



**BALUCHISTAN BOARD
OF INTERMEDIATE & SECONDARY
EDUCATION**

Dated Quetta, the Sep 30th, 2026

NOTIFICATION

Subject: REVISED PRACTICAL EXAMINATION MODALITY FOR CLASSES XI AND XII (APPLICABLE TO STUDENTS ENROLLED FROM THE ACADEMIC SESSION 2026 ONWARDS)

No. 257-269/RB/BBISE/2026. In exercise of Rule. 128 of the BBISE Rules, 2026, and the decisions taken in the 109th meeting of the Board/ Executive Body of BBISE, Quetta held on 27th August 2026, the old modality of Practical Part of Examination for class XI & XII is hereby replaced, with the following, with immediate effect:

S.No.	Description of Practical Examination Component	Marks
1.	Practical-Based Assessment (PBA) , which shall be conducted along with the theory paper of the respective science subject. (Sample PBA papers –Annex-I)	08
2.	Favourite Practical of the Student	02
3.	Performance-Based Assessment, conducted in school/college laboratories, where students perform practical work under the supervision and assessment of External Examiners (subject experts). (List of Practicals – Annex-II)	10
4.	Total Marks	20

Note:

- All concerned are advised to see R.128 **Conduct of Practical Examination, CHAPTER -8 (CONDUCT OF EXAMINATIONS)**, BBISE Rules on BBISE Website for details.
- This modality** shall not be applicable to the students who are currently registered in Class-XII (Whether they passed or failed science subjects in Class-XI). Their practical examination will be conducted as per **Old Modality**.

(Muhammad Ishaq)
CHAIRMAN

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- The Director Schools, Balochistan** (With Request to circulate it to all District Education Officers and others concerned)
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- Data Processing Manager, BBISE** (to make necessary arrangements on the BBISE Portal.)
- The Incharge (HSSC-Examination, HSSC-Result, Secrecy and Conduct Branch) of BBISE**, to make necessary arrangements.

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- The Secretary, Government of Balochistan, Colleges, Higher & Technical Education Department.
- The Secretary, Government of Balochistan, Schools Education Department.
- Additional Secretary (Staff) to the Chief Secretary, Balochistan.
- The Secretary, BBISE
- The Controller of Examination, BBISE

(Haroon Khan)
DEPUTY DIRECTOR RESEARCH
BBISE



BALUCHISTAN BOARD OF INTERMEDIATE & SECONDARY EDUCATION, QUETTA**TIME: 3 HOURS****HSSC-I (Model Paper) BIOLOGY****MARKS: 80+10=90****Section 1 — [17 × 1 = 17 Marks]****Q1. Write the Question No. and the complete correct option on the answer script.**

- I. Which organelle is primarily responsible for ATP production in a eukaryotic cell?
A. Golgi apparatus B. Mitochondrion C. Lysosome D. Ribosome
- II. The plasma membrane is mainly composed of:
A. Cellulose and proteins B. Phospholipids and proteins C. DNA and RNA D. RNA and lipids
- III. A stem cell is characterized primarily by its ability to:
A. Produce antibodies only B. Divide and differentiate into specialized cells C. Destroy other cells
D. Carry out photosynthesis
- IV. DNA replication occurs during which phase of the cell cycle?
A. G₁ phase B. S phase C. G₂ phase D. M phase
- V. Which carbohydrate is commonly known as the storage polysaccharide in plants?
A. Glycogen B. Cellulose C. Starch D. Chitin
- VI. The region of an enzyme where the substrate binds is called the:
A. Allosteric site B. Active site C. Phosphate group D. Glycosidic site
- VII. The immediate energy currency of most cells is: A. DNA B. ATP C. Glucose D. NADP
- VIII. Glycolysis takes place in the: A. Nucleus B. Cytoplasm C. Mitochondrial matrix D. Chloroplast
- IX. The genetic material of a virus may be:
A. Only DNA B. Only RNA C. DNA or RNA D. DNA and RNA in every virus
- X. Bacteria are classified as: A. Eukaryotes B. Prokaryotes C. Protists D. Fungi
- XI. The cell wall of fungi is primarily composed of:
A. Cellulose B. Chitin C. Peptidoglycan D. Glycogen
- XII. Which group of plants produces seeds but does not form flowers?
A. Bryophytes B. Pteridophytes C. Gymnosperms D. Angiosperms
- XIII. Animals belonging to phylum Arthropoda possess:
A. Jointed appendages B. Notochord C. Radial symmetry only D. No exoskeleton
- XIV. Which phylum includes animals with a notochord at some stage of their development?
A. Mollusca B. Annelida C. Chordata D. Arthropoda
- XV. The main function of roots is to:
A. Absorb water and minerals and anchor the plant B. Produce pollen only C. Carry out gas exchange only D. Produce seeds directly
- XVI. Which tissue transports water and mineral salts from roots to other parts of a plant?
A. Phloem B. Xylem C. Epidermis D. Cambium
- XVII. The basic structural unit of DNA is the: A. Amino acid B. Nucleotide C. Fatty acid D. Monosaccharide

Section II — [13 × 3 = 39 Marks]**Q 2. Attempt any Thirteen (13) questions. Answer concisely with relevant explanation.**

- I. Which organelle is called cell within cell? Give reasons.
- II. Why are stem cells considered different from most specialized cells? Explain the two important properties that make stem cells useful in medicine.
- III. A student consumes a meal containing carbohydrates, proteins and lipids. Explain how these three classes of biological molecules differ in their basic building units.
- IV. Why does an enzyme generally lose its activity when exposed to very high temperature? Relate your answer to enzyme structure.
- V. A plant is kept in complete darkness for several days. Predict two major effects on its energy metabolism and explain the reasons.
- VI. Viruses are described as acellular entities. Explain why they cannot normally reproduce independently outside a suitable host cell.
- VII. Give three structural features that distinguish a typical prokaryotic cell from a typical eukaryotic cell.
- VIII. Why are fungi not classified as plants even though many fungi remain stationary and possess cell walls? Give three biological reasons.
- IX. Differentiate between bryophytes, pteridophytes and seed-producing plants on the basis of vascular tissue and reproduction.
- X. A plant produces seeds but does not produce flowers or fruits. Which major plant group is it most likely to belong to? Give reasons for your answer.
- XI. What characteristics distinguish members of phylum Arthropoda from members of phylum Annelida?
- XII. An animal has a notochord, dorsal hollow nerve cord and pharyngeal structures at some stage of its development. Which major animal group does it belong to? Explain your identification.

