RTO AMVI पूर्व परीक्षा

यशाची गुरुकिल्ली

The Ultimate Guide

- Combine Group B & C च्या आधारावरील दर्जेदार अभ्यास साहित्य
- बदलणाऱ्या परीक्षा पद्धतीनुसार अद्यावत अभ्यास साहित्य
- विषयांची मुद्देसूद मांडणी
- महत्वाच्या Facts चा समावेश

पुस्तक मागणीसाठी संपर्क:

8263954946 | 9607155111

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9607155111

अक्षरजुळणी, सजावट व मुखपृष्ठ

Team Infinity

We Have made all possible effort to make this book error free however it is request to all students, if you find any error or want to give suggestions that we can incorporate into future editions, feel free Send us email girish@infinitycivilacademy.com

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श्री स्वामी समर्थ...

स्वामींच्या चरणी अर्पण ...

PREFACE

RTO AMVI या पदासाठीच्या पूर्व परीक्षेच्या तयारीसाठी लागणारे व विद्यार्थ्यांच्या अभ्यासाच्या सर्व गरजा पूर्ण करणारी "यशाची गुरुकिल्ली" आम्ही सादर करीत असतांना आम्हाला विशेष आनंद होत आहे.

RTO AMVI पूर्व परीक्षा ही स्पर्धक विद्यार्थ्यांसाठी अत्यंत महत्त्वपूर्ण टप्पा असतो. यामध्ये महाराष्ट्र लोकसेवा आयोगाच्या गट क च्या गटामध्ये RTO AMVI पूर्व परीक्षा मोडते . यामध्ये विविध विषय समविष्ट आहेत त्यामुळे विद्यार्थ्यांना विविध पुस्तके हाताळावी लागतात व त्यातच विद्यार्थ्यांचा बहुमुल्य वेळ दर्जेदार अभ्याससाहित्य जमा करण्यात जातो. विद्यार्थ्यांचा हा वेळ या पुस्तकाच्या माध्यमातून वाचेल व तो त्यांना अभ्यास करण्यासाठी उपयुक्त ठरेल.

या पुस्तकाची निर्मिती करताना प्रत्येक विषयामध्ये तज्ञ व अनुभवी असलेल्या शिक्षकांची मेहनत फळारुपाला आली आहे . RTO AMVI परीक्षेतील सर्व विषय, मागील वर्षांचे प्रश्नपत्रिकांचे सखोल आणि सूक्ष्म विश्लेषण करून त्या प्रश्न पातळीला धरून हे अभ्यास साहित्य तयार केले गेले आहे. त्यामुळे विद्यार्थ्यांना अभ्यासाची रणनीती ठरवण्यासाठी मदत होईल . विद्यार्थ्यांना प्रभावी मार्गदर्शन मिळावे हा प्रमुख हेतू आहे.

पुस्तकात सर्वोतोपरी त्रुटी काढून टाकण्याचा प्रयत्न केला आहे तरी काही त्रुटी आढळून आल्यास संपर्क करावा .

