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**DEVELOPMENT IN
THE FIELD OF
INFORMATION
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As IAS prelims 2021 is knocking at the door, jitters and anxiety is a common emotion that an aspirant feels. But if we analyze the whole journey, these last few days act most crucial in your preparation. This is the time when one should muster all their strength and give the final punch required to clear this exam. But the main task here is to consolidate the various resources that an aspirant is referring to.

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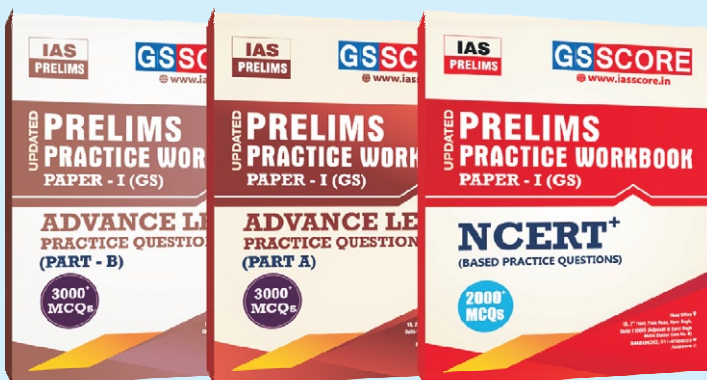
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DEVELOPMENT IN THE FIELD OF INFORMATION TECHNOLOGY

Information Technology (IT) is a generic term that covers the acquisition, processing, storage, and dissemination of information. It involves the application of computers and communication technology in the task of information handling, information, and information flow from the generation to the utilization levels.

Basic Computer/IT Terms

- **Adware:** It is a software package that automatically renders advertisements to generate revenue for its author.
- **Android:** It is a Linux based operating system designed primarily for touchscreen mobile devices such as smartphones and tablets computers.
- **Algorithm:** It is a step by step method of solving a problem. It is commonly used for data processing, calculation, and other related computer and mathematical operations.
- **Antivirus Software:** It consists of computer programs that attempt to identify threats and eliminate computer viruses and other malicious software (Malware).
- **Big Data:** It is a phrase used to mean a massive volume of both structured and unstructured data that is so large that it is difficult to process using traditional database and software techniques. In most enterprise scenarios the volume of data is too big or it moves too fast or it exceeds current processing capacity.

- **Bandwidth:** The maximum amount of data that can travel in a communication path in a given time, measured in bits per second (bps).
- **Bar Code:** It is a machine-readable representation of information in a visual format on a surface. The first bar code system was developed by **Norman Joseph Woodland and Bernard Silver in 1952**.
- **Blog:** It is a discussion or informational site published on the World Wide Web.
- **Bluetooth:** A protocol that permits a wireless exchange of information between computers, cell phones, and other electronic devices within a radius of about 30 feet.
- **Cryptograph:** The pre-fix “**crypt**” means “**hidden**” or “**vault**” and the suffix “**graphy**” stands for “**writing**”. Cryptography is a method of protecting information and communications through the use of codes so that only those for whom the information is intended can read and process it. It includes techniques such as microdots, merging words with images, and other ways to hide information in storage or transit.
- **Cookie:** A packet of information that travels **between a browser and the webserver**.
- **Data mining:** It is defined as a process used to extract (mining) usable data from a larger set of any raw data. It implies analysing data patterns in large batches of data using one or more software. Data mining has applications in multiple fields, like science and research, business.
- **Digital locker:** It is an online media storage service. Files stored include music, videos, movies, games, and other media. Most digital locker services require a user to register to avail of the service.
- **Digital Signature:** It is a mathematical technique used to validate the authenticity and integrity of a message, software, or digital document. The digital equivalent of a handwritten signature or stamped seal, a digital signature offers far more inherent security, and it is intended to solve the problem of tampering and impersonation in digital communications.
- **Digital divide:** It refers to the difference between people who have easy access to the Internet and those who do not. A lack of access is believed to be a disadvantage to those on the disadvantaged side of the digital divide because of the huge knowledge base that can only be found online.
- **Debugging:** It is a methodical process of finding and reducing the number of bugs, or defects, in a computer program or a piece of electronic hardware, thus making it behave as expected.
- **Encryption:** In cryptography, encryption is the process of encoding messages (or information) in such a way that hackers cannot read it, but authorised users can access it.
- **Graphic Interchange Format (GIF):** A simple file format for pictures and photographs that are compressed so they can be sent quickly.
- **JPEG:** It is a commonly used method of lossy compression for digital photography. The term ‘JPEG’ is an acronym for the **Joint Photographic Experts Groups**.
- **HyperText Transfer Protocol (HTTP):** It is an important protocol used on the World Wide Web for moving hypertext files across the internet. It requires an HTTP client program on one end and HTTP server program on the other end.
- **Internet Protocol (IP) Address:** IP addresses are assigned to every computer on a TCP/IP network. It ensures that data on a network goes where it is supported to go e.g., 192.168.2.250.
- **Internet Service Provider (ISP):** It is a business organization that offers users access to the Internet and related services.
- **Local Area Network (LAN):** In a LAN the connected computers are geographically close together. They are either in the same building or within a smaller area.
- **Metadata**
 - It is data that describes other data. Meta is a prefix that is used in information technology implying “**an underlying definition or description.**”

