and 4p orbitals
- g) Describe the shapes of s and p orbitals
- h) State the electronic configuration of atoms and ions given the proton number/charge
- i) Explain:
 - i) Ionization energy
 - ii) The factors influencing the ionization energies of elements
 - iii) The trends in ionization energies across a Period and down a Group of the Periodic Table

4. CHEMICAL BONDING:

In this topic, candidate should be able to:

- a) Characterise electrovalent (ionic) bond as in sodium chloride and Calcium oxide.
- b) Use the 'dot-and-cross' diagrams to explain
 - i) Covalent bonding, as in hydrogen(H_2); oxygen(O_2); chlorine(Cl_2); hydrogen chloride; carbon dioxide; methane and ethene
 - ii) Co-ordinate (dative covalent) bonding, as in the formation of the ammonium ion and in $H_3N^+ - BF_3$.
- c) Describe the shapes and bond angles in molecules by using the qualitative model of electron-pair repulsion theory up to 4 pairs of electron including bonded electron pair and lone pair around central atom.
- d) Describe covalent bonding in terms of orbital overlap, giving σ and Π bonds
- e) Explain the shape of, and bond angles in ethane, ethene and benzene molecules in terms of σ and Π bonds

- f) Describe hydrogen bonding, using ammonia and water as simple examples of molecules containing N-H and O-H groups
- g) Explain the terms bond energy, bond length and bond polarity and use them to compare the reactivities of covalent bonds
- h) Describe intermolecular forces (Van der Waal's forces), based on permanent and induced dipoles, as in CHCl_3 , Br_2 and in liquid noble gases
- i) Describe metallic bonding in terms of a lattice of positive ions surrounded by mobile electrons
- j) Describe, interpret and/or predict the effect of different types of bonding (ionic bonding; covalent bonding; hydrogen bonding; Van der Waal's forces and metallic bonding) on the physical properties of substances
- k) Deduce the type of bonding present in a substance from the given information

5. CHEMICAL ENERGETICS:

In this topic, candidate should be able to:

- a) Understand concept of energy changes during chemical reactions with examples of exothermic and endothermic reactions.
- b) Explain and use the terms:
 - i) Enthalpy change of reaction and standard conditions, with particular reference to: Formation; combustion; hydration; solution; neutralization and atomisation
 - ii) Bond energy (ΔH positive, i.e. bond breaking)
 - iii) Lattice energy (ΔH negative, i.e. gaseous ions to solid lattice)
- c) Find heat of reactions/neutralization from experimental results using mathematical relationship.

$$\Delta H = mc\Delta T$$
- d) Explain, in qualitative terms, the effect of ionic charge and of ionic radius on the numerical magnitude of lattice energy
- e) Apply Hess's Law to construct simple energy cycles, and carry out calculations involving such cycles and relevant energy terms, with particular reference to:
 - i) Determining enthalpy changes that cannot be found by direct experiment, e.g. an enthalpy change of formation from enthalpy changes of combustion
 - ii) Average bond energies
 - iii) Born-Haber cycles (including ionisation energy and electron affinity)

6. SOLUTIONS:

In this topic, candidate should be able to:

- a) Describe and explain following concentration units of solutions
 - i) Percentage composition
 - ii) Molarity (M)
 - iii) Molality (m)
 - iv) Mole fraction (X)
 - v) Parts of million (ppm)
- b) Understand concept and applications of colligative properties such as:
 - i) Elevation of boiling point
 - ii) Depression of freezing point
 - iii) Osmotic pressure

7. ELECTROCHEMISTRY:

In this topic, candidate should be able to:

- a) Explain the industrial processes of the electrolysis of brine, using a diaphragm cell
- b) Describe and explain redox processes in terms of electron transfer and/or of changes in oxidation number
- c) Define the terms:
 - Standard electrode (redox) potential and Standard cell potential
- d) Describe the standard hydrogen electrode as reference electrode
- e) Describe methods used to measure the standard electrode potentials of metals or non-metals in contact with their ions in aqueous solution
- f) Calculate a standard cell potential by combining two standard electrode potentials
- g) Use standard cell potentials to:
 - i) Explain/deduce the direction of electron flow in the external circuit.
 - ii) Predict the feasibility of a reaction
- h) Construct redox equations using the relevant half-equations
- i) State the possible advantages of developing the H₂/O₂ fuel cell
- j) Predict and to identify the substance liberated during electrolysis from the state of electrolyte (molten or aqueous), position in the redox series (electrode potential) and concentration