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आपला

गिरीश खेडकर

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इतिहास -आधुनिक भारताचा विशेषत: महाराष्ट्राचा इतिहास.
भूगोल - महाराष्ट्राच्या भूगोलाच्या विशेष अभ्यासासह - पृथ्वी, जगातील विभाग, हवामान, अक्षांश-रेखांश, महाराष्ट्रातील जमिनीचे प्रकार, पर्जन्यमान, प्रमुख पिके, शहरे, नद्या, उद्योगधंदे, इत्यादी.
अर्थव्यवस्था - **भारतीय अर्थव्यवस्था** - राष्ट्रीय उत्पन्न, शेती, उद्योग, परकीय व्यापार, बँकिंग, लोकसंख्या, दारिद्रय व बेरोजगारी, मुद्रा आणि राजकोषीय नीति, इत्यादी. **शासकीय अर्थव्यवस्था** - अर्थसंकल्प, लेखा, लेखापरीक्षण, इत्यादी.
राज्यशास्त्र
सामान्य विज्ञान - भौतिकशास्त्र (Physics), रसायनशास्त्र (Chemistry), प्राणिशास्त्र (Zoology), वनस्पतीशास्त्र (Botany), आरोग्यशास्त्र (Hygiene).
अंकगणित - बेरीज, वजाबाकी, गुणाकार, भागाकार, दशांश, अपूर्णांक व टक्केवारी इत्यादी
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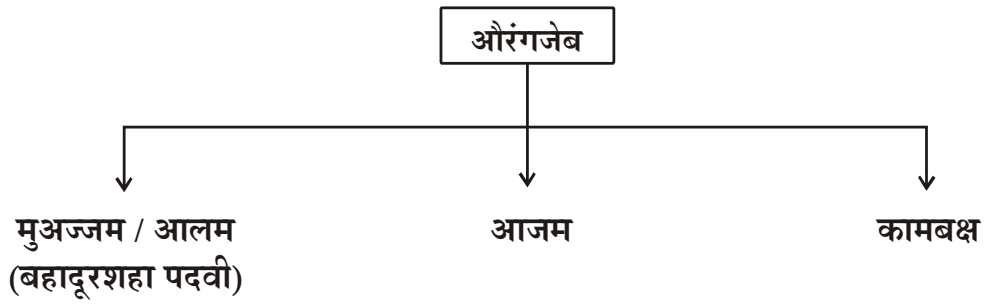
इतिहास

मुघल सत्तेचे पतन

- 20 फेब्रुवारी 1707 रोजी 88 व्या वर्षी औरंगजेबाचा मृत्यू.
- त्याच्या मृत्यूनंतर त्याच्या मुलांमध्ये सत्ता संघर्ष सुरू झाला.
- मुघलांमध्ये वारसा हक्क नियम हा श्रेष्ठत्वाचा होता. (मराठ्यांमध्ये जेष्ठत्व)



- 18 जून 1707 मध्ये आगऱ्याजवळ आजमचा पराभव झाला व तो मारला गेला.
- जानेवारी 1709 मध्ये हैद्राबादजवळ कामबक्ष मारला गेला.
- 1707 मध्ये मुअज्जमने 'बहादूरशाह' ही पदवी घेऊन स्वत:ला सम्राट घोषित केले.

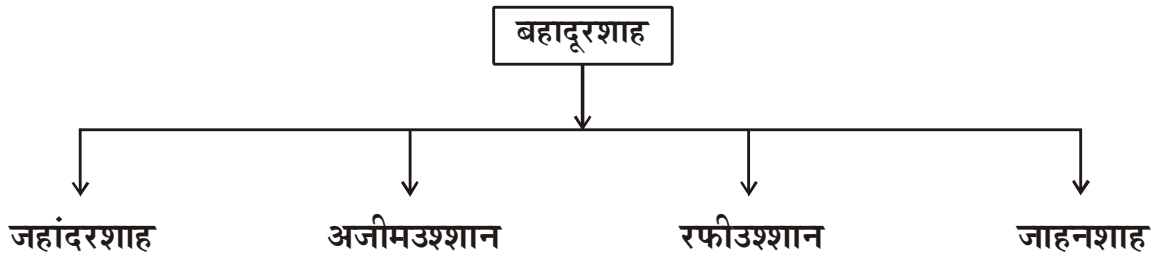
● सम्राट बहादूरशाह :

- 62 व्या वर्षी सत्तेवर आला.
- त्याने शांततेच्या धोरणाचा अवलंब केला.

A) 1689 पासून मुघलांच्या कैदेत असणाऱ्या शाहूंची सुटका त्याने केली आणि शाहूला दक्षिणेत जाण्याची अनुमती दिली. मूळ उद्देश हा होता की, मराठ्यांमध्ये यादवी निर्माण व्हावी.

B) बहादूरशाहला शिखांबरोबर संघर्ष करावा लागला.

