30 Years of Excellence

# INTEL
# BRIDGE COURSE
# 2025

## Advanced Science Course

## Course of Study

INTEL INSTITUTE
The Premier Institute in Nepal for Bridge Courses
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Advanced Science Course

# COURSE OF STUDY

# &

# SAMPLE QUESTION

# Contents

# LIST OF TEACHING STAFF

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- Sagun Bajracharya
- Sailesh Rai
- Swasti Joshi

# PHYSICS

**UNIT 1: MECHANICS** **15 HOURS**

- **Physical Quantities:** Dimensions and uses of dimensional analysis
- **Vectors:** Triangle, parallelogram and polygon laws of vectors, resolution of vectors; unit vectors, scalar and vector products
- **Kinematics:** Instantaneous velocity and acceleration, relative velocity, equation of motion of a freely falling body, projectile motion and its applications
- **Dynamics:** Linear momentum, impulse, conservation of linear momentum, application of Newton's laws, moment, solid friction: Laws of solid friction and their verifications
- **Work, energy and power:** Work done by a constant force and a variable force, power, work-energy theorem; kinetic and potential energy, conservation of energy, conservative and non-conservative forces, elastic and inelastic collisions
- **Circular Motion:** Angular displacement, velocity and acceleration, relation between angular and linear velocity and acceleration, centripetal acceleration, centripetal force,
- **Gravitation:** Newton's laws of gravitation, gravitational field strength, gravitational potential; gravitational potential energy, variation in value of 'g' due to altitude and depth., motion of a satellite: orbital velocity and time period of the satellite, escape velocity
- **Elasticity:** Hooke's law: Force constant, stress; strain; elasticity and plasticity, elastic modulus: Young modulus, bulk modulus, shear modulus, poisson's ratio, elastic potential energy

**UNIT 2: HEAT AND THERMODYNAMICS** **9 HOURS**

- **Heat and Temperature:** Molecular concept of thermal energy, heat and temperature, and cause and direction of heat flow, meaning of thermal equilibrium and Zeroth law of thermodynamics, thermal equilibrium as a working principle of mercury thermometer
- **Thermal Expansion:** Linear expansion and its measurement, cubical expansion, superficial expansion and its relationship with linear expansion, liquid expansion: Absolute and apparent,
- **Quantity of Heat:** Newton's law of cooling, measurement of specific heat capacity of solids and liquids, change of phases: Latent heat, specific latent heat of fusion and vaporization, measurement of specific latent heat of fusion and vaporization,
- **Rate of heat flow:** Conduction: Thermal conductivity and measurement, convection, radiation: Ideal radiator, black-body radiation, Stefan–Boltzmann law
- **Ideal gas:** Ideal gas equation, molecular properties of matter, kinetic-molecular model of an ideal gas, Boltzmann constant, root mean square speed, heat capacities: Gases and solids

**UNIT 3: WAVE AND OPTICS** **9 HOURS**

- **Reflection at curved mirror:** Real and virtual images, mirror formula.
- **Refraction at plane surfaces:** Laws of refraction: Refractive index, relation between refractive indices, lateral shift, total internal reflection
- **Refraction through prisms:** Minimum deviation condition, relation between angle of prism, minimum deviation and refractive index, deviation in small angle prism
- **Lenses:** Spherical lenses, angular magnification, lens maker's formula, power of a lens
- **Dispersion:** Pure spectrum and dispersive power, chromatic and spherical aberration.

**UNIT 4: ELECTRICITY AND MAGNETISM** **5 HOURS**

- **Electric Charges:** Electric charges, charging by induction, Coulomb's law- Force between two-point charges, force between multiple electric charges
- **Electric field:** Electric field due to point charges; field lines, Gauss Law: electric flux, application of Gauss law: Field of a charge sphere.
- **Potential, potential difference and potential energy:** Potential difference, potential due to a point, charge, potential energy, electron volt, equipotential lines and surfaces, potential gradient
- **DC Circuits:** Electric Currents; Drift velocity and its relation with current, Ohm's law; Electrical resistance; Resistivity; Conductivity, current-voltage relations; Ohmic and Non-Ohmic resistance, resistances in series and parallel, electromotive force of a source, internal resistance, work and power in electrical circuits