8. CHEMICAL EQUILIBRIUM:

In this topic, candidate should be able to:

- a) Explain, in terms of rates of the forward and reverse reactions, what is meant by a reversible reaction and dynamic equilibrium
- b) State Le Chatelier's Principle and apply it to deduce qualitatively the effects of changes in temperature, concentration or pressure, on a system at equilibrium
- c) Deduce whether changes in concentration, pressure or temperature or the presence of a catalyst affect the value of the equilibrium constant for a reaction
- d) Deduce expressions for equilibrium constants in terms of concentrations, K_c , and partial pressures, K_p
- e) Calculate the values of equilibrium constants in terms of concentrations or partial pressures from appropriate data
- f) Calculate the quantities present at equilibrium, given appropriate data
- g) Describe and explain the conditions used in the Haber process.
- h) Understand and use the Bronsted-Lowry theory of acids and bases
- i) Explain qualitatively the differences in behaviour between strong and weak acids and bases and the pH values of their aqueous solutions in terms of the extent of dissociation
- j) Explain the terms pH; K_a ; pK_a ; K_w and use them in calculations
- k) Calculate $[H^+(aq)]$ and pH values for strong and weak acids and strong bases
- l) Explain how buffer solutions control pH
- m) Calculate the pH of buffer solutions from the given appropriate data
- n) Show understanding of, and use, the concept of solubility product, K_{sp}
- o) Calculate K_{sp} from concentrations and vice versa
- p) Show understanding of the common ion effect

9. REACTION KINETICS:

In this topic, candidate should be able to:

- Explain and use the terms: rate of reaction; activation energy; catalysis; rate equation; order of reaction; rate constant; half-life of a reaction; rate-determining step
- Explain qualitatively, in terms of collisions, the effect of concentration changes on the rate of a reaction
- Explain that, in the presence of a catalyst, a reaction has a different mechanism, i.e. one of lower activation energy
- Describe enzymes as biological catalysts (proteins) which may have specific activity
- Construct and use rate equations of the form

$$\text{Rate} = k[\text{A}]^m[\text{B}]^n$$

with special emphasis on:

- Deducing the order of a reaction by the initial rates method
 - Justifying, for zero- and first-order reactions, the order of reaction from concentration-time graphs
 - Verifying that a suggested reaction mechanism is consistent with the observed kinetics
 - Predicting the order that would result from a given reaction mechanism (and vice versa)
 - Calculating an initial rate using concentration data
- Show understanding that the half-life of a first-order reaction is independent of initial concentration and use the half-life to calculate order of reaction.
 - Calculate the rate constant from the given data
 - Name a suitable method for studying the rate of a reaction, from given information

B. INORGANIC CHEMISTRY

1. PERIODS:

In this topic, candidate should be able to:

Discuss the variation in the physical properties of elements belonging to period 2 and 3 and to describe and explain the periodicity in the following physical properties of elements.

- Atomic radius
- Ionic radius
- Melting point
- Boiling point
- Electrical conductivity
- Ionization energy

2. GROUPS:

In this topic, candidate should be able to:

Describe and explain the variation in the properties of group II, IV and VII elements from top to bottom with special emphasis on:

- a) Reactions of group-II elements with oxygen and water
- b) Characteristics of oxides of carbon and silicon
- c) Properties of halogens and uses of chlorine in water purification and as bleaching agent
- d) Uses of Nobel gases (group VIII)

3. TRANSITION ELEMENTS:

In this topic, candidate should be able to:

Discuss the chemistry of transition elements of 3-d series with special emphasis on:

- a) Electronic configuration
- b) Variable oxidation states
- c) Use as a catalyst
- d) Formation of complexes
- e) Colour of transition metal complexes

4. ELEMENTS OF BIOLOGICAL IMPORTANCE:

In this topic, candidate should be able to:

- a) Describe the inertness of Nitrogen
- b) Manufacture of Ammonia by Haber process
- c) Discuss the preparation of Nitric acid and nitrogenous fertilizers
- d) Describe the presence of Sulphur dioxide in the atmosphere which causes acid rain
- e) Describe the manufacture of Sulphuric acid by contact method

C. ORGANIC CHEMISTRY

1. FUNDAMENTAL PRINCIPLES:

In this topic, candidate should be able to:

- a) Classify the organic compounds
- b) Explain the types of bond fission, homolytic and heterolytic
- c) Discuss the types of organic reactions; Polar and free radical
- d) Discuss the types of reagents; nucleophile, electrophile and free radicals
- e) Explain isomerism; structural and cis-trans
- f) Describe and explain condensed structural formula, displayed and skeletal formula
- g) Discuss nomenclature of organic compounds with reference to IUPAC names of Alkanes, Alkenes, Alcohols and Acids

2. HYDROCARBON:

In this topic, candidate should be able to:

Describe the chemistry of Alkanes with emphasis on

- a) Combustion
- b) Free radical substitution including mechanism

Discuss the chemistry of Alkenes with emphasis on

- a) Preparation of alkenes by elimination reactions
 - i) Dehydration of alcohols
 - ii) Dehydrohalogenation of Alkyl halide
- b) Reaction of Alkenes such as
 - i) Catalytic hydrogenation
 - ii) Halogenation (Br_2 addition to be used as a test of an alkene)
 - iii) Hydration of alkenes
 - iv) Reaction with HBr with special reference to Markownikoff's rule
 - v) Oxidation of alkenes using Bayer's reagent (cold alkaline KMnO_4) and using hot concentrated acidic KMnO_4 for cleavage of double bond
 - vi) Polymerization of ethene

Discuss chemistry of Benzene with examples

- a) Structure of benzene showing the delocalized Π -orbital which causes stability of benzene
- b) Electrophilic substitution reactions of benzene
 - i) Nitration including mechanism
 - ii) Halogenation
 - iii) Friedel Craft's reaction

3. ALKYL HALIDES:

In this topic, candidate should be able to:

- a) Discuss importance of halogenoalkanes in everyday life with special use of CFCs, halothanes, CCl_4 , CHCl_3 and Teflon
- b) Reaction of alkyl halides such as:
 S_N -reactions, (Reactions of alcohols with aqueous KOH, KCN in alcohol and with aqueous NH_3)
Elimination reaction with alcoholic KOH to give alkenes.

4. ALCOHOLS AND PHENOLS:

In this topic, candidate should be able to:

Discuss Alcohols with reference to

- a) Classification of alcohols into primary, secondary and tertiary
- b) Preparation of ethanol by fermentation process
- c) Reaction of alcohol with
 - i) $\text{K}_2\text{Cr}_2\text{O}_7 + \text{H}_2\text{SO}_4$
 - ii) PCl_5
 - iii) Na-metal
 - iv) Alkaline aqueous Iodine
 - v) Esterification
 - vi) Dehydration

Phenols

- a) Discuss reactions of phenol with:
 - i) Bromine
 - ii) HNO_3
- b) Explain the relative acidity of water, ethanol and phenol

5. ALDEHYDES AND KETONES:

In this topic, candidate should be able to:

- a) Describe the structure of aldehyde and ketones
- b) Discuss preparation of aldehydes and ketones by oxidation of alcohols
- c) Discuss following reactions of aldehydes and ketones
 - i) Common to both
 - 2,4-DNPH
 - HCN
 - ii) Reactions in which Aldehydes differs from ketones
 - Oxidation with $K_2Cr_2O_7 + H_2SO_4$, Tollen's reagent and Fehling solution
 - Reduction with sodium boron hydride
 - iii) Reaction which show presence of CH_3CO group in aldehydes and ketones
 - Triiodomethane test (Iodo form test) using alkaline aqueous iodine.

