

SOMP Key Idea Approach for Mains Mentorship 2023

SCIENCE AND TECHNOLOGY

SOMP KEY IDEA APPROACH

Often when students write answers, despite knowing content and all nit-picks of answer writing they find themselves ranging in average and sometimes even below average marks. The answer writing is not just about writing the right content but also **about writing it in the right manner**. Now the question arises what is the right manner that SOMP speak off?

Students write with the knowledge that they acquire over hour readings and learning and try to produce it in their own language in answer sheets. But is writing in general language sufficient to **fetch that 1 marks extra**? Then how are you making our answer subject specific, by using the same words in every subject. That definitely doesn't seem right and surely is questionable. Therefore, it is essential to understand that while following norms of answer writing, its structure or presentation is essential, use of appropriate language which is subject specific is equally needed.

This study material prepared by SOMP is to fulfill this demand of answers and make them specific from general. It gives valuable key ideas which can be readily included in answers at suitable places to acquire specificity. Not only this, after going through this material an aspirant can quickly revise the key terminologies used to express critical ideas. While substituting them for a larger sentence will make answers enriched as well as well composed, sentencing the quotes in answers has the possibility of fetching more marks in this tug of war.

The purpose of the document is to provide key words used in every sub section of the syllabus of UPSC CSE and help ***SOMP Mains Mentorship 2023 students*** to understand their importance and use. To fulfill this objective the material contains Theme areas, Key ideas associated with it, Context of these key ideas and a statement which provides a glimpse of its use. Alongside it also consist of quotes related to themes which are general in nature and can be quoted in answers. The material also guides you about various specific areas in which these materials can be utilized to replace general casual words.

SOMP hopes to help and ensure that our students get through their tough journey and our support in this process eventually makes them realize it. So we hope that you will utilize this study material well and enrich your answers in the exam hall. All the best.

Quotes- SCIENCE AND TECHNOLOGY

- “Science is a beautiful gift to humanity; we should not distort it.” **Dr APJ Abdul Kalam**
- “It is science alone that can solve problem of poverty and Hunger”-**Pandit Nehru**
- “Chandrayan-3 scripts a new chapter in India’s space odyssey. It soars high, elevating the dreams and ambitions of every Indian. This momentous achievement is a testament to our scientist relentless dedication”- **PM Modi**
- “Change is crucial. It brings new thought; new thought leads to innovative actions.” **Dr APJ Abdul Kalam**
- “In science, there is no such thing as failure. There are only experiments and efforts”- **PM Modi**
- "Science knows no country, because knowledge belongs to humanity, and is the torch which illuminates the world." - **Louis Pasteur**
- “Everything is theoretically impossible until it is done.” – **Robert A. Heinlein**
- “If we knew what it was we were doing, it would not be called research, would it?” – **Albert Einstein**
- "The greatest discoveries often lie not in finding new things, but in seeing familiar things in new ways." - **Alexander Fleming**
- “Science is magic that works.” – **Kurt Vonnegut**
- “I didn’t fail 1000 times. The light bulb was an invention with 1000 steps.” – **Thomas Edison**
- “In questions of science, the authority of a thousand is not worth the humble reasoning of a single individual.” – **Galileo Galilei**
- “The scientist only imposes two things, namely truth and sincerity, imposes them upon himself and upon other scientists.” – **Erwin Schrödinger**
- "The pursuit of science is a never-ending journey into the unknown, fueled by curiosity and guided by reason." - **Neil Armstrong**
- “Space missions carry hopes and dreams of our nation”- **PM Modi**

SUB THEME: SCIENTIFIC PRINCIPLES

Key Idea: Double-Edged Sword

- **Context:** The term "double-edged sword" describes a situation where something has both positive and negative consequences, much like how technology can bring benefits as well as challenges.
- **Statement:** Technology is a double-edged sword, offering remarkable opportunities for progress while also presenting complex ethical, social, and security dilemmas that require careful navigation.

Key Idea: Foundational scientific developments

- **Context:** Throughout history, science has advanced through key discoveries and innovations that have laid the groundwork for our understanding of the natural world.
- **Statement:** Foundational scientific developments are pivotal breakthroughs that shape our knowledge and open the doors to new realms of understanding.

Key Idea: Indigenisation of Technology

- **Context:** Indigenisation of technology refers to the process of developing and adopting advanced technologies within a country, making the nation self-reliant and reducing dependency on external sources.
- **Statement:** Indigenisation of technology empowers nations to harness their capabilities, fostering innovation and autonomy in technological progress.

Key Idea: Technology Transfer

- **Context:** Technology transfer involves the sharing or exchange of knowledge, expertise, and technological advancements from one entity or location to another, often between research institutions, industries, or countries.
- **Statement:** Technology transfer accelerates progress by disseminating valuable knowledge and innovations, fostering collaboration and driving global advancement.