**UNIT 5: MODERN PHYSICS** **4 HOURS**

- **Nuclear Physics:** Nucleus: Discovery of nucleus, nuclear density; Mass number; Atomic number, atomic mass; Isotopes, Einstein's mass-energy relation, mass defect, packing fraction, BE per nucleon ,nuclear fission and fusion, energy released
- **Recent Trends in physics:** *Universe:* Big Bang and Hubble law: expansion of the universe, black hole and gravitational wave

# CHEMISTRY

**UNIT 1: FOUNDATION AND FUNDAMENTALS 3 HOURS**

- General introduction of chemistry
- Importance and scope of chemistry
- Basic concepts of chemistry (atoms, molecules, relative masses of atoms and molecules, atomic mass unit, radicals, molecular formula, empirical formula).

**UNIT 2: STOICHIOMETRY 2 HOURS**

- Mole and its relation with mass, volume and number of particles
- Calculations based on mole concept.

**UNIT 3: ATOMIC STRUCTURE 4 HOURS**

- Rutherford's atomic model
- Limitations of Rutherford's atomic model
- Postulates of Bohr's atomic model and its application
- Spectrum of hydrogen atom
- Quantum numbers
- Orbitals and shape of s and p orbitals only
- Aufbau principle
- Pauli's exclusion principle
- Hund's rule and electronic configurations of atoms and ions.

**UNIT 4: CLASSIFICATION OF ELEMENTS AND PERIODIC TABLE 4 HOURS**

- Modern periodic law and modern periodic table
- Classification of elements into different groups, periods and blocks
- IUPAC classification of elements
- Nuclear charge and effective nuclear charge
- Periodic trend and periodicity: Atomic radii, ionic radii, ionization energy, electron affinity, electronegativity, metallic characters

**UNIT 5: CHEMICAL BONDING AND SHAPES OF MOLECULES 3 HOURS**

- Valence shell, valence electron and octet theory
- Ionic bond and its properties
- Covalent bond and coordinate covalent bond

**UNIT 6: OXIDATION AND REDUCTION 2 HOURS**

- General and electronic concept of oxidation and reduction
- Oxidation number and rules for assigning oxidation number

**UNIT 7: STATES OF MATTER** **4 HOURS**

- **Gaseous state**: Kinetic theory of gas and its postulates, gas laws; Boyle's law and Charles' law, Avogadro's law, combined gas equation
- **Liquid state:** Physical properties of liquids; Evaporation and condensation, vapour pressure and boiling point, surface tension and viscosity
- **Solid state:** Types of solids, amorphous and crystalline solids, efflorescent, deliquescent and hygroscopic solids, crystallization and crystal growth, water of crystallization, introduction to unit crystal lattice and unit cell

**UNIT 8: CHEMISTRY OF NON–METALS** **5 HOURS**

- **Hydrogen:** Chemistry of atomic and nascent hydrogen, isotopes of hydrogen and their uses, application of hydrogen as fuel, heavy water and its applications
- **Allotropes of Oxygen:** Definition of allotropy and examples, oxygen: Types of oxides (acidic, basic, neutral, amphoteric, peroxide and mixed oxides)
- **Ozone:** Occurrence, preparation of ozone from oxygen, structure of ozone, test for ozone, ozone layer depletion, uses of ozone
- **Nitrogen:** Reason for inertness of nitrogen and active nitrogen, chemical properties of ammonia [Action with $CuSO_4$ solution, water, $FeCl_3$ solution, Mercurous nitrate paper]

**UNIT 9: CHEMISTRY OF METALS** **4 HOURS**

- **Metals and Metallurgical Principles:** Definition of metallurgy and its types, introduction of ores, gangue or matrix, flux and slag, alloy and amalgam, general principles of extraction of metals (different processes involved in metallurgy)
- **Alkali Metals:** General characteristics of alkali metals
- **Alkaline Earth Metals:** General characteristics of alkaline earth metals, molecular formula and uses of (quick lime, bleaching powder, magnesia, plaster of par is and epsom salt),

