

# Composition of Paper for Medical and Dental Colleges ETEA Entrance Test 2019

S.No	Subject	No of Questions
1	Biology	80
2	Chemistry	60
3	Physics	40
4	English	20
	<b>Total</b>	<b>200</b>

Note:

- Total No of Questions 200
- Total Marks 200
- No Negative Marking each question carry 1 mark
- Time duration to attempt the paper shall be 150 minutes (2 hrs 30 minutes)

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## BIOLOGY

### 1. Cell Structure & Function

- a. Techniques used in Cell Biology
- b. Cell Wall and Plasma Membrane
- c. Cytoplasm and Organelles
- d. Prokaryotic and Eukaryotic Cells

### 2. Biological Molecules

- a. Biological Molecules in Protoplasm
- b. Importance of water
- c. Carbohydrates Classification (monosaccharides, Disaccharides and Polysaccharides) and their role.
- d. Proteins (Amino Acids and peptide linkages, globular and fibrous proteins) and its role.
- e. Lipids Classification (Acylglycerols, phospholipids, waxes and terpenes)
- f. Nucleic Acids (Nucleotides and Phosphodiester Linkage, DNA, RNA, ATP and NAD)
- g. Conjugated Molecules (Glycolipids, glycoproteins, lipoproteins and nucleoproteins)

### 3. Enzymes

- a. Structure of enzymes
- b. Mechanism of enzyme action
- c. Factors affecting the rate of enzymatic action
- d. Enzyme inhibition (Competitive and noncompetitive inhibitors)
- e. Classification of Enzymes

### 4. Bioenergetics

- a. Photosynthesis
  - i. Role of Light
  - ii. Role of Photosynthesis Pigments – Absorption Spectrum and Action Spectrum
  - iii. Role of Carbon Dioxide
  - iv. Role of Water
  - v. Mechanism of Photosynthesis

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- b. Cellular Respiration
  - i. Aerobic and anaerobic respiration
  - ii. Mechanism of respiration
  - iii. Synthesis of ATP – Chemiosmosis and Substrate – level Phosphorylation
  - iv. Photorespiration
- 5. A cellular Life
  - a. Viruses
  - b. Parasitic Nature of viruses
  - c. Life cycle of bacteriophage
  - d. Life Cycle of HIV
  - e. Viral Diseases (Hepatitis, Herpes, Polio ad Leaf Curl virus disease of cotton)
  - f. Prions and Viroids (Structure and examples of disease caused by them)
- 6. Prokaryotes
  - a. Taxonomy of Prokaryotes
  - b. Achaea
  - c. Bacteria; Ecology and Diversity
  - d. Structure, shape and Size of Bacteria
  - e. Modes of Nutrition in Bacteria
  - f. Growth and Reproduction in Bacteria
  - g. Importance of Bacteria
  - h. The Bacterial Flora of Humans
  - i. Control of Harmful Bacteria
- 7. Protists and Fungi
  - a. Protists – the evolutionary relationships
  - b. Major groups of protists (Protozoa, Algae, Myxomycota, Oomycota)
  - c. General characteristics of fungi
  - d. Diversity among fungi (Zygomycota, Ascomycota, Basidiomycota)
  - e. Importance of Fungi

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**8. Diversity among plants**

- a. The evolutionary origin of plants
- b. Nonvascular plants
- c. Seedless vascular plants, evolution of leaf
- d. Seed plants, gymnosperm and angiosperm, Evolution of Seed

**9. Diversities among animals**

- a. Characteristics of animals
- b. Criteria of animal classification
- c. Diversity in animals, invertebrates and vertebrates

**10. Form and Functions in plants**

- a. Nutrition in plants
- b. Gaseous exchange in plants
- c. Transport in plants
- d. Homeostasis in plants (Osmotic adjustment and thermoregulation in plants)
- e. Support in plants (support in herbaceous and woody plants)
- f. Growth and development in Plants
- g. Growth responses in Plants

**11. Digestion**

- a. Digestive system of Man
- b. Disorders related to digestive system and food habits (ulcer, food poisoning, obesity, dyspepsia, anorexia nervosa, bulimia nervosa)