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Key Idea: Survivability, Sustainability, Mobility

- **Context:** These three concepts encompass critical aspects of modern development, including the ability to endure challenges, maintain ecological balance, and facilitate movement.
- **Statement:** Technological advancement needs to focus upon following principles- Sustainability, Sustainability and mobility altogether.

Key Idea: 3As- Availability, Affordability, Accessibility

- **Context:** The 3As represent essential principles for ensuring products or services are accessible and beneficial to a wide range of individuals, regardless of their circumstances.
- **Statement:** The solutions created by Modern science require 3A approach of Availability, Affordability and Accessibility to remotest corner of country.

Key Idea: Cutting Edge-Technology

- **Context:** Cutting-edge technology refers to the most advanced and innovative developments in a particular field, pushing the boundaries of what is currently possible.
- **Statement:** Cutting-edge technology represents the forefront of human ingenuity, driving progress and reshaping industries through groundbreaking innovations.

Key Idea: One gene-One experiment

- **Context:** "One gene-one experiment" is a principle in molecular biology, suggesting that studying the function of a single gene often requires focused experiments to understand its role and effects.
- **Statement:** The concept of "one gene-one experiment" emphasizes the importance of isolating variables to gain precise insights into the functions and mechanisms of individual genes.

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Key Idea: Defence industrialisation

- **Context:** Defence industrialisation involves the development and production of military equipment, technology, and systems within a country to enhance its national security and self-sufficiency.
- **Statement:** Defence industrialisation strengthens a nation's security by fostering domestic production of essential military assets, reducing reliance on external sources and bolstering strategic autonomy.

Key Idea: Co-development and Co-production

- **Context:** Co-development and co-production refer to collaborative efforts between multiple entities, often from different countries, to jointly create and manufacture products, technologies, or systems.
- **Statement:** Co-development and co-production harness collective expertise, resources, and perspectives, resulting in shared innovations and enhanced capabilities that benefit all participants involved.

Key Idea: Spin-off Technologies

- **Context:** Spin-off technologies are unintended innovations that result from the development of a primary technology or research, offering unexpected applications and benefits.
- **Statement:** Spin-off technologies emerge as unexpected gifts of progress, extending the impact of initial research and development into new realms of usefulness and advancement.

Key Idea: Precision Technologies

- **Context:** Precision technologies encompass a range of advanced tools and methods designed to achieve accurate and targeted outcomes in various fields, often through meticulous control and measurement.
- **Statement:** Precision technologies empower industries with unparalleled accuracy, enabling refined processes and outcomes that were previously unattainable.

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Key Idea: In-house Design Capability

- **Context:** In-house design capability refers to an organization's capacity to internally create and develop designs for products, systems, or solutions, rather than outsourcing these tasks to external entities.
- **Statement:** In-house design capability empowers organizations to have direct control over the creative process, fostering innovation, customization, and efficient development of products or solutions.

Key Idea: Innovative Ecosystem

- **Context:** An innovative ecosystem refers to a dynamic environment where diverse elements such as research institutions, industries, start-ups, and supportive policies converge to foster creativity, collaboration, and the development of groundbreaking ideas.
- **Statement:** An innovative ecosystem nurtures a fertile ground for novel ideas to flourish, catalyzing cross-disciplinary interactions and driving transformative progress in various domains.

Key Idea: Knowledge-Intensive Sectors

- **Context:** Knowledge-intensive sectors are industries that heavily rely on intellectual capital, specialized skills, and advanced knowledge to create value and drive innovation.
- **Statement:** Knowledge-intensive sectors thrive on expertise and intellectual prowess, generating high-value products, services, and advancements that propel societies towards greater sophistication and progress.

Key Idea: Technological Breakthroughs

- **Context:** Technological breakthroughs represent significant advancements or discoveries that bring about revolutionary changes in science, engineering, or industry, often solving complex challenges or enabling new capabilities.
- **Statement:** Technological breakthroughs redefine the boundaries of human achievement, reshaping possibilities and opening doors to uncharted realms of innovation and progress.

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Key Idea: Premature Deindustrialisation

- **Context:** Premature deindustrialisation due to AI refers to the potential scenario where automation and artificial intelligence lead to a decline in traditional manufacturing industries before other sectors have fully matured.
- **Statement:** Premature deindustrialisation due to AI underscores the need for strategic planning and diversification to ensure that technological advancements benefit all sectors and contribute to sustainable economic growth.

Key Idea: IoT ecosystem

- **Context:** The Internet of Things (IoT) ecosystem refers to the interconnected network of devices, sensors, software, and services that enable the exchange of data and information among various physical objects through the internet.
- **Statement:** The IoT ecosystem empowers a new era of connectivity and automation, revolutionizing how devices communicate, collect data, and enhance efficiency in industries, homes, and everyday life.