- ▶ Metadata summarizes basic information about data, which can make finding and work with particular instances of data easier.
- ▶ For example, author, date created, and date modified and file sizes are examples of very basic document metadata.
- ▶ Having the ability to filter through that metadata makes it much easier for someone to locate a specific document.

◉ Net Neutrality

- ▶ It is a principle affirming that all **ISP must treat all data on the internet equally**. They must not discriminate against certain services, users, content, applications, or methods of communication.
- ▶ Under Net Neutrality regulations, an ISP is neither allowed to intentionally block, or slow down specific content or websites nor is an ISP allowed to charge additional fees for access to certain internet services.

- ◉ **Piracy:** The illegal copying of software or other creative works.

◉ Phishing

- ▶ It is a fraudulent attempt whereby cybercriminals try to get sensitive information from you, like credit card numbers and passwords.
- ▶ Some specific techniques include spear-phishing (targets specific people or departments), whale phishing (targets important people like CEOs), and **Smishing** (phishing via text messages) and **vishing** (voice phishing that takes place over the phone, usually through impersonation)

◉ Ransomware

- ▶ It is a subset of malware in which the data on a victim's computer is locked, typically by encryption, and payment is demanded before the ransomed data is decrypted and access returned to the victim.
- ▶ The motive for ransomware attacks is nearly always monetary, and unlike other types of attacks, the victim is usually notified that an exploit has occurred and is given instructions for how to recover from the attack.
- ▶ Payment is often demanded in a virtual currency, such as bitcoin so that the cybercriminal's identity isn't known.

- ◉ **Spoofing:** When cybercriminals try to get into your computer by masquerading as a trusted source. Examples include email spoofing (using email header that appears to be from someone you trust), IP spoofing (using a fake IP address to impersonate a trusted machine), and address bar spoofing (using malware to force you to view a specific web page).

- ◉ **Spyware:** Malware that gathers information about you, usually to track your internet use and deliver pop-up ads.

- ◉ **Spam:** Irrelevant or unsolicited messages sent over the Internet, typically to large numbers of users, for advertising. Phishing spreading malware, etc

◉ Virtual Reality

- ▶ An artificial environment created with computer hardware and software and presented to the user in such a way that it appears and feels like a real environment.
- ▶ To create this effect, the user needs Hardware devices like goggles, gloves, and earphones, etc inbuilt with sensors. It enables people to deal with information more easily.
- ▶ VR provides a different way to see and experience information, one that is dynamic and immediate.

- ◉ **Zombie:** Malware used to take control of a system remotely at a later time.

- ◉ **Worm:** Malware that self-replicates and sends itself to other computers in your network.

Current Trends in Information Technology

Advancements in IT systems relate to what the industry is leaning toward or disregarding now. Information technology is advancing so rapidly that new developments are quickly replacing current projections.