6. CARBOXYLIC ACID:

In this topic, candidate should be able to:

- a) Show preparation of ethanoic acid by oxidation of ethanol or by the hydrolysis of CH_3CN
- b) Discuss the reactions of ethanoic acid with emphasis on:
 - i) Salt formation
 - ii) Esterification
 - iii) Acid chloride formation
 - iv) Amide formation
- c) Hydrolysis of amide in basic and acidic medium
- d) Describe the strength of organic acids relative to chloro substituted acids

7. AMINO ACIDS:

In this topic, candidate should be able to:

- a) Describe the general structure of α -amino acids found in proteins
- b) Classify the amino acids on the basis of nature of R-group
- c) Describe what is meant by essential amino acids
- d) Understand peptide bond formation and hydrolysis of polypeptides/protein

8. MACROMOLECULES:

In this topic, candidate should be able to describe and explain

- a) Addition polymers such as polyethene, polypropene, polystyrene and PVC.
- b) Condensation polymers such as polyesters, nylon
- c) Structure of proteins
- d) Chemistry of carbohydrates
- e) Chemistry of lipids
- f) Enzymes
- g) Structure and function of nucleic acid (DNA & RNA)

9. ENVIRONMENTAL CHEMISTRY:

In this topic, candidate should be able to

- a) Understand causes of water pollution
- b) Discuss disposal of solid wastes
- c) Understand chemistry and causes of
 - i) Smog
 - ii) Acid rain
 - iii) Ozone layer

Department of Examinations

Table of Specification (CHEMISTRY-2011)
F.Sc. and Non-F.Sc.

Topic	MCQs
A. Physical Chemistry	
1. Fundamental concepts	02
2. States of matter	02
3. Atomic structure	02
4. Chemical bonding	02
5. Chemical energetics	02
6. Solutions	02
7. Electrochemistry	02
8. Chemical Equilibrium	02
9. Reaction kinetics	02
B. Inorganic Chemistry	
1. Periods	02
2. Groups	02
3. Transition elements	02
4. Elements of biological importance	04
C. Organic Chemistry	
1. Fundamental principles	02
2. Hydrocarbon	02
3. Alkyl halides	02
4. Alcohols and Phenols	04
5. Aldehydes and Ketones	03
6. Carboxylic acid	03
7. Amino acids	06
8. Macromolecules	06
9. Environmental chemistry	02
Total	58

ENGLISH

STRUCTURE OF THE SYLLABUS (2011)

F.Sc. and Non-F.Sc.

The English section shall consist of four parts:

Part I:

- It will be comprised of Four Questions in which the candidate will have to select the appropriate/suitable word from the given alternatives.

Part II:

- It will contain sentences with grammatical errors and the candidate will have to identify the error. There will be Six Questions from this part.

Part III:

- There will be Ten Questions consisting of a list of Four sentences each. The candidate will have to choose the grammatically correct sentence out of the given four options.

Part IV:

- In this part, the candidate will be asked to choose the right synonyms. Four options will be given and He/She will have to choose the most appropriate one. There will be Ten Questions from this part.

Essential Word Power

1.	Acupuncture
2.	Aberration
3.	Abnegate
4.	Aboriginal
5.	Absolution
6.	Abstruse
7.	Acclimate
8.	Accolade
9.	Accrue
10.	Acquiesce
11.	Actuary
12.	Acumen
13.	Adage
14.	Adamantine
15.	Addled
16.	Admonition
17.	Adonis
18.	Adroitness
19.	Aerobic- exercise
20.	Aerodynamic
21.	Affect
22.	Affinity
23.	Afflatus
24.	Akimbo
25.	Alacrity
26.	Allay
27.	Altruistic