**UNIT 10: BASIC CONCEPT OF ORGANIC CHEMISTRY**

**2 HOURS**

- Introduction to organic chemistry and organic compounds
- Reasons for the separate study of organic compounds from inorganic compounds
- Tetra-covalency and catenation properties of carbon
- Classification of organic compounds
- Alkyl groups, functional groups and homologous series
- Idea of structural formula, contracted formula and bond line structural formula

**UNIT 11: FUNDAMENTAL PRINCIPLES OF ORGANIC CHEMISTRY** **4 HOURS**

- IUPAC Nomenclature of organic compounds
- Definition and classification of isomerism
- Structural isomerism and its types: chain isomerism, position isomerism, functional isomerism, metamerism and tautomerism

**UNIT 12: HYDRO CARBONS** **3 HOURS**

- **Saturated Hydrocarbons (Alkanes):** Alkanes: Preparation from haloalkanes (Reduction and Wurtz reaction), decarboxylation, catalytic hydrogenation of alkene and alkyne, chemical properties: Substitution reactions (halogenation, nitration & sulphonation only), oxidation of ethane
- **Unsaturated hydrocarbons (Alkenes & Alkynes):**
  **Alkenes**: Preparation by Dehydration of alcohol, dehydrohalogenation, catalytic hydrogenation of alkyne, chemical properties: Addition reaction with HX (Markovnikov's addition and peroxide effect).
  **Alkynes:** Preparation from carbon and hydrogen, 1, 2 dibromoethane, chloroform/iodoform only: Chemical properties: Addition reaction with ($H_2$, HX, $H_2O$),

**UNIT 13: AROMATIC HYDROCARBONS** **2 HOURS**

- Introduction and characteristics of aromatic compounds
- Huckel's rule of aromaticity
- Kekule structure of benzene

# BIOLOGY

## ZOOLOGY

### UNIT 1: INTRODUCTION TO BIOLOGY 2 HOURS

- **Introduction to Biology:** Various branches of biology.

### UNIT 2: EVOLUTIONARY BIOLOGY 6 HOURS

- **Life and its Origin:** Concept on Oparin-Haldane theory and Miller and Urey's experiment
- **Evidences of evolution**: General concept on Morphological, Anatomical, Paleontological, Embryological and Biochemical evidences of evolution
- **Theories of evolution:** Concept of Lamarckism, Darwinism & Neo Darwinism.

### UNIT 3: FAUNAL DIVERSITY 10 HOURS

- **Protista**: Protozoa: Diagnostic features and classification up to class with examples, *Paramecium caudatum* and *Plasmodium vivax* - habits and habitat, structure (various parts and their functions), reproduction (Types only),concept on life-cycle and various types of *Plasmodium*
- **Animalia:** Diagnostic features and classification of the following phyla (up to class) with examples: Porifera, Coelenterata (Cnidaria), Platyhelminthes, Aschelminthes (Nemathelminthes), Annelida, Arthropoda, Mollusca, Echinodermata and Chordata
- **Earthworm** (*Pheretima posthuma*): Habit and habitat, Concept on External features; Digestive system (only concept on alimentary canal & physiology of digestion), excretory system (types of nephridia and structure of septal nephridia), nervous system (general concept on central & peripheral nervous system) & concept on reproductive systems (male & female reproductive organs).
- **Frog** (*Rana tigrina*): Habit and habitat, concept of external features, digestive system (concept on alimentary canal, digestive glands & physiology of digestion), blood vascular system (structure & working mechanism of heart), respiratory system (types of respiration, concept respiratory organs of pulmonary respiratory system & concept of physiology of respiration) and reproductive system (Concept on male & female productive organs).

### UNIT 4: BIOTA AND ENVIRONMENT 3 HOURS

- **Animal adaptation and behavior:** Concept on animal adaptation, Reflex action and taxes
- **Environmental Pollution:** Air, water land pollution
- **Conservation Biology:** Wildlife, categories of wildlife, concept on conservation areas of Nepal

**BOTANY**

**UNIT 5: BIOMOLECULES AND CELL BIOLOGY**

**9 HOURS**

- **Biomolecules:** Introduction of structure and functions of: Carbohydrates, proteins, lipids, nucleic acids and water
- **Cell:** Introduction of cell, concepts of prokaryotic and eukaryotic cells, eukaryotic cells (discussion on structure and functions of cell wall, cell membrane, plastids, mitochondria, golgi complex, endoplasmic reticulum, ribosome, lysosomes, nucleus and chromosomes)
- **Cell division:** Concept on cell division, its types (amitosis, mitosis and meiosis) and their significances.