**12. Circulation**

- a. Blood Circulatory System of Man
  - i. Heart
  - ii. Blood vessels
  - iii. Blood pressure and its measurement
  - iv. Cardiovascular disorders
  - v. Lymphatic system of man

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**13. Immunity**

- a. First Line of Defense (Skin, Digestive Tract, Air Passageway)
- b. Second Line of Defense (The nonspecific defenses such as killing cells of blood, protective proteins, inflammatory response, temperature response)
- c. Third line of Defense – The specific defenses (inborn and acquired immunity, Cell mediated and antibody mediated immunity)
- d. Disorders of immune system (allergies, autoimmune diseases, transplant rejections)

**14. Respiration**

- a. Respiratory system of man
- b. Respiratory disorders

**15. Homeostasis**

- a. Osmoregulation
- b. Excretion
- c. Excretory system of man (structure and function of kidney)
- d. Disorders of Urinary Tract
- e. Thermoregulation

**16. Support and Movement**

- a. Human Skeleton
- b. Disorder of Skeleton
- c. Muscles

**17. Nervous Coordination**

- a. Nervous system of Man
- b. Effects of drugs on nervous coordination
- c. Disorders of nervous system

**18. Chemical Coordination**

- a. Hormones – the chemical messengers
- b. Endocrine system of man (glands with location, secretions, and imbalance)

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**19. Behavior**

- a. The nature of Behavior
- b. Innate Behavior
- c. Learning
- d. Social Behavior

**20. Reproduction**

- a. Reproductive System of Male and female and their hormonal regulations
- b. Disorders of reproductive system
- c. Sexually transmitted disease

**21. Development and aging**

- a. Embryonic Development
- b. Control of development
- c. Human embryonic development
- d. Birth and nursing
- e. Disorders during embryonic development
- f. Postnatal development
- g. Aging

**22. Inheritance**

- a. Law of Independent Assortment (probabilities)
- b. Incomplete Dominance, Multiple alleles and co-dominance
- c. ABO Blood Group System
- d. RH blood Group system and Erythroblastosis foetalis
- e. Polygenic inheritance and epistasis
- f. Gene Linkage and crossing over
- g. Sex determination
- h. Sex linkage (drosophila and man, X- Linked Disorders, sex limited and sex influenced traits)

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### 23. Chromosomes and DNA

- a. Chromosomal theory of inheritance
- b. DNA as the hereditary material
- c. DNA replication (Meselson and Stahl experiments and mechanism)
- d. Gene Expression (Gene code, transcription, translation)
- e. Regulating Gene Expression
- f. Mutation (Chromosomal and Gene Mutations)

### 24. Evolution

- a. The evolution of the concept of evolution
- b. Evidences of evolution
- c. Evolution from prokaryotes to eukaryotes
- d. Lamarckism
- e. Darwinism
- f. Neo – Darwinism

### 25. Man and His Environment

- a. Biogeochemical cycle (water cycle and nitrogen cycle)
- b. The flow of energy ( productivity, Trophic levels)
- c. Ecological Succession
- d. Population dynamics
- e. Human Impact on Environment (nuclear Power, CO<sub>2</sub> and Global Warming, Acid Rain, Ozone Depletion, common pollution sources)
- f. Environmental resources and their depletion

### 26. Biotechnology

- a. Gene Cloning
- b. DNA Sequencing
- c. DNA Analysis
- d. Genome Maps
- e. Tissue Culture

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- f. Transgenic Bacteria, Plants and Animals
- g. Biotechnology and healthcare
- h. Scope and importance of Biotechnology

**27. Biology and Human Welfare**

- a. Vaccination and Integrated Disease management
- b. Animal Husbandry
- c. Latest techniques applied to enhance crop and fruit yields
- d. Home Gardening
- e. Role of Microbes in Human Welfare



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## CHEMISTRY

### 1. Stoichiometry

- Mole and Avogadro's Number
- Mole Calculations
- Percentage Composition
- Excess and Limiting Reagents
- Theoretical Yield and Actual yield as percentage

### 2. Atomic Structure

- Discharge Tube Experiments
- Application of Bohr's Model
- Planck's Quantum Theory
- X-Rays
- Quantum Numbers and Orbitals
- Electronic configuration