- XIII. Explain how xylem and phloem differ in their structure and function.
- XIV. A plant's roots are damaged severely, but its leaves remain intact initially. Predict two effects that will gradually appear in the aerial parts of the plant and explain why.
- XV. Explain how DNA structure allows it to serve as a reliable molecule for storing hereditary information.
- XVI. Suppose a DNA molecule contains 30% adenine. What percentage of the DNA bases would be thymine? Explain the biological principle used to reach your answer.
- XVII. Explain how variation within a population provides the raw material for natural selection.
- XVIII. Differentiate between a population, community and ecosystem, giving one example of each.

Section III — [4 × 6 = 24 Marks]

Instruction: Each question has two alternatives. Attempt only one alternative from each question.

- Q3. A cell contains a large number of mitochondria and ribosomes. What does this indicate about the activities of the cell? Explain the role of these organelles.

OR Describe the major stages of mitosis and explain how the chromosomes behave during each stage. Why is accurate chromosome distribution important for the daughter cells?
- Q4. A student consumes a diet containing very little protein. Predict two possible effects on the body and explain why proteins are essential for normal body functions.

OR An enzyme-controlled reaction is very slow at low temperature, becomes faster at an optimum temperature, and then slows down at high temperature. Explain this pattern using the properties of enzymes.
- Q5. Explain the importance of light, carbon dioxide, and water, in photosynthesis. How would a decrease in light intensity or carbon dioxide concentration affect the rate of photosynthesis?

OR Write the main steps of cellular respiration and describe steps of Krebs’s cycle with a suitable diagram.
- Q6. Animals show great diversity in their body structures and functions. Describe the main characteristics of arthropods. Why are they successful group of animals on land?

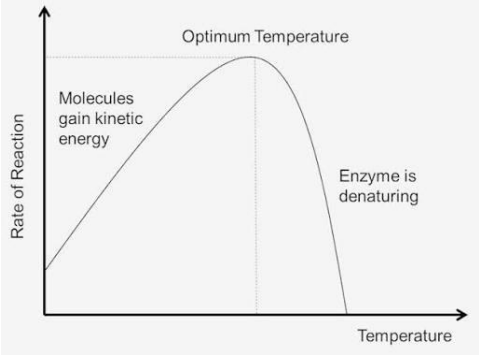
OR Compare bryophytes, pteridophytes, and seed plants with respect to their body structure, vascular tissues, and method of reproduction. Explain how these features are related to their survival on land.

Section IV — Practical Based Assessment (8+2=10 Marks)

I — Effect of Temperature on Enzyme Activity [4]

A student investigates the effect of temperature on the activity of amylase. Equal volumes of starch and amylase are placed in test tubes and maintained at different temperatures. The time required for the starch to disappear is recorded.

Temperature (°C)	20	30	40	50	60
Time taken (s)	180	120	70	45	110



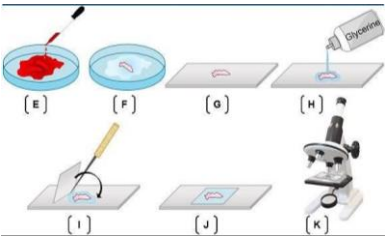
a) Identify the independent variable in this experiment. [1]

b) Identify the dependent variable. [1]

c) Which temperature appears to be closest to the optimum temperature? [1]

d) State two variables that should be kept constant. [1]

II— Temporary Slide of Onion Epidermis [4]



a) Name a suitable stain used for observing onion epidermal cells. [1]

b) Why is a stain used? [1]

c) Write the main steps for preparing a temporary onion epidermal slide. [2]

Q. Write the procedure of your favorite experiment with a labelled diagram

(2 Marks)

BALUCHISTAN BOARD OF INTERMEDIATE & SECONDARY EDUCATION, QUETTA**TIME: 3 HOURS****HSSC-I (Model Paper) CHEMISTRY****MARKS: 80+10=90****Section 1 — [17 × 1 = 17 Marks]****Q1. Write the Question No. and the complete correct option on the answer script.****I.** The volume occupied by 1.4 g of N₂ gas at STP is

- a) 2.24 dm³ b) 22.4 dm³
 c) 1.12 dm³ d) 11.2 dm³

II. If n is equal to 4, then f is equal to:

- a) 0 b) 0, 1
 c) 0, 1, 2 d) 0, 1, 2, 3

III. The distance between first and third orbit is:

- a) 4 times b) 6 times
 c) 9 times d) 12 times

IV. The example of a paramagnetic molecule is:

- a) H₂ b) N₂
 c) O₂ d) F₂

V. Which liquid has weak intermolecular forces?

- a) Water b) Gasoline
 c) Gas oil d) Ethyl alcohol

VI. The boiling point of glycerine at 50 mmHg is:

- a) 100°C b) 120°C
 c) 240°C d) 360°C

VII. In an exothermic reaction, the sign of ΔH is:

- a) Positive b) Negative
 c) Zero d) Variable

VIII. A catalyst alters, which of the following in a chemical reaction?

- a) Entropy b) Enthalpy
 c) Internal energy d) Activation energy

IX. When an acid is added to water, then:

- a) [H⁺] > [OH⁻] b) [H⁺] < [OH⁻]
 c) [H⁺] = [OH⁻] d) [H⁺] ~ [OH⁻]