**UNIT 6: FLORAL DIVERSITY** **7 HOURS**

- **Introduction:** Binomial nomenclature; five kingdom classification system (Monera, Protista, Fungi, Plantae and Animalia), three domains of life.
- **Fungi:** Characteristics features of fungi; its classification (concept on phycomycetes, ascomycetes, basidiomycetes and deuteromycetes)
- **Algae:** General introduction of algae; its classification (concept on green, brown and red algae); Morphology of *Spirogyra*.
- **Bryophyta:** General introduction of bryophyte and its classification of bryophyte (concept on liverworts, hornworts and moss)
- **Pteridophyta:** General introduction and characteristic features of pteridophytes
- **Gymnosperm:** General introduction and characteristic features of Gymnosperms

**UNIT 7: INTRODUCTORY MICROBIOLOGY**

**2 HOURS**

- **Kingdom Monera:** General introduction, structure of bacterial cell, mode of nutrition; concept on cyanobacteria (blue green algae)
- **Virus:** General introduction; its types; concept on structure bacteriophage.

**UNIT 8: ECOLOGY** **4 HOURS**

- **Ecosystem ecology:** Introduction on ecology and its types, biotic and abiotic factors, species interactions; trophic level, food chain, food web, ecological pyramids, concept of ecosystem, biogeochemical cycle - carbon and nitrogen cycles.
- **Ecological Imbalances:** Green house effects, depletion of ozone layer, acid rain.

# MATHEMATICS

## MATH BASICS

Percentage, Annuity and Rate, Mensuration, Trigonometric Ratios and Identities, Algebra Basics, Fundamental Geometry.

## MATH ADVANCED

### UNIT1: ALGEBRA 15 HOURS

- **Set Theory**: Methods of Describing Set, Types of Sets, Relation between Sets, Operation on Sets, Euler-Venn Diagrams.
- **Real Numbers**: Geometric Representation, Intervals, Absolute Value of Real Numbers.
- **Relation and Function**: Ordered Pair, Cartesian Product, Relations and Inverse Relations, Domain and Range of Relations.

  Definition of Function, Domain & Range of a Function, Inverse Function, Composite Function, Introduction of Special Type: Algebraic (Linear, Quadratic & Cubic), Trigonometric, Exponential, Logarithmic)
- **Polynomial and Quadratic Equation**: Polynomials and Polynomial Equation, Factor and Remainder Theorem, Nature of Roots of Quadratic Equation, Relation between Roots and Quadratic Equation, Formation of Quadratic Equation.
- **Sequence and Series**: Arithmetic, Geometric and Harmonic Sequences and Series and their Properties, Relation between A.M., G.M. and H.M., Sum of Infinite Geometric Series.
- **Matrices and Determinants**: Types of Matrices, Operation on Matrices and their properties, Transpose of a Matrix and its Properties, Minors and Cofactors, Adjoint and Inverse Matrices, Determinants of order 2 and order 3 Matrices.
- **Complex Numbers**: Imaginary Unit, Conjugate and Absolute Value of Complex Number and, Additive and Multiplicative Inverse of Complex Numbers, Square Roots of Complex Number, Cube Roots of Unity.

### UNIT 2: TRIGONOMETRY 6 HOURS

- **Trigonometric Equations**: Equations and Identities, General Value Solutions of Trigonometric Equations.
- **Inverse Circular Functions**: Domain and Range of Inverse Trigonometric Functions, Properties of Inverse Trigonometric Functions (Self Inverse, Reciprocal, Conversion).
- **Properties of Triangle**: Sine Law, Cosine Law, Projection Law, Area of Triangle, Solution of Triangle.