Key Idea: Spectral efficiency

- **Context:** Spectral efficiency is a measure of how effectively a communication system utilizes the available frequency spectrum to transmit data, ensuring optimal use of limited resources.
- **Statement:** Spectral efficiency reflects the system's ability to transmit more data within the same frequency bandwidth, increasing capacity and enhancing the overall performance of wireless communication networks.

Key Idea: Digital Infrastructure

- **Context:** Digital infrastructure refers to the foundational components and technologies that enable the functioning of digital systems and services, encompassing networks, data centers, software platforms, and connectivity solutions.
- **Statement:** Digital infrastructure forms the backbone of the modern digital age, supporting seamless communication, data storage, and access to online resources that drive economic growth and societal transformation.

Key Idea: Digital Public Infrastructure

- **Context:** Digital Public Infrastructure (DPI) encompasses the technological framework and services established by governments to provide secure, reliable, and accessible digital platforms for citizens, businesses, and public institutions.
- **Statement:** Digital Public Infrastructure fosters digital inclusion and streamlines interactions between the public and government, enhancing efficiency, transparency, and the delivery of essential services in the digital era.

Key Idea: Invisible Web

- **Context:** The invisible web, also known as the deep web, refers to online content that is not indexed by traditional search engines and is not easily accessible through regular browsing.
- **Statement:** The invisible web consists of databases, private networks, and other content that requires specific access methods, highlighting the vast and often hidden depths of information on the internet.

Key Idea: Denial-of-Service Attack

- **Context:** A denial-of-service (DoS) attack is a malicious attempt to disrupt the normal functioning of a computer network, service, or website by overwhelming it with a flood of traffic, rendering it inaccessible to legitimate users.
- **Statement:** A denial-of-service attack aims to disrupt online services and create chaos by flooding a system with excessive traffic, highlighting the vulnerabilities that exist in the digital landscape.

Key Idea: Bidirectional Encryption

- **Context:** Bidirectional encryption, also known as two-way encryption, refers to a security method where data is encrypted both when it's sent and when it's received, ensuring that information remains protected throughout its transmission.
- **Statement:** Bidirectional encryption provides a robust layer of security, safeguarding data against unauthorized access or interception during its journey between sender and recipient.

Key Idea: Decentralized Database

- **Context:** A decentralized database is a type of database system where data is stored and managed across multiple locations or nodes rather than in a single central location, enhancing security, accessibility, and scalability.
- **Statement:** A decentralized database distributes data across a network, reducing the risk of a single point of failure and enabling collaborative data management while maintaining integrity and availability.

Key Idea: Decentralized Consensus

- **Context:** Decentralized consensus is a mechanism by which participants in a distributed network agree on the state of a system without relying on a central authority, often achieved through protocols like blockchain.
- **Statement:** Decentralized consensus ensures trust and agreement among network participants, enabling secure and transparent transactions or interactions without the need for a central controlling entity.

Key Idea: Double-Spending Problem

- **Context:** The double-spending problem refers to the challenge in digital transactions where a single digital token or currency unit is spent more than once, which is a concern when dealing with digital assets that lack a physical presence.
- **Statement:** The double-spending problem necessitates innovative solutions, like blockchain technology, to prevent fraudulent or duplicate transactions and ensure the integrity of digital transactions and currencies.

Key Idea: Peer-to-peer Bitcoin Network

- **Context:** The peer-to-peer Bitcoin network is the decentralized network through which Bitcoin transactions are conducted directly between users without the need for intermediaries, using a distributed ledger known as the blockchain.
- **Statement:** The peer-to-peer Bitcoin network empowers users to send and receive digital currency directly, promoting transparency, security, and autonomy in financial transactions without relying on traditional financial institutions.

Key Idea: Intelligent Machines

- **Context:** Intelligent machines refer to devices or systems that possess the ability to process information, learn from data, make decisions, and perform tasks that typically require human intelligence, often through the use of artificial intelligence and machine learning technologies.
- **Statement:** Intelligent machines represent the forefront of technological advancement, capable of enhancing efficiency, accuracy, and automation across various industries while raising questions about ethics, privacy, and the future of work.

Key Idea: Self-learning Algorithms

- **Context:** Self-learning algorithms, also known as machine learning algorithms, are computational techniques that enable computer systems to improve their performance on a task through exposure to data, allowing them to learn and adapt without being explicitly programmed.
- **Statement:** Self-learning algorithms empower computers to acquire knowledge and refine their performance, mimicking aspects of human learning and enabling systems to evolve and make better decisions over time.

Key Idea: Technological advancement

- **Context:** Technological advancement refers to the continuous progression and improvement of tools, systems, and methods driven by innovation and discovery.
- **Statement:** Technological advancement propels society forward, enhancing our capabilities, efficiency, and quality of life through transformative breakthroughs.



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