X. The block of the periodic table that contains the transition metals is:

- a) s-block b) p-block
 c) d-block d) f-block

XI. The halogen that is a liquid under normal conditions is:

- a) Fluorine b) Chlorine
 c) Bromine d) Iodine

XII. The primary cause of acid rain is:

- a) CO₂ b) CH₄
 c) SO₂ d) CFCs

XIII. The property of carbon that allows it to form long chains and cyclic structures is:

- a) Isomerism b) Catenation
 c) Solubility d) Flammability

XIV. The product formed when haloalkanes react with aqueous NaOH is:

- a) Alkyl cyanides b) Nitroalkanes
 c) Alcohols d) Amines

XV. The organic compounds containing a hydroxyl functional group are:

- a) Aldehydes b) Ketones
 c) Alcohols d) Alkyl halides

XVI. If the theoretical yield of a reaction is 100 grams but the actual yield is 85 grams, what is the percent yield?

- a) 85 % b) 80 %
 c) 75 % d) 65 %

XVII. The functional group that is easily oxidized to carboxylic acids is:

- a) Aldehyde b) Alkene
 c) Alcohol d) Alkyne

Section II — [13 × 3 = 39 Marks]**Q 2. Attempt any Thirteen (13) questions. Answer concisely with relevant explanation.**

- I. Define mole with an example? (2+1)
- II. How many orbitals are in the 2p and 3d subshells? (1.5+1.5)
- III. Which three molecules among the following have dipole moment: H₂O, CO₂, NH₃, Cl₂, CHCl₃ (1+1+1)
- IV. What is sp³ hybridization? Which molecule show sp³ hybridization. (2+1)
- V. Give the three factors affecting the electron affinity. (1+1+1)
- VI. Evaporation is a cooling process and occurs at all temperature. How? (03)
- VII. Differentiate exothermic reactions with endothermic reactions by suitable examples. (1+1+1)
- VIII. Define elementary reaction with an example. (2+1)
- IX. Distinguish reversible reaction with irreversible reaction by suitable example. (2+1)
- X. Define s, p and d-block elements. (1+1+1)
- XI. What is nitrification? Name the two bacteria involved in nitrification. (1+1+1)
- XII. Define acid rain? Give two oxides that cause acid rain. (1+1+1)
- XIII. What is functional group? Write the functional groups of alcohol and aldehyde. (1+1+1)
- XIV. Define empirical formula? Give the empirical formulas of glucose and benzene. (1+1+1)
- XV. Write the formulas of primary, secondary and tertiary alkyl halides? (1+1+1)
- XVI. What is Tollen's test? For what purpose is it used? (2+1)

Section III — [4 × 6 = 24 Marks]**Instruction: Each question has two alternatives. Attempt only one alternative from each question.**

Q.3. A liquid is heated under different external pressure conditions. Analyze how the change in external pressure affects its boiling point. Explain the molecular basis of boiling and identify the factors that determine the boiling point of a liquid. (2+2+2)

OR Define Lowery–Bronsted acids and bases. Also identify them in the following reactions. (2+1+1+1+1)



Q.4. Consider the bonding in C–C, C=C, and C≡C. Analyze the formation of sigma (σ) and pi (π) bonds in these molecules and compare their orbital overlap, strength, and rotational characteristics. (6)

OR What is Le Chatelier's Principle? How does it apply to concentration and temperature changes? (2+2+2)

Q.5. Explain the four major sources of the atmosphere along with their altitudes and temperature ranges. (6)

OR Differentiate between homolytic and heterolytic fission. Also explain Free radical reaction. (2+1+1+1+1)

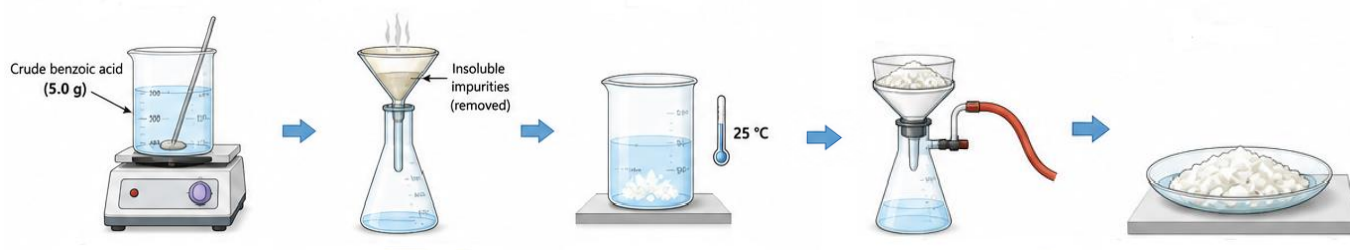
Q.6. Explain the basicity of amines. Also write the reactions of amines with water and acids properly. (2+2+2)

OR Alcohols can be prepared by several chemical methods. Analyze any three important methods for the preparation of alcohols, explaining the starting materials, reaction conditions, chemical equations, and the type of alcohol obtained in each method. (6)

Section IV — Practical Based Assessment (8+2=10 Marks)

Q. Attempt any TWO of the three PBA questions. Each carries equal marks. (2 × 4 = 8)

I. Consider the diagram carefully and answer the following questions. [04]



(i) Which technique is illustrated in the above diagram? [1]

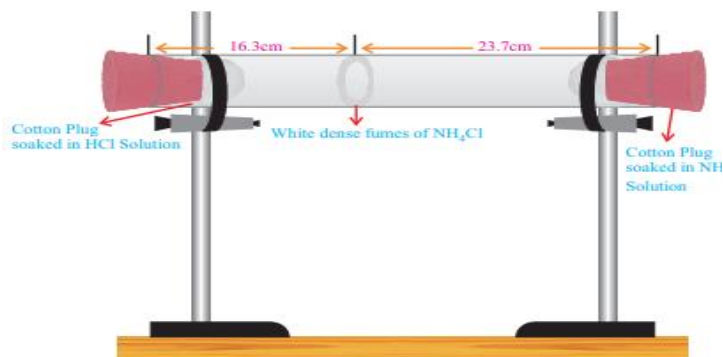
(ii) Label the steps (a-e) shown in the diagram. [1]

a. _____ b. _____ c. _____ d. _____ e. _____

(iii) Why is it important to use hot water to dissolve the crude benzoic acid? [1]