**UNIT 3: ANALYTICAL GEOMETRY** **6 HOURS**

- **Straight Lines**: Rectangular Co-ordinate (Cartesian) System, The Distance and Slope of a Line between Two Points, Internal Division, External Division, Section Formula, Mid-point Formula, Standard Equation of Straight Lines, Collinear Points, Concurrent Lines, Angle between Two Lines, Two Sides of a Line, Length of the Perpendicular from a Point on a Line.
- **Pair of Straight Lines**: Homogeneous Equation and General Equation of Degree Two in x and y, Condition of a Second Degree General Equation Representing the Pair of Lines, Angle between Pair of Lines.

**UNIT 4: VECTORS** **3 HOURS**

- **Vectors and Scalars**: Law of Vector Addition, Position Vectors, Unit Vectors, Modulus of Vectors, Direction of Vectors, Collinear and Coplanar Vectors.
- **Product of Vectors**: Scalar and Vector Product between Two Vectors and their Geometrical Interpretation.

**UNIT 5: STATISTICS AND PROBABILITY** **4 HOURS**

- **Statistics:** Measure of Central Tendency, Partition of Data, Measure of Dispersion, Combined Mean and Standard Deviation
- **Probability**: Mathematical and Empirical Definition of Probability, Probability of Independent and Mutually Exclusive Cases, Basic Laws on Probability

**UNIT 6: CALCULUS** **8 HOURS**

- **Limits**: Limits of Indeterminate Forms, Algebraic Properties of Limits, Fundamental Results on Algebraic and Trigonometric Limits.
- **The Derivative**: Derivative and its Geometrical Meaning, Derivative Using Definition and Rules (Sum Rule, Product Rule, Quotient Rule, Power Rule and Chain Rule), Derivative of Parametric and Implicit Functions
- **Integration:** Fundamental Rules on Integration, Integration Using Basic Integrals.

# ENGLISH

**SECTION I: Reading Comprehension** **2 Hours**

- Definition
- Reading Strategies
- Practice

**Section II: Sentence Completion** **2 Hours**

- Vocabulary
- Use of Specific Words
- Sentence Completion Practice

**SECTION III: Structure-Based Questions** **2 Hours**

- Examples
- Practice

**SECTION IV: Analogy and Logical Reasoning** **3 Hours**

- Definitions and Examples
- Practice

**SECTION V: Grammatical Structures and Expressions**

**5 Hours**

- Adverbs and Adjectives
- Modal Auxiliaries
- Countable and Uncountable Nouns
- Verbs
- Tense
- Speech - Direct and Indirect
- Voice - Active and Passive
- Questions:
  - Indirect Questions
  - Information Question
  - Tag Questions
- Subject - Verbs Agreement
- Conditional Sentences
- Conjunctions
- Preposition and Prepositional Phrases
- Articles – A, An, The
- Use of Some, Many, Any, Enough, A lot etc.
- Suggestions, Offers and Invitations
- Transformation of Sentences

**SECTION VI: Photonics and Phonology** **2 Hours**

- Definitions and Distinctions
- Speech Organs
- Classification of Consonant and Vowel Sounds
- Syllable
- Practice

**SECTION VII: Composition** **2 Hours**

- Paragraph Writing
- Story Writing
- Précis Writing
- Essay Writing
- Writing Biography/Autobiography

**Section VIII: Technical Writing** **2 Hours**

- Letter Writing:
  - Personal Letter
  - Business Letter
  - Letter to the Editor
  - Invitation Letter
- E-mail Writing

# *ENTRANCE PREPARATION*

***ST.XAVIER'S, SOS, BUDHANILKANTHA AND OTHERS***

- **English**
- **Mathematics**
- **Science (Physics, Chemistry and Biology)**
- **General Knowledge**

Advanced Science Course

# SAMPLE QUESTION

# Instructions

1. Write your **Name** and **Exam Entry Card number** clearly in the space given in the **Answer Sheet.**
2. **Read the questions carefully.**
3. Choose the best option **marking it carefully**.
4. **Do not leave your seat** during the Test without permission.
5. Maintain **complete silence** in the examination hall.
6. Do not use **calculators or mobiles**.
7. Do not write anything on the **Test Paper.**
8. **Use scrap paper** provided for rough work.
9. Darken the circles with **BLACK OR BLUE INK PENS** while marking answers.