- गुरू गोविंद सिंहांच्या मृत्यूनंतर बंदा बैरागीने शिखांना एकत्र केले व संघर्ष पुढे चालवला.
- 17 फेब्रुवारी 1712 मध्ये बहादूरशाहचा मृत्यू झाला.
- "ज्याच्याविषयी काही चांगले शब्द वापरता येतील असा शेवटचा मुघल सम्राट म्हणजे बहादूरशाह." - सर सिडनी ओवन



- बहादूरशाहच्या मृत्यूनंतर त्याच्या मुलांमध्ये संघर्ष सुरू झाला.
- या संघर्षात जहांदरशाहचा विजय झाला.
- इराणी गटाचा नेता 'जुल्फीकाखाँ' याच्या मदतीने जहांदरशाहने सम्माट पद मिळविले.
- या काळात दरबारात मोठी गटबाजी निर्माण झाली आणि वेगवेगळे गट स्थापन झाले.

गट	नेते
1) इराणी गट	झुल्फीकारखाँ
2) तुराणी गट	निजाम-उल-मुल्क, मोहम्मद अमिनखाँ
3) हिंदुस्थानी गट	सय्यद बंधु (अब्दुल्ला आणि हुसेन अली)

- जहांदरशाह एक वर्षच सत्तेवर राहिला. सय्यद बंधूंनी त्याला सत्तेवरून दूर केले आणि अजीमउश्शान चा मुलगा 'फर्रूखसियर' याला सम्राट बनवले. (1713)

● फर्रूखसियरच्या काळातील महत्वाच्या घटना.

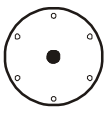
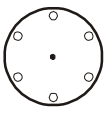
- शिखाचा नेता बंदा बैरागी याला गुरदासपूर येथे पकडण्यात आले व 1716 मध्ये दिल्ली येथे ठार करण्यात आले.
- 1717 मध्ये 'इस्ट इंडिया कंपनी' ला व्यापारात अनेक सवलती देण्यात आल्या.
- कंपनीला बंगालमधील करमुक्त व्यापाराची सवलत मिळाली.
- 1713 मध्ये जझिया कर रह करण्यात आला. (सय्यद बंधूंच्या प्रयत्नाने)
- नंतरच्या काळात सय्यद बंधू आणि फर्रूखसियर यांच्यात वाद वाढू लागले परिणामी सय्यद बंधूंनी मराठ्याच्या मदतीने सम्राटाला दूर केले.
- 1719 या एका वर्षाच्या काळात दिल्लीने 4 सम्राट पाहिले.
- 1719 ला फर्रूखसियरला पदावरून दूर केले आणि अनुक्रमे रफी-उद्-राजद व रफीउदौला यांना सम्राट बनवले आणि दूर ही केले व मोहम्मदशाह याला सम्राट बनवले.
- मुहम्मदशाहने सय्यद बंधूंचा काटा काढला. असे असले तरी तो परिस्थितीवर नियंत्रण ठेवू शकला नाही तसेच साम्राज्याचा होणारा ऱ्हास थांबवू शकला नाही.

नवीन राज्यांचा उदय (Rise of New States)	
दक्षिणेचा निजाम	- निजाम-उल-मुल्क
अवध	- सादतखाँ
रोहिलखंड	- नजीबखाँ रोहिला
बंगाल	- मुर्शिदकुली खाँ
जाट	- चुडामन (भरतपूर)

● नवीन राज्यांच्या उदयाची कारणे :

1) मुघल साम्राज्याचा ढासळता पाया.
2) कमी होत चाललेली लष्करी शक्ती. यांतून एक राजकीय पोकळी निर्माण.
3) महत्वकांक्षी सरदारांना, सुभेदारांना स्वतंत्र किंवा अर्धस्वतंत्र राज्ये निर्माण.