### 3. Theories of Covalent Bonding and Shapes of Molecules

- Shapes of Molecules
- Theories of Covalent Bonding
- Bond Characteristics
- Effect of Bonding on Physical and Chemical Properties

### 4. States of Matter 1 : Gases

- Kinetic Molecular theory of gases
- Absolute temperature scale on basis of Charles law
- Avogadro's Law
- Ideal Gas Equation
- Deviation from ideal gas behavior
- Van Der Waals Equation
- Dalton's Law of Partial Pressure
- Graham's law of diffusion and effusion
- Liquefaction of gases.
- Fourth State of Matter : Plasma

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**5. States of Matter 2 : Liquid**

- a. Kinetic Molecular Interpretation of Liquids
- b. Intermolecular forces (Van Der Waals Forces)
- c. Energetics of Phase Changes
- d. Liquid Crystals

**6. States of Matter 3 : Solids**

- a. Kinetic Molecular interpretation of solids
- b. Types of solids
- c. Properties of crystalline solids
- d. Crystal Lattice
- e. Types of crystalline Solids

**7. Chemical Equilibrium**

- a. Reversible Reactions and Dynamic Equilibrium
- b. Factors affecting Equilibrium (Le-Chatelier's Principle)
- c. Industrial Application of Le-Chatelier's Principle (Haber's Process)
- d. Solubility Product & Precipitation Reactions
- e. Common Ion Effect

**8. Acids, Bases & Salts**

- a. Acidic, Basic and Atmospheric Substances
- b. Bronsted-Lowery Definitions of Acids and Bases
- c. Conjugate Acid-Base Pairs
- d. Expressing the strength of acids and bases
- e. Lewis definition of acids and bases
- f. Buffer solutions and their applications
- g. Salt hydrolysis

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**9. Chemical Kinetics**

- a. Chemical Kinetics
- b. Rates of reactions
- c. Collision Theory, Transition State and activation energy
- d. Catalysis

**10. Solutions and colloids**

- a. General Properties of Solutions
- b. Concentration Units
- c. Raoult's Law
- d. Colligative properties of dilute solutions
- e. Colloids

**11. Thermochemistry**

- a. Energy in chemical reactions
- b. Thermodynamics
- c. Internal Energy
- d. First Law of thermodynamics
- e. Standard State and Standard Enthalpy Changes
- f. Heat Capacity
- g. Calorimeter
- h. Hess's Law : Enthalpy Change Calculations
- i. Born Haber Cycle

**12. Electrochemistry**

- a. Oxidation-Reduction Concepts
- b. Electrode, electrode potential and electrochemical series
- c. Types of electrochemical cells

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### 13. S- and P- Block Elements

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- a. Period 3 (Na to Ar)
    - i. Physical and atomic properties of the elements
    - ii. Reaction of Period 3 elements with water, Oxygen and chlorine
    - iii. Physical Properties of oxides
    - iv. Acid-Base behavior of the Oxides
    - v. Chlorides of the Period 3 Elements
    - vi. Hydroxides of the Period 3 Elements
  - b. Group 1 Elements
    - i. Atomic and Physical Properties
    - ii. Trends in Reactivity with Water
    - iii. Reactions with Oxygen
    - iv. Reactions with Chlorine
    - v. Effects of Heat on Nitrates, Carbonates and Hydrogen-Carbonates
    - vi. Flame Tests
  - c. Group 2 Elements
    - i. Atomic and Physical Properties
    - ii. Trends in Reactivity with water
    - iii. Reaction with oxygen and Nitrogen
    - iv. Trends in Solubility of the Hydroxides, Sulphates and Carbonates
    - v. Trends in thermal stability of the nitrates and carbonates
    - vi. How beryllium differs from other members of its group?
  - d. Group 4 Elements
    - i. Physical Properties : Melting and Boiling Points
    - ii. The trend from Non-Metal to Metal
    - iii. Oxidation State
    - iv. Possible Oxidation States (Inert Pair Effect in formation of Ionic and covalent Bonds)
    - v. Chlorides of Carbon, Silicone and Lead (structures, stability and reactions with water)

