

# **General Science & Technology**

for

## **UPSC**

**(Analysis of Previous year  
Question paper & syllabus)**

**(MAINS : 2013 – 2019)**

**By**

**Dr. Ravi P. Agrahari  
(Faculty of KSG, IIT Delhi,  
Author of Mc Graw Hill)**

**Exclusive Programme**

**for**

**UPSC**

**Prelims - cum – Mains  
Examination**

**Dr. Ravi P. Agrahari**

Science & Technology play a very important role in UPSC prelims and mains examination. In prelims there are 15% question from this section in last NINE years. Prelims preparation needs both factual and conceptual clarity because it balances both.

**Dr. Ravi P. Agrahari**

Where is the  
General Sciences  
in  
General Studies

?????

**Dr. Ravi P. Agrahari**



<b>General Science</b>	<b>2011</b>	<b>2012</b>	<b>2013</b>	<b>2014</b>	<b>2015</b>	<b>2016</b>	<b>2017</b>	<b>2018</b>	<b>2019</b>
<b>Biology</b>	0	1	6	8	1	2	3	0	2
<b>Physics</b>	0	0	4	0	0	0	0	0	0
<b>Chemistry</b>	0	0	0	1	0	0	0	0	0
<b>Science &amp; Technology</b>	18	12	6	9	13	16	11	14	18
<b>Grand Total</b>	<b>18</b>	<b>13</b>	<b>16</b>	<b>18</b>	<b>14</b>	<b>18</b>	<b>14</b>	<b>14</b>	<b>20</b>

**Dr. Ravi P. Agrahari**

# Syllabus of Prelims Exam

## GENERAL SCIENCE

**Dr. Ravi P. Agrahari**

**GS (PAPER – III)**  
**(Syllabus of Mains exam - Science & Tech.)**

Science and Technology- developments and their applications and effects in everyday life, Achievements of Indians in science & technology; indigenization of technology and developing new technology.

Awareness in the fields of IT, Space, Computers, robotics, nano-technology, bio-technology and issues relating to intellectual property rights.

**Dr. Ravi P. Agrahari**

# **Science & Technology**

**UNIT-1: SCIENCE & TECHNOLOGY IN INDIA**

**UNIT-2: ENERGY**

**UNIT-3: SPACE TECHNOLOGY**

**UNIT-4: Communication and Information Technology**

**UNIT-5: DEFENCE TECHNOLOGY**

**UNIT-6: SUPERCONDUCTIVITY, LASER, ARTIFICIAL INTELLIGENCE,  
ROBOTICS, NANOTECHNOLOGY**

**UNIT-7: INTELLECTUAL PROPERTY RIGHTS (IPR) & RELATED RIGHTS**

**UNIT-8: ASTRONOMY & PARTICLE PHYSICS**

**UNIT-9: BIOTECHNOLOGY**

**Unit-10: DIFFERENT TYPES OF DISEASES AND ITS RECENT ISSUES, HEALTH  
& FAMILY WELFARE AND VARIOUS IMMUNISATION PROGRAMME**

**Unit-11: MISCELLANEOUS TOPICS**

**Dr. Ravi P. Agrahari**

# **ANALYSIS OF MAINS QUESTION PAPER**

**2013 - 2019**

**Dr. Ravi P. Agrahari**

# **UPSC MAINS - 2013**

**Dr. Ravi P. Agrahari**

1. Write a note on India's green energy corridor to alleviate the problem of conventional energy.
2. What do you understand by Fixed Dose drug Combinations (FDCs)? Discuss their merits and demerits.
3. What do you understand by Umpire Decision Review System in cricket? Discuss its various components. Explain how silicone tape on the edge of a bat may fool the system?

**Dr. Ravi P. Agrahari**

4. a) What is a digital signature? What does its authentication mean? Give various salient built-in features of a digital signature.
- b) How does the 3D printing technology work? List out the advantages and disadvantages of the technology.
5. Bringing out the circumstances in 2005 which forced amendment to the section 3(d) in Indian Patent Law, 1970, discuss how it has been utilized by the Supreme Court in its judgement in rejecting Novartis' patent application for 'Glivec'. Discuss briefly the pros and cons of the decision.