(iv) Why is the filtrate allowed to cool slowly? [1]

II. Pay close attention to the figure and respond to the following questions. [04]



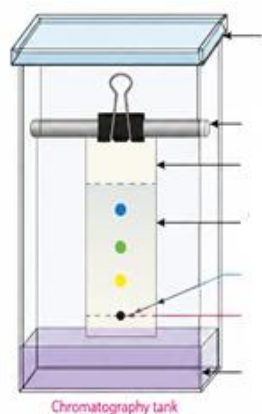
(i) From the tube, calculate the distance travelled by ammonia and that travelled by HCl. [2]

(ii) In the diagram, the gases diffuse from the area of _____ concentration. [1]

(iii) Complete the chemical equation. [1]



III. Take a close look at the diagram and respond to the following questions. [04]



(i) Label the following parts in the diagram: [1]

a. Solvent front b. Origin (sample spot)
c. Solvent d. Filter paper

(ii) Name the stationary phase and the mobile phase used in this technique. [1]

a. Stationary phase: _____

b. Mobile phase: _____

(iii) What is the purpose of placing the origin (sample spot) above the solvent level? [1]

(iv) Why do different colored components separate from each other in this technique? [1]

Q. Pen down One of your favourite practical along with its sketch and application.

[1+0.5+0.5=2]

Section 1 — [17 × 1 = 17 Marks]

Q1. Write the Question No. and the complete correct option on the answer script.

- I. Which of the following physical quantities has a unit but no physical dimensions?
 (a) Strain (b) Angle Relative (c) Permittivity (d) Refractive Index
- II. If the dot product of two non-zero vectors is zero, the magnitude of their cross product is equal to:
 (a) Zero (b) AB (c) -AB (d) 1
- III. The slope of a displacement-time graph represents:
 (a) Acceleration (b) Velocity (c) Momentum (d) Force
- IV. The banking angle of a curved road depends directly on the speed of the vehicle and:
 (a) Mass of the vehicle (b) Radius of curvature (c) Friction coefficient (d) Air resistance
- V. Under Hooke's law, if the stress on a metal wire is doubled, its strain will be:
 (a) Quadrupled (b) Halved (c) Doubled (d) Unchanged
- VI. Squeezing the end of a water garden hose leads to an increase in water flow velocity. This demonstrates:
 (a) Bernoulli's Principle (b) Torricelli's Theorem (c) Equation of Continuity (d) Stokes' Law
- VII. If a Carnot engine absorbs 1000 J of heat from a hot reservoir and rejects 400 J to a cold reservoir, its efficiency is:
 (a) 40% (b) 60% (c) 100% (d) 25%
- VIII. The frequency of a train's horn increases as it approaches a stationary listener because of:
 (a) Increased amplitude (b) Beats phenomenon (c) Doppler Effect (d) Polarization
- IX. If the distance between two-point charges is halved, the electrostatic force between them:
 (a) Decreases to $\frac{1}{4}$ (b) Increases 4 times (c) Doubles (d) Remains unchanged
- X. Which of the following materials is most suitable for making a transformer core due to its high magnetic permeability and low retentivity?
 (a) Hard Steel (b) Soft Iron (c) Copper (d) Brass
- XI. According to the first postulate of special relativity, the laws of physics are identical in all:
 (a) Accelerating frames (b) Inertial frames of reference (c) Gravitational fields (d) Rotating frames
- XII. The derived SI unit of Young's Modulus is Pascal (Pa). In terms of base units, this is represented by:
 (a) $\text{kg m}^{-1} \text{s}^{-2}$ (b) $\text{kg m}^{-2} \text{s}^{-2}$ (c) $\text{kg m}^2 \text{s}^{-2}$ (d) $\text{kg m}^{-1} \text{s}^{-1}$
- XIII. A rocket works in space on the basis of conservation of:
 (a) Mass (b) Mechanical Energy (c) Linear Momentum (d) Angular Momentum
- XIV. The change in internal energy during an isothermal expansion of an ideal gas is equal to:
 (a) Total work done (b) Zero (c) Heat absorbed (d) Heat rejected
- XV. Which wave phenomenon demonstrates that light is a transverse wave and not a longitudinal wave?
 (a) Interference (b) Diffraction (c) Refraction (d) Polarization
- XVI. A region of space where an electric charge experiences an electrostatic force is called:
 (a) Electric potential (b) Electric flux (c) Electric field (d) Electric potential gradient
- XVII. An astronaut inside an Earth-orbiting satellite experiences apparent weightlessness because:
 (a) Gravity is zero (b) Centrifugal force cancels gravity
 (c) Mass becomes zero (d) Satellite and astronaut are in free fall

Section II — [13 × 3 = 39 Marks]

Q 2. Attempt any Thirteen (13) questions. Answer concisely with relevant explanation.

- I. Show that the famous mass-energy equation $E = mc^2$ is dimensionally homogenous.
- II. Differentiate between precision and accuracy of physical measurements.
- III. State why the scalar product of two mutually perpendicular vectors is zero, and give one physical example.
- IV. Briefly explain why the horizontal and vertical components of projectile motion are treated independently.
- V. State the law of conservation of angular momentum and write its algebraic expression.
- VI. Differentiate between elastic deformation and plastic deformation.
- VII. Explain why water flows faster through a narrower section of a pipe than a wider section using the conservation of mass.
- VIII. Explain the second law of thermodynamics and relate entropy to the degree of disorder of particles in a system.
- IX. Differentiate between constructive and destructive interference of sound waves.