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- vi. Oxides
- e. Group 7 Elements: Halogens
  - i. Atomic and Physical Properties and related trends
  - ii. Bond Enthalpies in Halogens and hydrogen halides
  - iii. Strength of halogens as oxidizing agents :  $F > Cl > Br > I$
  - iv. The acidity of hydrogen halides
  - v. Halide ions as reducing agents and trend in halide strength, ability of halide ions

#### 14. D & F Block Elements : Transition Elements

- a. General features
  - i. Electronic structure
  - ii. Binding Energy
  - iii. Variable oxidation states
  - iv. Catalytic activity
  - v. Magnetic behavior
  - vi. Alloy formation
- b. Coordination Compounds
- c. Chemistry of Some Important Transition elements
  - i. Vanadium
  - ii. Chromium
  - iii. Manganese
  - iv. Iron
  - v. Copper

#### 15. Organic Compounds

- a. Sources
- b. Coal as a source of organic compounds
- c. Characteristics of organic compounds
- d. Uses of organic compounds
- e. New Allotrope of Carbon : bucky ball
- f. Functional groups and homologous series
- g. Detection of element in organic compounds

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**16. Hydrocarbons**

- a. Types of Hydrocarbons
- b. Alkanes and Cycloalkanes
- c. Radical Substitution reactions
- d. Oxidation of organic compounds
- e. Alkenes
- f. Isomerism
- g. Alkynes
- h. Benzene and substituted Benzenes

**17. Alkyl Halides and Amines**

- a. Alkyl Halides
- b. Organometallic compounds (Grignard's reagents)
- c. Amines

**18. Alcohols, Phenols and Ethers**

- a. Nomenclatures
- b. Physical Properties
- c. Structures
- d. Acidity
- e. Preparations of Alcohols
- f. Reactions
- g. Differences among them
- h. Chemical Reactivity

**19. Carbonyl Compounds 1:**

- a. Aldehydes and Ketones
- b. Nomenclature
- c. Physical Properties
- d. Acidity Structure
- e. Preparations of Aldehydes and Ketones
- f. Reactivity
- g. Reactions of Aldehydes and ketones

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**20. Carbonyl Compounds 2:**

- a. Carboxylic acid and functional derivatives
- b. Nomenclature
- c. Physical Properties
- d. Structure
- e. Preparations of Carboxylic Acids
- f. Reactivity
- g. Reactions of Carboxylic Acids

**21. Biochemistry**

- a. Carbohydrates
- b. Proteins
- c. Enzymes
- d. Lipids
- e. Nucleic Acids
- f. Minerals of Biological Significance

**22. Industrial Chemistry**

- a. Introduction to Chemical process industry and Raw Materials used
- b. Safety Considerations in Process industries
- c. Dyes
- d. Pesticides
- e. Petrochemicals
- f. Synthetic Polymers (PVS and Nylon)
- g. Cosmetics: Lipsticks, Nail Varnish and Remover, Hair Dyes
- h. Adhesives

**23. Environmental Chemistry**

- a. Chemistry of the troposphere
- b. Chemistry of Stratosphere
- c. Water Pollution and Water Treatment
- d. Green Chemistry

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## 24. Analytical Chemistry

- a. Classical Method of Analysis (Combustion analysis and determination of molecular formula)
- b. Modern Methods of Analysis (Spectroscopy, Spectroscopic Methods)



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## PHYSICS

### 1. Measurement

- a. The scope of Physics
- b. SI Base, Supplementary and derived units
- c. Errors and uncertainties
- d. Use of significant figures
- e. Precision and accuracy
- f. Dimensionality

### 2. Vectors and Equilibrium

- a. Cartesian Coordinate system
- b. Addition of vectors by head to tail rule
- c. Addition of vectors by perpendicular components
- d. Scalar product of two vectors
- e. Vector product of two vectors
- f. Torque
- g. Equilibrium of forces
- h. Equilibrium of torques

### 3. Forces and Motion

- a. Displacement
- b. Average velocity and instantaneous velocity
- c. Average acceleration and instantaneous acceleration
- d. Review of equations of uniformity accelerated motion
- e. Newton's law of motion
- f. Momentum and impulse
- g. Law of conservation of momentum
- h. Elastic collisions in one dimension