**Dr. Ravi P. Agrahari**

# **UPSC-MAINS-2014**

**Dr. Ravi P. Agrahari**

- 1. Scientific research in Indian universities is declining, because a career in science is not as attractive as are business professions, engineering, or administration, and the universities are becoming consumer-oriented. Critically comment. (200 words)**
- 2. Can overuse and free availability of antibiotics without Doctor's prescription, be the contributors to the emergence of drug-resistant diseases in India? What are the available mechanisms for monitoring and control? Critically discuss the various issues involved. (200 words)**
- 3. In a globalized world, intellectual property rights assume significance and are a source of litigation. Broadly distinguish between the terms — Copyrights, Patents, and Trade Secrets. (200 words)**

**Dr. Ravi P. Agrahari**

# **UPSC-MAINS-2015**

**Dr. Ravi P. Agrahari**

- 1. What do you understand by “Standard Positioning Systems” and “Precision Positioning Systems” in the GPS era? Discuss the advantages India perceives from its ambitious IRNSS programme by employing just seven satellites. (200 words)**
- 2. What are the areas of prohibitive labour that can be sustainably managed by robots? Discuss the initiatives that can propel research in premier research institutes for substantive and gainful innovation. (200 words)**

- 3. Discuss the advantages and security implications of cloud hosting of servers vis-a-vis in-house machine-based hosting for government businesses. (200 words)**
- 4. India's Traditional Knowledge Digital Library (TKDL), which has a database containing formatted information on more than 2 million medicinal formulations is proving a powerful weapon in the country's fight against erroneous patents. Discuss the pros and cons of making this database publicly available under open-source licensing. (200 words)**

# **UPSC-MAINS-2016**

**Dr. Ravi P. Agrahari**

- 1. Give an account of the current status and the targets to be achieved pertaining to renewable energy sources in the country. Discuss in brief the importance of National Programme on Light Emitting Diodes (LEDs). (200 words)**
- 2. Discuss India's achievements in the field of Space, Science, and Technology. How does the application of this technology helped India in its socio-economic development? (200 words)**
- 3. Why is nanotechnology one of the key technologies of the 21st century? Describe the salient features of Indian Government's Mission on Nanoscience and Technology and the scope of its application in the development process of the country. (200 words)**

**Dr. Ravi P. Agrahari**

# **UPSC-MAINS-2017**

**Dr. Ravi P. Agrahari**

1. Stem cell therapy is gaining popularity in India to treat a wide variety of medical conditions including leukaemia, Thalassemia, damaged sornea and several burns. Describe briefly what stem cell therapy is and what advantages it has over other treatments?
2. India has achieved remarkable successes in unmanned space missions including the Chandrayaan and Mars Orbiter Mission, but has not ventured into manned space mission, both in terms of technology and logistics? Explain critically
3. Give an account of the growth and development of nuclear science and technology in India. What is the advantage of fast breeder reactor programme in India?
4. How does the Juno Mission of NASA help to understand the origin and evolution of the Earth? (150 words)

# **UPSC-MAINS-2018**

**Dr. Ravi P. Agrahari**

1. Discuss the work of ‘Bose-Einstein Statistics’ done by Prof. Satyendra Nath Bose and show how it revolutionized the field of Physics. (150 Words, 10 Marks)
2. Why is there so much activity in the field of biotechnology in our country? How has this activity benefitted the field of biopharma? (250 Words, 15 Marks)
3. With growing energy needs should India keep on expanding its nuclear energy programme? Discuss the facts and fears associated with nuclear energy. (250 Words, 15 Marks)

**Dr. Ravi P. Agrahari**

# **UPSC-MAINS-2019**

**Dr. Ravi P. Agrahari**

**Q1. What is India's plan to have its own space station and how will it benefit our space programme?  
(Answer in 150 words) 10 Marks**