1. Cloud Computing

- ▶ Cloud computing is a network of resources a company can access, and this method of using a digital drive increases the efficiency of organizations.
- ▶ Instead of local storage on computer hard drives, companies will be freeing their space and conserving funds.
- ▶ According to Forbes, 83 percent of enterprise workloads will be in the cloud by 2020, which means 2019 will show an increasing trend in closing in on this statistic.
- ▶ Cloud storage and sharing is a popular trend many companies have adopted and even implemented for employee interaction.
- ▶ A company-wide network will help businesses save on information technology infrastructure.
- ▶ Cloud services will also extend internal functions to gain revenue.
- ▶ Organizations that offer cloud services will market these for external products and continue their momentum.
- ▶ Organizations will transfer their stored files across multiple sources using virtualization.
- ▶ Companies are already using this level of virtualization, but will further embrace it in the year to come.
- ▶ Less installation across company computers is another positive result of cloud computing because the Internet allows direct access to shared technology and information.
- ▶ The freedom of new products and services makes cloud computing a growing trend.

2. Mobile Computing and Applications

- ▶ Mobile phones, tablets, and other devices have taken both the business world and the personal realm by storm.
- ▶ Mobile usage and the number of applications generated have both skyrocketed in recent years.
- ▶ Now, 77 percent of Americans own smartphones — a 35 percent increase since 2011.
- ▶ Experts project mobile traffic to increase even further in 2019, and mobile applications, consumer capabilities, and payment options will be necessary for businesses.
- ▶ Fastest-growing companies have already established their mobile websites, marketing, and apps for maximized security and user-friendliness. Cloud apps are also available for companies to use for on-the-go capabilities.

3. Big Data Analytics

- ▶ Big data is a trend that allows businesses to analyze extensive sets of information to achieve variety in increasing volumes and growth of velocity.
- ▶ Big data has a high return on investment that boosts the productivity of marketing campaigns, due to its ability to enable high-functioning processing.

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- ▶ Data mining is a way companies can predict growth opportunities and achieve future success.
- ▶ Examination of data to understand markets and strategies is becoming more manageable with advances in data analytic programs.
- ▶ This practice in information technology can be observed for its potential in data management positions for optimal organizations.
- ▶ Database maintenance is a growing sector of technology careers.

4. Automation

- ▶ Another current trend in the IT industry is automated processes.
- ▶ Automated processes can collect information from vendors, customers, and other documentation.
- ▶ Automated processes that check invoices and other accounts-payable aspects expedite customer interactions.
- ▶ Machine processes can automate repetitive manual tasks, rather than assigning them to employees.
- ▶ This increases organization-wide productivity, allowing employees to use their valuable time wisely, rather than wasting it on tedious work.
- ▶ Automation can even produce more job opportunities for IT professionals trained in supporting, programming, and developing automated processes.
- ▶ Machine learning can enhance these automated processes for a continually developing system.
- ▶ Automated processes for the future will extend to groceries and other automatic payment methods to streamline the consumer experience.

Emerging Trends in Information Technology

1. Artificial Intelligence and Smart Machines

- ▶ Artificial intelligence harnesses algorithms and machine learning to predict useful patterns humans normally identify.
- ▶ Smart machines take human decision-making out of the equation so intelligent machines can instigate changes and bring forward solutions to basic problems.
- ▶ Companies are rallying around artificial intelligence in the workplace because it allows employees to use their abilities for the most worthwhile tasks, along with the management of these smart machines for a more successful system.
- ▶ The U.S. Army is applying artificial intelligence measures from Uptake Technologies to vehicles mainly used in peacekeeping missions for repair purposes.
- ▶ Their predictive software will reduce irregular maintenance and hone in on machine components that are more likely to deteriorate or get damaged.
- ▶ Predictive vehicle repairs can grow and extend to civilian purposes in the coming years.
- ▶ AI face recognition is beginning to help with missing people reports, and it even helps identify individuals for criminal investigations when cameras have captured their images.