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- i. Momentum and explosive forces
  - j. Projectile Motion
  - k. Rocket Motion
- 4. Work and Energy**
- a. Work done by a constant force
  - b. Work as scalar product of force and displacement
  - c. Work against gravity
  - d. Work done by variable force
  - e. Gravitational potential at a point
  - f. Escape velocity
  - g. Power as scalar product of force and velocity
  - h. Work energy principle in resistive medium
  - i. Sources and uses of energy
    - a. Conventional sources of energy
    - b. Non-conventional sources of energy
- 5. Rotational and circular motion**
- a. Kinematics of angular motion
  - b. Centripetal force and centripetal acceleration
  - c. Orbital velocity
  - d. Artificial satellites
  - e. Artificial gravity
  - f. Moment of inertia
  - g. Angular momentum
- 6. Fluid Dynamics**
- a. Streamline and turbulent flow
  - b. Equation of continuity
  - c. Bernoulli's equation

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- d. Application of Bernoulli's equation
  - e. Viscous fluids
  - f. Fluid friction
  - g. Terminal velocity
7. Oscillations
- a. Simple Harmonic Motion (SHM)
  - b. Circular Motion and SHM
  - c. Practical SHM system (mass spring and simple pendulum)
  - d. Energy conservation in SHM
  - e. Free and forced oscillations
  - f. Resonance
  - g. Damped oscillations
8. Waves
- a. Periodic Waves
  - b. Progressive waves
  - c. Transverse and longitudinal waves
  - d. Speed of sound in air
  - e. Newton's formula and Laplace correction
  - f. Superposition of waves
  - g. Modes of vibration of strings
  - h. Fundamental mode and harmonics
  - i. Vibrating air columns and organ pipes
  - j. Doppler effect and its applications
  - k. Generation, detection and use of ultrasonic

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## 9. Physical Optics

- a. Nature of light
- b. Wave front
- c. Huygen's principle
- d. Interference
  - a. Young's double slit experiment
  - b. Michelson's interferometer
- e. Diffraction
- f. Polarization

## 10. Thermodynamics

- a. Thermal Equilibrium
- b. Heat and Work
- c. Internal Energy
- d. First law of thermodynamics
- e. Molar specific heats of a gas
- f. Heat engine
- g. Second law of thermodynamics
- h. Carnot's cycle
- i. Refrigerator
- j. Entropy

## 11. Electrostatics

- a. Force between charges in different media
- b. Electric field
- c. Electric field of various charge configurations
- d. Electric field due to dipole
- e. Electric flux

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- f. Gauss's law and its applications
- g. Electric potential
- h. Capacitors
- i. Energy stored in a capacitor

## 12. Current electricity

- a. Steady current
- b. Electric potential difference
- c. Resistivity and its dependence upon temperature
- d. Internal resistance
- e. Power dissipation in resistance
- f. Thermoelectricity
- g. Kirchhoff's Laws
- h. The potential divider
- i. Balanced potentials (Wheatstone bridge and potentiometer)

## 13. Electromagnetism

- a. Magnetic field of current – carrying conductor
- b. Magnetic force on a current – carrying conductor
- c. Magnetic flux density
- d. Ampere's law and its application in solenoid
- e. Force on a moving charged particle in a magnetic field
- f.  $e/m$  of an electron
- g. torque on a current carrying coil in a magnetic field
- h. electro-mechanical instruments

## 14. Electromagnetic induction

- a. Induced emf
- b. Faraday's law
- c. Lenz's law

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- d. Eddy currents
- e. Mutual inductance
- f. Self-inductance
- g. Energy stored by an inductor
- h. Motional emf's
- i. A.C. Generator
- j. A.C. Motor and Back emf
- k. Transformer

#### 15. Alternating Current

- a. Alternating Current (AC)
- b. Instantaneous, peak and rms values of AC
- c. Phase, Phase lag and phase lead in AC
- d. AC through a resistor
- e. AC through a capacitor
- f. AC through an inductor
- g. Impedance
- h. RC series circuit
- i. RL series circuit
- j. Power in AC circuits
- k. Resonant circuits
- l. Electrocardiography
- m. Principle of metal detectors
- n. Maxwell's equations and electromagnetic waves