**Q 2. What is Cyber Dome Project? Explain how it can be useful in controlling internet crimes in India.  
(Answer in 150 words) 10 Marks**

**Q 3. How is the government of India protecting traditional knowledge of medicine from patenting by pharmaceutical companies? (Answer in 250 words) 15 Marks**

**Q 4. How can biotechnology improve the living standards of farmers? (Answer in 250 words) 15 Marks**

**Dr. Ravi P. Agrahari**

**Q1. What is India's plan to have its own space station and how will it benefit our space programme?  
(Answer in 150 words) 10 Marks**

**Q 2. What is Cyber Dome Project? Explain how it can be useful in controlling internet crimes in India.  
(Answer in 150 words) 10 Marks**

**Q 3. How is the government of India protecting traditional knowledge of medicine from patenting by pharmaceutical companies? (Answer in 250 words) 15 Marks**

**Q 4. How can biotechnology improve the living standards of farmers? (Answer in 250 words) 15 Marks**

**Dr. Ravi P. Agrahari**

# THANK YOU

## SCIENCE AND TECHNOLOGY

FOR CIVIL SERVICES PRELIMINARY AND MAIN EXAMINATIONS

FOURTH EDITION

Science and Technology is one of the most dynamic subjects in the UPSC examination. In recent years, UPSC is emphasising on dynamic cum analytical aspect of Science and Technology. Keeping this in mind and aligned as per the examination trends, the fourth edition of *Science and Technology* has been thoroughly revised to suit the needs of students appearing for UPSC Preliminary and Main Examination. This book delves into important aspect of the examination in detail, providing aspirants with a ready-made amalgamation of basic concepts intertwined with recent developments in the various fields making it easier for students especially from non-science background to comprehend and retain.

### Salient Features

- All the recent developments related to the pandemic have been added in a separate section as 'CORONA DIARY'
- Updated content on recent developments/current affairs/government schemes related to Science and Technology
- Facts and figures chronologically presented using appropriate pictograms, graphics and tables for immediate understanding
- Important terms highlighted through the text for easy retention
- Previous years' questions of UPSC Preliminary examination have been added chapter wise to understand the trend of the examination
- Previous years' questions of UPSC Main examination (up to 2019) with the solutions have been provided in a separate section for practice
- Practice test papers at the end for self-assessment
- To access 2020 UPSC Preliminary examination question paper analysis , click on the below mentioned link

### About the Author

Dr. Ravi P Agrahari, a Ph.D. from IIT Delhi, is a recipient of Junior Research Fellowship and Senior Research Fellowship from CSIR, Government of India. He worked as a research scientist in IIT Delhi from 2015 to 2017. Mr. Agrahari is presently working as an independent consultant in the field of Environment, renewable and sustainable energy and biomass issues at the Bag Energy Research Society, Varanasi and Rene Foundation Thoothukudi (Tamil Nadu). He is an expert in the field of energy and has published various papers in many reputed international journals. He has attended many international conference in Sweden and France. Dr. Agrahari is well known for his expertise in "Environment Science" and "Science and Technology" and has authored several books on these topics for UPSC examinations. He has been teaching for over 15 years. Dr. Agrahari has been associated with more than 50 reputed coaching institutes in more than 15 states of India. He is also associated with various NGOs and Civil Societies for the welfare of weaker section and minority students.

To access additional learning resources, please visit

<https://www.mheducation.co.in/>

and follow the steps given on the front inner cover of the book

Writing to us at  
info.india@mheducation.com



www.mheducation.co.in

ISBN-13: 978-93-90113-06-4

ISBN-10: 93-90113-06-7



9789390113064

## SCIENCE AND TECHNOLOGY

FOURTH EDITION

SCIENCE AND TECHNOLOGY  
FOR CIVIL SERVICES PRELIMINARY AND MAIN EXAMINATIONS

## SCIENCE AND TECHNOLOGY

FOR CIVIL SERVICES PRELIMINARY  
AND MAIN EXAMINATIONS



RAVI P AGRAHARI

**Dr. Ravi P. Agrahari**