- X. Explain why the core of an electromagnet is made of soft iron rather than hard steel.
- XI. Calculate the impulse delivered to a 0.15 kg baseball hit by a bat, changing its velocity from 30 m/s to 40 m/s.
- XII. A metal wire is 2.0 m long and has a cross-sectional area of $1.0 \times 10^{-6} \text{ m}^2$. A force of 100 N produces an extension of 1.0 mm. Calculate the Young modulus of the wire.
- XIII. Two point charges of $+2.0 \text{ }\mu\text{C}$ and $-3.0 \text{ }\mu\text{C}$ are separated by 0.20 m in free space. Calculate the magnitude of the electrostatic force between them. Take $k = 9.0 \times 10^9 \text{ N m}^2\text{C}^{-2}$.
- XIV. Calculate the magnetic force acting on a 1.5 m straight wire carrying a current of 2.0 A placed perpendicular to a 0.5 T magnetic field.
- XV. Compute the length of a 10-meter rod as measured by an observer moving at 0.6c relative to the rod.
- XVI. An ideal gas occupies 0.020 m^3 at a pressure of $1.5 \times 10^5 \text{ Pa}$. It expands at constant pressure to 0.050 m^3 . Calculate the work done by the gas.

Section III — [4 × 6 = 24 Marks]

Instruction: Each question has two alternatives. Attempt only one alternative from each question.

- Q 3.

Derive the mathematical expressions for the Time of Flight and Maximum Height of a projectile launched with initial velocity v_i at an angle θ above the horizontal.

OR

Analyze why astronauts inside an Earth-orbiting satellite experience apparent weightlessness. Prove mathematically that the normal reaction force acting on them is zero.
- Q4.

Explain dot product and cross product of two vectors in detail. Outline at least three physical properties of each, and provide one real-world physical example for both products.

OR

Derive the formula for the magnetic force $F = ILB\sin\theta$ acting on a current-carrying conductor placed inside a uniform magnetic field. Discuss the conditions for maximum and zero force.
- Q5.

Derive Bernoulli’s Equation for the steady, laminar flow of an ideal, incompressible fluid through a pipe of non-uniform cross-section at different heights.

OR

State and explain the four stages of a Carnot Cycle. Derive the equation for the efficiency of a Carnot heat engine in terms of reservoir temperatures T_h and T_c .
- Q6.

Design an experiment to determine the Young modulus of a metal wire. Identify the measurements required and explain how the experimental data can be used to calculate the Young modulus.

OR

Analyze how the predictions of special relativity differ from classical physics when an object moves at a speed close to the speed of light, with reference to time dilation and length contraction.

Section IV — Practical Based Assessment (8+2=10 Marks)

Q. Attempt any TWO of the three PBA questions. Each carries equal marks. (2 × 4 = 8)

I. A screw gauge having a 0.5 mm pitch and 50 divisions on its circular scale is used to measure the diameter of an Aluminum sphere. Before taking the measurement, it is seen that when the two jaws of the screw gauge are closed together, the 23rd division matches with the main scale line, and the main scale zero is barely visible.

Fill in the Fractional reading column, observed reading column and how will you use the zero correction?
(2)

No. of obs.	Main scale reading M (mm)	Circular scale Reading ' n '	Fractional reading $V = n \times \text{L.C.}$	Observed Reading $R = M + V$ (mm)	Corrected Reading $R \pm \text{Z.C.}$
1	0.5	25			
2	0.7	35			
3	06	41			

The diagram shows a micrometer screw gauge used to measure the diameter of a sphere.

Annex 1

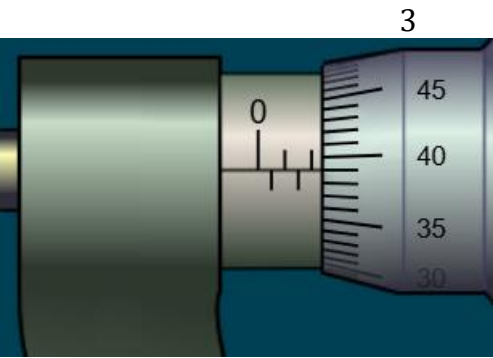
(i) What is the main scale reading on the micrometer? (1)

Reading = _____ unit = _____

(ii) What is circular scale reading on the micrometer. (0.5)

Reading = _____.

(iii) What is the diameter of the sphere. (0.5)



II. The following observations are made in an experiment. Complete the missing entries in the table. (03)

No. of obs	Mass (hanger+ weights)	Height	String turns on the axle	Rotation of the wheel N			Time for N rotations t			ω	I
	m	h	n	1	2	Mean	1	2	Mean	rad/s	g·cm ²
	gm	cm					sec	sec	sec		
1	150	121	14	19	17	18	4.3	4.1	4.2		
2	160	121	14	22	23	22.5	4.5	4.6	4.55		
3	140	120	15	18	17	17.5	4.2	4.1	4.15		

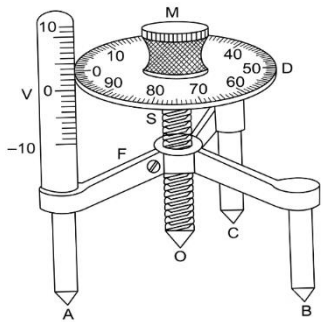


If the mass attached to the string is increased, what effect will it have on the angular velocity of the flywheel? (1)

III. Figure below shows a spherometer being used to measure the radius of curvature of a convex lens.

(i) The pitch of a spherometer is 1 mm, and its circular disc has 100 divisions. Calculate the least count of the instrument. (1)

Answer:



(ii) The spherometer is first placed on a plane glass plate, and the mean reading of the central screw is found to be 3.15 mm. It is then placed on a convex mirror. The distance between the two outer legs (the “leg distance” l) is 5 cm. (3)

S.N	Main Scale Reading (mm)	Circular Scale Reading		Total Reading
		No. of divisions coinciding	Value $\times$ LC (in mm)	
1	3.0	45		
2	2.8	52		
3	3.1	38		

Complete the “Total Reading” column for all three observations in cm.