   **Example:** A student divided a number by 2/3 when he was required to multiply it by 3/2. Calculate the percentage of error in his result.

   A) 100 B) 66 C) 0 D) 33

   The answer is '0'; so, darken the circle for the correct answer as shown below:

   
   

10. Do not scratch, overwrite, tick, or mark more than one answer, as this will be considered invalid.
11. Do not leave your seat until your T**est Papers** (Question Paper, Answer Sheet & scrap paper) are collected by the Invigilator.

**Time: 1 Hour** **Full Marks: 50**

***Choose the best option and cross-mark the right box available in the answer sheet.***

**General Science**

1. The quantity that can be zero if a body remains in motion for some time is:
   a) Distance b) Displacement
   c) Speed d) None
2. The representation of power is:
   a) $FV_2/2$ b) FV
   c) F/V d) $F_2V$
3. Mercury is used in thermometer due to:
   a) High specific heat capacity and low thermal conductivity
   b) How specific heat capacity and low thermal conductivity
   c) High specific heat capacity and high conductivity
   d) Low specific heat capacity and high conductivity
4. When water is boiling and converting into steam. The specific heat capacity is:
   a) 0 b) 1
   c) Infinite d) 0.5
5. Which color of light has the highest energy?
   a) Blue b) Red
   c) Green d) Yellow
6. A mark at the bottom of the tank 1m deep appears to be raised by 0.1m. The value of refractive index of liquid tank is:
   a) 10/9 b) 10
   c) 4/3 d) 1/10
7. The transverse wave, the oscillations are:
   a) Perpendicular to the direction of propagation
   b) In the same direction as that of propagation of wave
   c) In all direction
   d) Circular
8. Specific resistance of wire depends upon:
   a) Its length b) Its cross sectional area
   c) Its dimension of area d) Its material
9. Father of periodic table:
   a) Henry Moseley b) Lavoiser
   c) Mendeleev d) Roberyt Boyle
10. Percentage of carbon in limestone is:
    a) 90% b) 24%
    c) 12% d) 48%

11. The gas which changes red litmus paper to blue is:
    a) $NH_3$ b) $CO_2$
    c) $O_2$ d) $H_2$
12. Most abundant metal in earth crust is:
    a) O b) Fe
    c) Al d) Cu
13. The burning of Hydrogen is called:
    a) Hydrogenation b) Hydration
    c) Oxidation d) Reduction
14. Paraffins refer to:
    a) Alkanes b) Alkenes
    c) Alkynes d) All
15. Which one is diatomic?
    a) $H_2O$ b) $NH_3$
    c) $O_3$ d) HCl
16. Scientific name of Pigeon is:
    a) *Livia livia* b) *Columba livia*
    c) *Struthio* d) *Anas*
17. Vertebrates have:
    a) 2 chambered heart b) 3 chambers
    c) 4 chambers d) All
18. Octopus belongs to:
    a) Annelida b) Echinodermata
    c) Mollusca d) Spanges
19. Which is only marine?
    a) Mollusca b) Porifera
    c) Echinodermata d) Coelenerata
20. Excretion in flatworms is by:
    a) Nephrons b) Nephridia
    c) Flame cells d) Malphigian tubule
21. Binomial system was given by:
    a) Aristotle b) Robert Hooke
    c) Carolus linnaeus d) Lamarck
22. Vascular crypogams is:
    a) Thallophyta b) Bryophyta
    c) Pteridophyta d) Gymnosperm
23. Edible part of mushroom is:
    a) Ascocarp b) Basidiocarp
    c) Basidospore d) Hyphae

24. Chaismata formation takes place in:
    a) Leptotene b) Zygotene
    c) Pachytene d) Diplotene
25. Circular DNA is found in:
    a) Bacteria b) Algae
    c) Fungi d) None