#### 16. Physics of solids

- a. Classification of solids
- b. Mechanical properties of solids

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- c. Elastic limit and yield strength
- d. Electrical properties of solids
- e. Superconductors
- f. Magnetic properties of solids

#### 17. Electronics

- a. Intrinsic and extrinsic semiconductors
- b. P&N type substances
- c. Electrical conductivity by electron and holes
- d. PN Junction
- e. Forward and reverse biased PN Junction characteristics
- f. Half and full wave rectification
- g. Uses of specially designed PN junctions
- h. Transistor and its characteristics
- i. Transistor as an amplifier (C-E Configuration)

#### 18. Dawn of Modern Physics

- a. Special Theory of relativity
- b. Quantum theory of radiation
- c. Photoelectric effect
- d. Compton's effect
- e. Pair production and pair annihilation
- f. Wave nature of particles
- g. Electron microscope
- h. Uncertainty principle

#### 19. Atomic Spectra

- a. Atomic spectra
- b. Emission of spectral lines
- c. Ionization and excitation potentials

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- d. Inner shell transitions and characteristics X – Rays
- e. Laser

## 20. Nuclear Physics

- a. Composition of atomic nuclei
- b. Isotopes
- c. Mass spectrograph
- d. Mass defect and binding energy
- e. Radioactivity (properties of alpha, beta and gamma rays)
- f. Energy from nuclear decay
- g. Half-life and rate of decay
- h. Interaction of radiation with matter
- i. Radiation detectors (GM counter and solid state detector)
- j. Nuclear reactions
- k. Nuclear fission (fission chain reaction)
- l. Nuclear reactors (types of nuclear reactor)
- m. Nuclear fusion ( nuclear reaction in sun)
- n. Radiation exposure
- o. Biological and medical uses of radiation (radiation therapy, diagnosis of diseases, tracers techniques)
- p. Basic forces of nature
- q. Elementary particles and particle classification (hadrons, leptons and quarks)

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## ENGLISH

1. **Comprehend key vocabulary**
  - a. Synonyms
  - b. Antonyms
2. **Demonstrate control of tenses and sentence structure**
  - a. Use of correct tenses and sentence structure in writing
3. **Demonstrate correct use of subject-verb agreement**
  - a. Use of correct subject-verb agreement in written texts
4. **Demonstrate correct use of articles and prepositions**
  - a. Use appropriate articles and prepositions in different written contexts
  - b. Select the appropriate article or preposition for a particular context
5. **Use of Narrations and Voice**
  - a. Direct and Indirect Speech
  - b. Active Voice and Passive Voice

Vocabulary		
<b>A</b> Alacrity Alert Astonish Attain Attentive	<b>B</b> Befriend Boost Benefit Benevolent Brighten	<b>C</b> Charitable Consciousness Charity Consider Charm
<b>D</b> Decent Delectable Delicate Delicious Desirable	<b>E</b> Economic Enjoy Essence Ecstasy Enlighten	<b>F</b> Fabulous Flexible Fair Flower Faith

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<b>G</b> Goodness Galore Goodwill Game Gorgeous	<b>H</b> Heart Honorable Heaven Hope Help	<b>I</b> Immense Innocent Innovate Immune Input
<b>J</b> Joke Jolly Jubilant Juicy Just	<b>K</b> Keen Kind Kind-hearted Kindly Kudos	<b>L</b> Large Lively Lovable Laugh Lavish
<b>M</b> Made Mediate Magnificent Magnify Mellow	<b>N</b> Neat New Nice Nifty Nippy	<b>O</b> Onward Open Open-minded Opportunity Original
<b>P</b> Pleasant Pardon Please Produce Pleasurable	<b>Q</b> Quality Quiet Quantity Quarter Queen	<b>R</b> Radiant Reliable Rapture Relief Ready
<b>S</b> Satisfaction Smile Superior Satisfactory Sociable	<b>T</b> Tact Timeless Teacher Top Training	<b>U</b> Uncritical Understand Upbeat Upgrade Uplift
<b>V</b> Validate Valuable Venerable Veracious Verify	<b>W</b> Warmth Welcome Witty Wellbeing Wonder	<b>Y</b> Yearn Yes Young Value Youth
<b>Z</b> Zeal Zealous Zest Zoom Zero		

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