Q. Write the procedure of your favorite experiment with a labelled diagram

(2 Marks)

Section 1 — [17 × 1 = 17 Marks]

Q1. Write the Question No. and the complete correct option on the answer script.

- I. The smallest unit of data in a computer is.
A) Byte B) Bit C) KB D) MB
- II. Which is an example of analog signal?
A) Digital image B) Binary data C) Human speech D) Computer file
- III. Which logic gate gives output 1 only when all inputs are 1?
A) OR B) NOT C) AND D) NOR
- IV. In which SDLC phase are system requirements studied and analyzed?
A) Design B) Testing C) Analysis D) Maintenance
- V. Which topology connects all computers to a central device?
A) Bus B) Ring C) Star D) Mesh
- VI. Which is an example of a computational artifact?
A) Website B) Chair C) Notebook D) Pen
- VII. Which is an important property of a good algorithm?
A) Ambiguity B) Reliability C) Complexity D) Randomness
- VIII. A prototype is mainly used to.
A) Collect feedback B) Delete data C) Install software D) Format a disk
- IX. Which operator gives the remainder in Python?
A) / B) // C) % D) **
- X. The first index of a Python list is.
A) 0 B) 1 C) -1 D) 2
- XI. Which term is used for the variable whose value is observed during experiment?
A) Independent variable B) Dependent variable C) Control variable D) Constant
- XII. Which chart is most suitable for showing parts of a whole?
A) Pie chart B) Line chart C) Scatter plot D) Histogram
- XIII. Which technology is important for connecting devices in IoT?
A) Wireless Sensor Networks B) Word processor C) Printer D) Compiler
- XIV. Which of the following best describes blockchain technology?
A. Programming language B. Digital ledger of transactions C. Network topology D. Database table.
- XV. Information collected directly from an original source is called.
A) Secondary information B) Primary information C) Processed information D) Duplicate information
- XVI. When a sample does not properly represent the population, it may cause.
A) Sampling bias B) Data storage C) Encryption D) Compilation
- XVII. What is the primary purpose of a firewall in cybersecurity?
A) Encryption Data B) Monitoring Network Traffic C) Block chain Malicious Traffic D) Generating Strong Password

Section II — [13 × 3 = 39 Marks]

Q 2. Attempt any Thirteen (13) questions. Answer concisely with relevant explanation.

1. Draw the truth table of NAND gate.
2. Differentiate between supervised learning and unsupervised learning with examples.
3. A school is developing an online attendance system. The team is collecting the requirements and then designs the system. Identify the two SDLC phases involved and state the purpose of each.
4. A college lab has all computers connected to one central switch. Identify the topology and give one advantage.
5. What is cybersecurity? Give two reasons why it is important.
6. What is computational thinking? Name any two of its components.
7. What is pseudo code? Why is it used in algorithm design instead of writing actual code directly?
8. A list is first arranged in ascending order before searching. Which searching method can be used and why?
9. A program performs the same calculation several times. How can a Python function make the program easier to manage?
10. What is blockchain? Name two types of blockchain.
11. What is a Python variable? Write two rules for naming variables.
12. Compare bus topology and star topology with respect to their cost, fault tolerance, and network architecture.
13. What is a for loop? What is the purpose of range() in Python?
14. Given marks = [65,72,81,54], write the statement to display 81 and state its index.
15. Define statistical modeling. What is meant by a dependent variable?
16. A student finds two websites giving different information about the same topic. State two steps the student should take before using the information.
17. What is an MVP? Why is it useful for a new digital business?

Section III — [4 × 6 = 24 Marks]

Instruction: Each question has two alternatives. Attempt only one alternative from each question.

- Q 3.

Explain the working of AND, OR, NAND, NOR and NOT gates. Draw the truth tables of any two gates and state one practical use of a logic gate.
- OR

A bank wants to protect his online transactions of its customers. Explain how encryption, firewalls and two-factor authentication will help to protect the data.
- Q 4.

Use a K-Map to simplify. $F = \overline{X}YZ + \overline{X}YZ + X\overline{Y}Z + XYZ + XY\overline{Z}$
- OR

Write a Python program using a function to find the square and cube of a number.
- Q 5.

Given marks=[65,72,81,54,90], write Python statements to: (a) Display the list, (b) Display the third element, (c) Find minimum, (d) Find maximum, (e) Find the sum. (f) Display each mark along with its position number (e.g., "Mark 1: 65").
- OR

Use the Bubble Sort method to arrange the following list in ascending order. Show the steps of each pass. [12, 5, 18, 7, 10].
- Q 6.

A student wants to use information found on social media for an assignment. Explain four steps the student should follow to evaluate and verify the information.
- OR

What is IoT? Explain any four technologies that help IoT work, with one example.

Section IV — Practical Based Assessment (8+2=10 Marks)

Q. Attempt any TWO of the three PBA questions. Each carries equal marks. (2 × 4 = 8)

I. Look at the pseudocode and answer the questions. (04)

Step 1: Set total = 0
Step 2: FOR i = 1 to 3
Step 3: total = total + i
Step 4: END FOR
Step 5: PRINT total

i	Total
1	
2	
3	

- A) What is the starting value of total? (01)
- B) Complete the table given above. (01)
- C) What will be printed at the end? (01)
- D) Write the name of the flowchart symbol used for PRINT. (01)

II. Look at the Python code and write the output. (04)

```
a = 6
b = 2
print(a + b)
print(a * b)
print(a ** b)
if a > b:
    print("a is greater")
else:
    print("b is greater")
```

- A) What is the output of print(a + b)? (01)
- B) What is the output of print(a * b)? (01)
- C) What is the output of print(a ** b)? (01)
- D) What is the output of the if-else statement? (01)

III. Read the information about three networks and answer the questions. (04)

Network	Description
X	All computers are connected to one central switch.
Y	All computers are connected to one common cable.
Z	Computers are connected to each other in a circle.