- ▶ According to the National Institute of Standards and Technology, face recognition is most effective when AI systems and forensic facial recognition experts team-up.
- ▶ AI will continue to promote safety for citizens in the future as software improvements shape these applications.
- ▶ Medical AI is another trend that reflects surprising success. Given patient information and risk factors, AI systems can anticipate the outcome of treatment and even estimate the length of a hospital visit.
- ▶ Deep learning is one way AI technology gets applied to health records to find the likelihood of a patient's recovery and even mortality.
- ▶ Experts evaluate data to discover patterns in the patient's age, condition, records, and more.
- ▶ Home AI systems are also increasingly popular to expedite daily tasks like listening to tunes, asking for restaurant hours, getting directions, and even sending messages.
- ▶ Many problem-solving AI tools also help in the workplace, and the helpfulness of this technology will continue to progress in 2019.
- ▶ AI careers are increasing in demand, but the nature of AI skills is shifting.
- ▶ AI projects have caught on throughout many businesses, but the outlook of company leaders is more than the projects are returning without properly equipped personnel to implement strategic AI advances. Positions related to AI are necessary to fulfill the potential of these enterprises.

2. Virtual Reality

- ▶ Technology that includes virtual reality is becoming prevalent.
- ▶ The software of virtual reality is making many industries prepared for various scenarios before entering them.
- ▶ The medical profession is projected to use virtual reality for some treatments and interactions with patients in the coming years.
- ▶ Virtual training sessions for companies can cut costs, fill in the need for personnel, and increase education.
- ▶ According to Gartner, by 2023, virtual simulations for selected patients with specific illnesses will reduce emergency room visits in America by 20 million.
- ▶ These simulations will have intelligence capabilities, so virtual-reality care can still provide patients with proper attention.
- ▶ Virtual-reality professionals will be in high demand in the coming years as the technology catches on in various industries.
- ▶ Specialized fields are the main places where virtual reality has caught on, but experts project it will become more applicable to other technological advances. Backgrounds in optics and hardware engineering are particularly sought-after skills.

3. Augmented Reality

- ▶ Augmented reality is a more versatile and practical version of virtual reality, as it does not fully immerse individuals in an experience.
- ▶ Augmented reality features interactive scenarios that enhance the real world with images and sounds that create an altered experience.
- ▶ The most common current applications of this overlay of digital images on the surrounding environment include the recent Pokémon Go fad or the additions on televised football in the U.S.

- ▶ Augmented reality can impact many industries in useful ways.
- ▶ Airports are implementing augmented-reality guides to help people get through their checks and terminals as quickly and efficiently as possible.
- ▶ Retail and cosmetics are also using augmented reality to let customers test products, and furniture stores are using this mode to lay-out new interior design options.
- ▶ The possibilities for augmented reality in the future revolve around mobile applications and health care solutions.
- ▶ Careers in mobile app development and design will be abundant, and information technology professionals can put their expertise to use in these interactive experiences.

4. Blockchain Data

- ▶ Blockchain data, like the new cryptocurrency Bitcoin, is a secure method that will continue to grow in popularity and use in 2019. This system allows us to input additional data without changing, replacing, or deleting anything.
- ▶ In the influx of shared data systems like cloud storage and resources, protecting original data without losing important information is crucial.
- ▶ The authority of many parties keeps the data accounted for without turning over too much responsibility to certain employees or management staff.
- ▶ For transaction purposes, blockchain data offers a safe and straightforward way to do business with suppliers and customers.
- ▶ Private data is particularly secure with blockchain systems, and the medical and information technology industries can benefit equally from added protection.

5. Cyber-Privacy and Security

- ▶ Shared company systems and the growth of the Internet leave a high amount of personal and company data at risk to breaches.
- ▶ Redesigned systems and new firewalls and gateways will be added to the services companies need to bolster their technology.
- ▶ Cybersecurity is a concentration of IT that will help secure clouds and improve the trust between businesses and their vendors.
- ▶ Recognition software will replace much of the password-protected systems companies use in 2019.
- ▶ Biometric measures and other safety protocols will increase the security of business practices, especially business-to-business interactions.
- ▶ Although authentication and recognition programs enhance protection, the Internet of Things technology requires further development.
- ▶ The vulnerability of the Internet of Things systems is already projected to contain risks the industry is not prepared for.
- ▶ As the Internet and shared company networks increase, cybersecurity and privacy are vulnerable to infiltration.
- ▶ However, many companies are already aware of the projected weak spots in their technology. IT professionals need to address these issues and find practical and fortifying solutions.