28.	Amazon
29.	Ambulatory
30.	Ameliorate
31.	Amenities
32.	Amorphous
33.	Ampere
34.	Analogue
35.	Anaphylactic
36.	Aneurysm
37.	Angina
38.	Anomaly
39.	Anomie
40.	Antagonist
41.	Antibody
42.	Apocryphal
43.	Apprehension
44.	Aquaplane
45.	Aquifer
46.	Arbiter
47.	Arboreal
48.	Arcane
49.	Archives
50.	Argosy
51.	Aria
52.	Armada
53.	Articulated
54.	Artifice

55.	Ascetic
56.	Asgard
57.	Askance
58.	Aspersion
59.	Assimilate
60.	Assume
61.	Atrophy
62.	Attire
63.	Audacious
64.	August
65.	Auspicious
66.	Avatar
67.	Avid
68.	Avoirdupois
69.	Bacchanal
70.	Baedeker
71.	Balk
72.	Bamboozle
73.	Bantam
74.	Barbaric
75.	Basilica
76.	Batik
77.	Batter
78.	Battery
79.	Bauble
80.	Bayou
81.	Beguile

82.	Behest
83.	Belated
84.	Benediction
85.	Beneficence
86.	Benign
87.	Bequeath
88.	Berate
89.	Berm
90.	Beset
91.	Bifurcated
92.	Bistro
93.	Blandish
94.	Blasphemous
95.	Blathering
96.	Blaze
97.	Bloom
98.	Bonk
99.	Bonsai
100.	Botanicals
101.	Bouquet
102.	Bowlerize
103.	Braille
104.	Brambles
105.	Brassy
106.	Bravura
107.	Bray
108.	Brio
109.	Broach
110.	Broadside
111.	Buckle
112.	Buoyant
113.	Burgeoning
114.	Cachet
115.	Caesarean
116.	Caliph
117.	Calisthenics
118.	Camber
119.	Cameo
120.	Candelabra
121.	Capital
122.	Capsule
123.	Carapace
124.	Cardigan
125.	Career
126.	Caricature
127.	Cartographer
128.	Cast
129.	Catacomb
130.	Catalyst
131.	Catharsis
132.	Caulk
133.	Cause célèbre
134.	Cay
135.	Centennial
136.	Cerberus
137.	Chassis
138.	Chastise
139.	Chiaroscuro
140.	Chicane

141.	Chimerical
142.	Chivalry
143.	Chromosome
144.	Churn
145.	Chutzpah
146.	Clamorous
147.	Claret
148.	Classic
149.	Classical
150.	Clement
151.	Close
152.	Cloud nine
153.	Coast
154.	Cobble
155.	Coccyx
156.	Coercive
157.	Coif
158.	Collage
159.	Comatose
160.	Comely
161.	Commiserate
162.	Commute
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BIOLOGY
STRUCTURE OF THE SYLLABUS (2011)
F.Sc. and Non-F.Sc.

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Department of Examinations

1. INTRODUCTION TO BIOLOGY:

Content

Branches of Biology

Learning outcomes:

a) Define the following terms:

Ecology, Physiology, Histology, Genetics, Zoogeography, Molecular Biology, Microbiology, Marine and Fresh water Biology, Biotechnology, Parasitology.

b) What are the various levels of Biological organization starting with atomic and subatomic levels to community level?

c) Define the following terms:

Transgenic plants, Cloning, Biological control, Biopesticides, Pasteurization, Disease Control (Preventive measure, Vaccinization, Drug therapy)

2. CELL BIOLOGY:

Content

Cell structure

Structure and Function of cellular organelles

Cell division

Learning outcomes:

a) Compare the structure of typical animal and plant cell

b) Compare and contrast the structure of Prokaryotic cell with Eukaryotic cells

c) Fluid mosaic model of cell membrane and transportation (diffusion, facilitated diffusion, active and passive transport), endocytosis and exocytosis.

d) Outline the structure and function of the following organelles:

Nucleus, Endoplasmic reticulum, Golgi apparatus, Mitochondria, Centrioles, Ribosomes

e) Explain Mitosis, what is its significance?

f) What is Meiosis, describe it in detail.

g) Describe Meiotic errors (Down's syndrome, Klinefelter's syndrome, Turner's syndrome)

h) Discuss the terms Karyokinesis and Cytokinesis;

i) Discuss and explain:

- Uncontrolled cell division (cancer)
- Programmed cell death (Apoptosis)
- Necrosis

3. BIOLOGICAL MOLECULES:

Content

Carbohydrate
Proteins
Lipids
Nucleic acids
Deoxyribonucleic acid (DNA)
Ribonucleic acid (RNA)
Enzymes

Learning outcomes:

- a) Discuss carbohydrates: Monosaccharides (Glucose), Oligosaccharides (Cane sugar, sucrose), Polysaccharides (Starches)
- b) Describe Proteins: Amino acids, Primary, Secondary, Tertiary and Quaternary structure of proteins
- c) Describe Lipids: Acylglyceroles, waxes, Phospholipids, Terpenoids
- d) Describe the structure along its back bone composition and function of DNA as hereditary material, Replication of DNA (Semi-conservative), Role of triplet codons, Transcription (making up of mRNA), Translation (protein synthesis: role of ribosomes, mRNA, tRNA)
- e) Give the structure and types of RNA (mRNA, rRNA, tRNA)
- f) What is enzyme and its role in reducing activation energy?
- g) Define the following terms:
 - Enzymes, Coenzyme, Co-factor, Prosthetic group, Apoenzyme and Holoenzyme
- h) Explain the mode/mechanism of enzyme action
- i) Describe the effects of temperature, pH, enzyme concentration and substrate concentration on the rate of enzyme catalysed reaction
- j) Explain the effects of reversible and irreversible, competitive and non-competitive inhibitors on the rate of enzyme activity

4. MICROBIOLOGY:

Content

Virus

Bacteria

Fungi

Learning outcomes

- a) Which are the viral diseases in humans?
- b) Reteroviruses and Acquired Immunodeficiency diseases
- c) Describe the Life cycle of Bacteriophage (in detail with its all steps) including:
 - Lytic cycle
 - Lysogenic cycle
- d) Describe the structure and types of bacteria
- e) Discuss in detail:
 - Gram +ve bacteria
 - Gram –ve bacteria
 - Nutrition in bacteria
- f) What are the uses and misuses of antibiotics?
- g) What are molds (fungi)? How they are useful and harmful to mankind, give examples.
- h) Describe the Life cycle of fungus (Rhizopus).

5. KINGDOM ANIMALIA AND PLANTAE:

Content

Kingdom Animalia (phyla)

Kingdom Plantae

Learning outcomes:

- a) Porifera (with respect to their capacity to regenerate)
- b) Coelenterata (coral reefs as habitat for sea animals)
- c) Platyhelminthes (Harmful effects on human beings) with examples
- d) Aschelminthes (Infection in humans) with examples
- e) Arthropoda (Economic importance of Arthropods and harmful impacts on Man)
- f) Define the following terms:
 - Coelomata, Acoelomata, Pseudocoele, Radiata, Bilateria, Diploblastic and Triploblastic organization.
- g) Economic importance of families with reference to food and other usefulness:
 - Cassia
 - Solanaceae
 - Gramineae

6. HUMAN PHYSIOLOGY:

Content

- a) Digestive System
- b) Gas exchange and Transportation
- c) Excretion and Osmoregulation
- d) Nervous System
- e) Reproduction
- f) Support and Movement
- g) Hormonal Control (Endocrine Glands)
- h) Immunity

Learning outcomes:

a) Digestive System:

- Anatomy of digestive system and specify the digestion in:
 - Oral cavity (role of teeth, tongue, saliva and enzymes)
 - Stomach (enzymes)
 - Small intestine
 - Large intestine

b) Gas exchange and Transportation:

- Anatomy of respiratory system (nostrils, trachea, lungs)
- Explain the term breathing
- Discuss Blood composition, lymph, structure of heart, carriage of oxygen and carbon dioxide

c) Excretion and Osmoregulation:

- Describe the structure of kidney and its functions with respect to homeostasis
- What are Kidney problems and cures?
 - Kidney stones, lithotripsy, kidney transplant, dialysis, renal failure
- What do you understand by the term Homeostasis?