- A) Write the topology name of Network X. (01)
- B) Write the topology name of Network Y. (01)
- C) Write the topology name of Network Z. (01)
- D) Which network (X, Y or Z) stops working completely if the central switch fails? (01)

Q. Write about one practical you have performed. Write its name, its program or steps and one use in daily life. (0.5 + 1 + 0.5 = 2)



Class XI Biology: Practical-Based & Laboratory Assessment Syllabus

Practical Based Assessment (50% of Practical Marks) 8+2=10 Marks		Lab Assessment Topics (50% of Practical Marks) 10 Marks
1)	Plant and Animal Cell Model	1. Microscopy and Measurement - Use a microscope to observe a specimen and determine actual size/magnification. 2. Plant Cell and Animal Cell - Prepare/observe slides and identify important cellular structures. 3. Mitosis - Identify and interpret different stages of mitosis from prepared slides or photographs. 4. Osmosis - Investigate the effect of different concentrations of a solution on plant tissue and analyse the change in mass/length. 5. Enzyme Activity - Investigate the effect of temperature or pH on enzyme activity and interpret the results graphically. 6. Photosynthesis - Investigate a factor affecting photosynthesis, such as light intensity or availability of carbon dioxide, using an appropriate model experiment. 7. Respiration - Demonstrate/measure respiration and carbon dioxide production using germinating seeds or another safe biological system. 8. Plant Transport - Demonstrate the movement of water through xylem using a coloured solution and examine/interpret the results. 9. Biological Classification and Identification - Identify specimens using observable characteristics and a simple dichotomous key. - Any other project/model related to the content of 9th grade <i>Note: Along with the awarded marks, complete explanation of the practical by the students, dually verified by the school, shall be sent to the board.</i>
2)	DNA Double-Helix Model	
3)	Cell Membrane – Fluid Mosaic Model	
4)	Enzyme Action – Lock-and-Key/Induced-Fit Model	
5)	Mitosis and Meiosis Model	
6)	Photosynthesis/Respiration Model	
7)	Bacterial Cell/Bacteriophage Model	
8)	Taxonomic Classification Model	
9)	Local Biodiversity/Ecosystem Survey	
10)	Food Chain and Food Web Model	
*	Any one of Student’s Favorite Practical 2 marks	



Class XI Chemistry: Practical-Based & Laboratory Assessment Syllabus

Practical Based Assessment (50% of Practical Marks) 8+2=10 Marks		Lab Assessment Topics (50% of Practical Marks) 10 Marks	
1)	Purification of Sodium Chloride by Passing HCl Gas (Common Ion Effect)	1)	To estimate the amount of Ba ²⁺ in the given solution of BaCl ₂ gravimetrically.
2)	Gravimetric Estimation of Ba ²⁺ from BaCl ₂ Solution	2)	Demonstrate that gases spread by diffusion to areas of lower concentration.
3)	Diffusion of Gases from High to Low Concentration	3)	Separate the given mixture of inks by paper chromatography.
4)	Separation of Ni ²⁺ , Co ²⁺ and Cu ²⁺ Ions by Paper Chromatography	4)	Prove that the loss of thermal energy when a liquid evaporates will lower the temperature of the liquid.
5)	Separation of Inks by Paper Chromatography	5)	Separate the following ions from a given mixture of their salts (Ni, Co and Cu) by paper chromatography.
6)	Cooling Effect of Evaporation	6)	Crystallize benzoic acid from water.
7)	Crystallization of Benzoic Acid from Water	7)	Separate lead and cadmium ions in a mixture solution by paper chromatography.
8)	Separation of Pb ²⁺ and Cd ²⁺ Ions by Paper Chromatography	8)	Purify a given sample of sodium chloride by passing HCl gas. (Application of common ion effect)
9)	Determine the value of X by volumetric method in the given sample of 6.3g of (COOH) ₂ .XH ₂ O dissolve per litre. You are provided with 0.1 M NaOH solution.	9)	To determine the heat of neutralization of a strong acid (HCl) with a strong base (NaOH).
10)	Standardize the given solution of KMnO ₄ and calculate the volume of KMnO ₄ required for preparing 1 dm ³ (1L) of 0.01 M KMnO ₄ solution volumetrically. You are provided with 0.1 M FeSO ₄ solution.	10)	Standardize the given solution of NaOH by volumetric method. You are provided 0.1M HCl solution. The given solution contains 6g of Na ₂ CO ₃ , dissolved per dm ³ .
11)	The given solution contains 6 g of Na ₂ CO ₃ dissolved per dm ³ . Determine the percentage purity of the sample solution by volumetric method. You are provided with 0.1 M HCl solution.	11)	Determine the exact molarity of the given solution of H ₂ SO ₄ and the volume of this acid required to prepare 500 mL of 0.02M acid by volumetric method. You are provided 0.1M NaOH solution.
		12)	Determine the value of X by volumetric method in the given sample of 6.3g of (COOH) ₂ . XH ₂ O dissolved per litre. You are provided with 0.1M NaOH solution.
		13)	Determine the solubility of oxalic acid at room temperature volumetrically. You are provided with 0.1M NaOH solution.
		14)	Standardize the given solution of KMnO ₄ , and calculate the volume of KMnO ₄ , required for preparing 1 dm ³ (1 L) of 0.01 M KMnO ₄ , solution volumetrically. You are provide with 0.1 M FeSO ₄ , solution.
		15)	Determine the amount of iron in the given sample volumetrically. You are provided with 0.01 M KMnO ₄ .
*	Any one of Student's Favorite Practical (2 marks)	16)	Determine the percentage composition volumetrically of a solution mixture of K ₂ C ₂ O ₄ , and K ₂ SO ₄ . You are provided with 0.01 M KMnO ₄ , solution. Find out the percentage composition of both the K ₂ C ₂ O ₄ and K ₂ SO ₄ volumetrically.
		17)	Determine the solubility of Mohr's salt at room temperature volumetrically. You are provided with 0.01 M KMnO ₄ solution.
Note: Along with the awarded marks, complete explanation of the practical by the students, dually verified by the school, shall be sent to the board.			