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6. Internet of Things

- ▶ It is an emerging movement of products with integrated Wi-Fi and network connectivity abilities.
- ▶ Cars, homes, appliances, and other products can now connect to the Internet, making activities around the home and on the road an enhanced experience.
- ▶ Use of IoT allows people to turn on music hands-free with a simple command, or lock and unlock their doors even from a distance.
- ▶ Many of these functions are helping organizations in customer interaction, responses, confirmations, and payments.
- ▶ Remote collection of data assists companies the most. IoT almost acts like a digital personal assistant.
- ▶ The intelligent features of some of these IoT products can aid in many company procedures.
- ▶ Voice recognition and command responses will allow you to access stored data on cloud services.
- ▶ IoT enriches the IT industry, especially in job creation.

7. Quantum Computing

- ▶ Quantum computing harnesses the phenomena of quantum mechanics to deliver a huge leap forward in computation to solve certain problems.
- ▶ Rather than store information using bits represented by 0s or 1s as conventional digital computers do, quantum computers use quantum bits, or qubits, to encode information as 0s, 1s, or both at the same time. This superposition of states—along with the other quantum mechanical phenomena of entanglement and tunneling—enables quantum computers to manipulate enormous combinations of states at once.
- ▶ Quantum computers, use qubits, which are typically subatomic particles such as electrons or photons.
- ▶ Companies, such as IBM, Google, and Rigetti Computing, use superconducting circuits cooled to temperatures colder than deep space. Others, like IonQ, trap individual atoms in electromagnetic fields on a silicon chip in ultra-high-vacuum chambers. In both cases, the goal is to isolate the qubits in a controlled quantum state.

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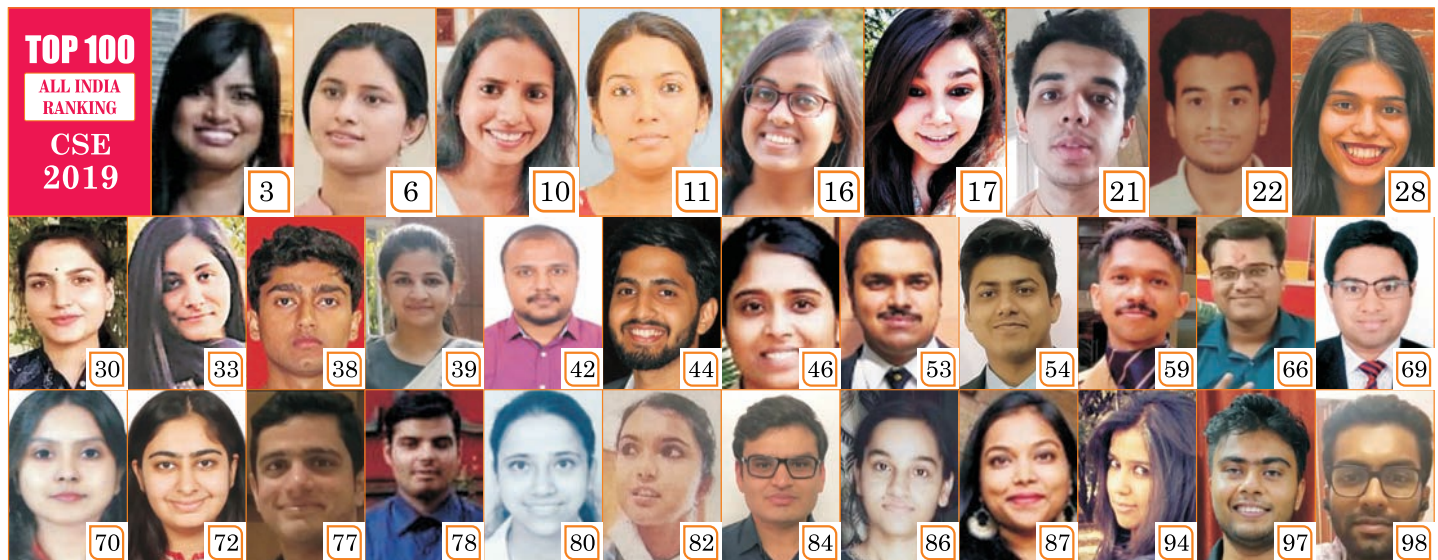
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