**Mathematics**

26. If A and B are two sets such that $A \cap B \neq \phi$, then A - (A - B) is =
    a) $\phi$ b) B
    c) $A \cap B$ d) B - A
27. The simple interest on a certain sum of money at 5% p.a in 2 years is Rs.112. What would be the compound interest on the same sum at the same rate at the same time?
    a) Approx. Rs.108 b) Approx. Rs.109
    c) Approx. Rs.114 d) Approx. Rs.120
28. The distance between lines 3x + 4y = 9 and 6x + 8y = 15 is:
    a) 5/7 b) 2/3
    c) 7/10 d) 3/10
29. The maximum and minimum value of Sinx + Cosx is:
    a) 2, -2 b) 1, -1
    c) 2 , - 2 d) 1/2, -1/2
30. If TanA + SinA = p and TanA - SinA = q, then $p^2 - q^2$ = -----.
    a) $\sqrt{pq}$ b) $2\sqrt{pq}$
    c) $3\sqrt{pq}$ d) $4\sqrt{pq}$
31. The string of a kite is inclined to the horizontal at an angle of $60^o$. Find the height of kite if the length of string is 150m.
    a) $150\sqrt{3}$ m b) $60\sqrt{3}$ m
    c) $75\sqrt{3}$ m d) 75m
32. If A = $\begin{pmatrix} 2 & -1 \\ -1 & 2 \end{pmatrix}$ and I is a unit matrix of order 2, then $A^2$ is = …
    a) A + I b) A - I
    c) 3A - 4I d) 4A - 3I
33. If a:b = 5 : 3, then (3a + 4b) : (5a + 2b) equals:
    a) 27 : 31 b) 25 : 29
    c) 29 : 25 d) 31 : 27
34. When 'z' is divided by 8 the remainder is 5. What is remainder when 4z is divided by 8?
    a) 1 b) 3
    c) 4 d) 5

35. For all x, let $f(x) = (10 - x)^2$. If $p = f(6)$, which one of the following is 4p?
    a) $f(24)$ b) $f(18)$
    c) $f(12)$ d) $f(8)$
36. 55 men can finish a work in 42 days. How many extra men should be added to complete the work 9 days earlier?
    a) 70 men b) 25 men
    c) 15 men d) 30 men
37. The probability that a boy will get a scholarship is 0.75 and that a girl will get is 0.27. What is probability that at least one of them will get scholarship?
    a) 0.75 b) 0.34
    c) 0.93 d) 0.80
38. The mean weight of 150 students is 60kg. The mean weight of boys is 70kg and that of girls is 55kg. What is number of boys?
    a) 50 b) 100
    c) 120 d) 105
39. If $y = \sqrt{6 + \sqrt{6 + \sqrt{6 + \ldots\ldots\ \infty}}}$, then the value of y is:
    a) 2 b) 3
    c) 6 d) $\infty$
40. If a square and an equilateral triangle have equal perimeters. What is the ratio of the area of the triangle to the area of the square?
    a) $2\sqrt{3}/9$ b) $4\sqrt{3}/9$
    c) 3/4 d) 4/3

**English**

41. A misanthrope hates:
    a) Women b) Games
    c) Mankind d) Democracy
42. He ..... the audience with his spicy anecdote.
    a) regaled b) rebuffed
    c) glorified d) provoked

43. They aren't happy and .....
    a) so am I
    b) I am too
    c) neither is I
    d) I am not either
44. They ..... to Germany by July.
    a) will fly
    b) will be flying
    c) will have flown
    d) may fly
45. He **stuck to his guns** even in the face of stiff position. The meaning of idiom in bold type is:
    a) Clung to his weapon
    b) Kept arguing
    c) Followed the chosen path
    d) Held on against attack or argument
46. We are accustomed ..... doing hard work.
    a) in
    b) of
    c) to
    d) with
47. The meaning of the word ENIGMA is:
    a) Praise
    b) Puzzle
    c) Clear
    d) Elusive
48. The photographs in the papers bore no ..... at all to the original.
    a) nearness
    b) comparison
    c) identity
    d) resemblance
49. To atone for one's sins:
    a) Ingratitude
    b) Propitiate
    c) Expiate
    d) Obsolete
50. ..... are friends.
    a) I, you and he
    b) He, you and I
    c) You, I and he
    d) You, he and I