Class XI Physics: Practical-Based & Laboratory Assessment Syllabus

Practical Based Assessment (50% of Practical Marks) 8+2=10 Marks		Lab Assessment Topics (50% of Practical Marks) 10 Marks
1)	Screw Gauge: Volume of a Spherical Object	1. To measure the volume of a small spherical object (ball bearing) using a screw gauge and to calculate the uncertainty in the result. 2. Using a spherometer, measure the radius of curvature of a convex lens and find the uncertainty in the measured value. 3. To investigate the fall of a spherical steel ball through a viscous medium and to determine the coefficient of viscosity of the fluid. 4. To study stationary waves using Melde’s apparatus and calculate the frequency of the AC source. 5. To find the wavelength of sound waves in air by forming stationary waves in a resonance tube, and to calculate the speed of sound at 0 °C. 6. To compare the electromotive force (EMF) of two given primary cells using a potentiometer. 7. To determine the time period (T), frequency (f), and angular frequency (ω) of a simple pendulum by varying its length (l), and to find the value of acceleration due to gravity (g). 8. To calculate the elastic potential energy stored in a spring from the load-extension graph for a vertical mass-spring system. 9. To determine the moment of inertia of a flywheel about its axis of rotation. 10. To measure the mechanical equivalent of heat (J) by the electrical method using a calorimeter. Note: Along with the awarded marks, complete explanation of the practical by the students, duly verified by the institution, shall be sent to the Board.
2)	Spherometer: Radius of Curvature of a Convex Lens	
3)	Viscosity by Falling-Sphere Method	
4)	Melde’s Apparatus: Stationary Waves	
5)	Resonance Tube: Wavelength & Speed of Sound	
6)	Potentiometer: Comparison of EMFs	
7)	Simple Pendulum: Time Period, Frequency & Gravitational Acceleration	
8)	Spring: Elastic Potential Energy	
9)	Flywheel: Moment of Inertia	
10)	Mechanical Equivalent of Heat by Electrical Method	
11)	Any other practical/activity related to the topics covered in the prescribed textbook.	
*	Any one of Student’s Favorite Practical (2 marks)	



Class XI Computer Science: Practical-Based & Laboratory Assessment Syllabus

Practical Based Assessment (50% of Practical Marks) - 10 Marks	Lab Based Assessment (50% of Practical Marks) -10 Marks
Algorithms and Pseudocode 1. Write pseudocode and draw a flowchart to find the greater of two numbers. 2. Write pseudocode to check whether a number is even or odd. 3. Write pseudocode to print the first ten natural numbers and their sum. 4. Complete a trace table for a given algorithm. 5. Show pass-by-pass working of Bubble Sort and Insertion Sort on a given list. 6. Show step-by-step working of Linear Search and Binary Search on a given list.	Computer Systems 1. Draw and test AND, OR, NOT, NAND, NOR and XOR gates using a logic simulator (e.g., Logisim) and verify their truth tables. 2. Build a logic circuit for a given Boolean expression (or a K-Map simplified expression) and test its output. 3. Encrypt and decrypt a short message using a simple cipher. 4. Demonstrate bus, star, ring, mesh, tree and hybrid topologies by drawing or building a small network. 5. Test the scalability and reliability of a network (e.g., what happens when a device is added or fails). 6. Explore firewall settings on a computer and explain what they do. 7. Complete a phishing awareness or cybersecurity threat analysis activity. 8. 8. Prepare a simple SDLC report (feasibility, analysis, design and testing) for a small system, such as a student examination system.
Python Programming 1. Open IDLE, write and run a first program using print(). 2. Take two numbers as input and display their sum, difference and product using int(). 3. Write a program using arithmetic, comparison and logical operators. 4. Write if-else programs: even/odd, greater of three numbers, leap year. 5. Write for loop programs using range(): table of a number, sum of the first n natural numbers, number pyramid. 6. Store marks in a list and find the minimum, maximum and sum; display each mark with its position number. 7. Write functions: square and cube of a number, area of a rectangle, even/odd check. 8. Draw a house or a geometric pattern using Turtle graphics and a loop. 9. Use the random library (number guessing game) and the datetime library (difference between two dates). 10. Find and fix logical and syntax errors in a given piece of code.	Data and Analysis 1. Load a small dataset with pandas and calculate its mean and median. 2. Plot a bar chart, pie chart, line graph, histogram and scatter plot using Matplotlib. 3. Compare two variables from a dataset and explain whether they show correlation.
Data and Analysis 1. Write a Python program that stores a list of marks and calculates its mean and median. 2. Select a random sample from a given population list using the random library and compare the sample average with the population average. 3. For a given scenario (e.g., work experience and salary), identify the independent variable, dependent variable, confounding variable and random assignment. 4. For a given table of data, choose the most suitable chart (bar, pie or line) and draw it by hand, giving a reason for the choice.	Applications, Impacts and Entrepreneurship 1. Prepare a chart or model showing IoT devices and the technologies that enable them. 2. Demonstrate how blocks are linked in a blockchain using paper blocks or a diagram. 3. Complete the assistive-technology activity and write a short reflection on the digital divide. 4. Conduct a short interview or survey, record the results and present them in a chart. 5. Design a paper or digital prototype for a product idea and describe its MVP.
Any other favorite practical related to Units 2, 3 and 4.	- Any other lab activity or model related to the content of Class 11. Note: Along with the awarded marks, complete explanation of the practical by the students, duly verified by the institution, shall be sent to the Board.