d) Nervous System:

- What is Nervous system and its types?
- Explain CNS (Central Nervous System) including forebrain, mid brain, hind brain and spinal cord
- Explain PNS (Peripheral Nervous System) and its types (Autonomic and Sympathetic Nervous System)
- Neurons (Associative, motor and sensory neuron)
- Discuss the Nervous disorders (Parkinson's disease, Epilepsy and Alzheimer's disease)
- What do you understand by Biological clock and circadian Rhythms?

e) Reproduction:

- Explain the Reproductive system in male in detail
- Explain the Reproductive system in female / Menstrual cycle
- Explain:
 - Spermatogenesis
 - Oogenesis
- Discuss the following Diseases in detail which are sexually transmitted:
 - Gonorrhoea, Syphilis, Genital Herpes, AIDS and how these diseases can be controlled (treatment is not required)

f) Support and Movement:

- Explain the role of Human skeleton and skeletal muscles in locomotion
- Explain the process of muscle contraction
- What is Muscle fatigue, Tetani, Cramps?
- Describe the structure and functions of involuntary, voluntary and cardiac muscles

g) Hormonal control (Endocrine glands):

- What are hormones?
- Describe Hypothalamus with its hormones.
- Describe Pituitary gland with hormones secreted from its Anterior, Median and Posterior lobe
- Describe adrenal gland with its hormones.
- What are Islets of Langerhans?
- What are the hormones of alimentary canal (Gastrin, secretin)?
- The hormones of ovaries and testes

h) Immunity:

- Immune system and define its components:
 - Antigen
 - Antibody (structure of antibody)
 - Lymphocytes (B and T cells)
- What is cell mediated response and humoral immune response?
- Types of Immunity:
 - Active immunity
 - Passive immunity
- What do you mean by vaccination?

7. BIOENERGETICS:

Content

Photosynthesis and cellular respiration

Learning outcomes

- a) Photosynthetic pigments and their absorption spectrum
- b) Light dependent stage
- c) Light independent stage
- d) Describe the respiration at cellular level including:
 - Glycolysis, Krebs cycle, Electron Transport Chain

8. BIOTECHNOLOGY:

Content

DNA technology

Learning outcomes

- a) Explain Recombinant DNA Technology
- b) Discuss Polymerase Chain Reaction (detailed procedure)
- c) What do you understand by the following terms:
 - Gene therapy
 - Transgenic animals

9. ECOSYSTEM:

Content

Components of Ecosystem

Biological succession

Energy flow in ecosystem

Impacts of Human activity on ecosystem

Learning outcomes:

- a) Abiotic and biotic components of ecosystem
- b) What is succession, give various stages of succession on land.
- c) Explain the following terms:
 - Predation, parasitism, symbiosis, mutualism, commensalism, grazing
- d) Describe the flow of energy in an ecosystem
 - Food chain
 - Food web
- e) What is the significance of Human activity on ecosystem as population, deforestation, ozone depletion, atmospheric pollution, Green house effect, industrial effluents (insecticides and herbicides).

10. EVOLUTION AND GENETICS:

Content

- Darwin's theory
- Lamarck's theory
- Evidences of evolution
- Genetics

Learning outcomes

- a) Theory of Darwin and Lamarck, also discuss the merits and demerits
- b) Evidences of evolution from paleontology and comparative embryology
- c) Sex determination and sex linkage in humans
- d) Define the following terms:
 - Mutations, Epistasis, Gene, Allele, Multiple allele, Pleiotropy.

Department of Examinations

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c) Fungi	01
5. Kingdom Animalia and Plantae	05
6. Human Physiology	
a) Digestive System	04
b) Gas exchange and Transportation	04
c) Excretion and Osmoregulation	05
d) Nervous System	04
e) Reproduction	05
f) Support and Movement	05
g) Hormonal Control (Endocrine Glands)	04
h) Immunity	05
7. Bioenergetics	05
8. Biotechnology	05
9. Ecosystem	05
10. Evolution and Genetics	05
Total	88