● केंद्र परीघ सिध्दांत

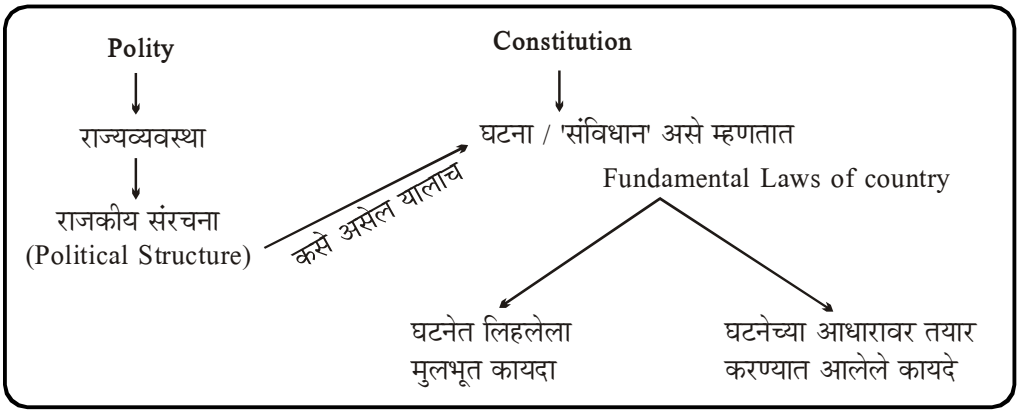
प्रबळ केंद्र  **दुर्बळ केंद्र** 

- औरंजेबाच्या मृत्यूनंतर केंद्र प्रबळ राहिले नाही, परिणामी परिघावरच्या सत्ता मोठ्या होऊ लागल्या आणि यातूनच नवीन राज्यांचा उदय झाला.

राज्यशास्त्र

प्रस्तावना

❒



❒ **शासनव्यवस्थेचा आराखडा (Framework of the State)**

☞ भारताने 'संसदीय शासनव्यवस्थेचा' स्वीकार केला आहे.

● **केंद्रस्तरावर** :

संसदीय शासनव्यवस्था

- राष्ट्राध्यक्ष (Head of the State) — नामधारी कार्यप्रमुख
- शासनप्रमुख (Head of the Government) — वास्तव, खरा कार्यकारी प्रमुख

● **राज्यस्तरावर** :

राज्य विधीमंडळ

- राज्यपाल — नामधारी प्रमुख
- मुख्यमंत्री — शासनप्रमुख

भारताची शासनव्यवस्था ही '**संघराज्यीय**' प्रकारची आहे.

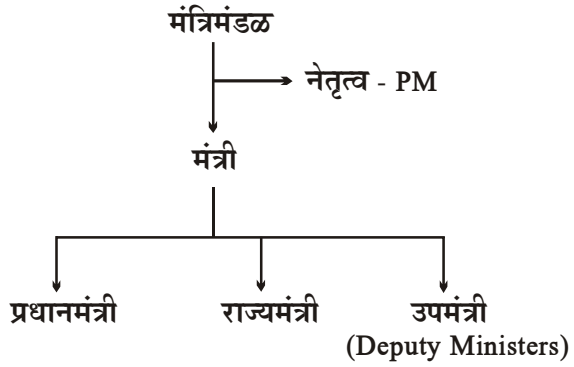
(घटनेत याचे वर्णन संघराज्य न करता '**राज्यांचा संघ**' असा केलेला आहे)

संसदीय शासनव्यवस्थेची 3 प्रमुख अंगे असतात.

(संघ) State (शासन व्यवस्था)

- कार्यकारी मंडळ (Executive)
  - राष्ट्रपती
  - उपराष्ट्रपती
  - पंतप्रधान (मंत्रिमंडळ प्रमुख)
  - मंत्रिमंडळ
  - महान्यायावादी (Attorney General of India)
- कायदेमंडळ (संसद) (Legislature)
  - (संसद) (Parliament)
  - राष्ट्रपती
  - लोकसभा
  - राज्यसभा
- न्यायमंडळ / न्यायव्यवस्था (Judiciary)
  - सर्वोच्च न्यायालच
  - उच्च न्यायालये
  - कनिष्ट न्यायव्यवस्थ

(कार्यकारी मंडळात समावेश; कारण त्यांच्याबद्दलची सगळी तरतूद कार्यकारी मंडळाच्या Chapter मध्ये include केली आहे म्हणून (भाग - 5))



[**Note** - England - संसद (Parliament)
India - संसद (Parliament)
USA - Congress]

(शासनव्यवस्था - State → Capital 'S'
MH State → small 's')

❒ **कार्य** -

1.कायदेमंडळ - कायदे करणे

2.कार्यकारी मंडळ - कायदेमंडळाने तयार केलेल्या कायद्यांची अंमलबजावणी करणे.

3.न्यायमंडळ - विविध प्रकारचे तंटे सोडवणे हे न्यायमंडळाचे कार्य असते.

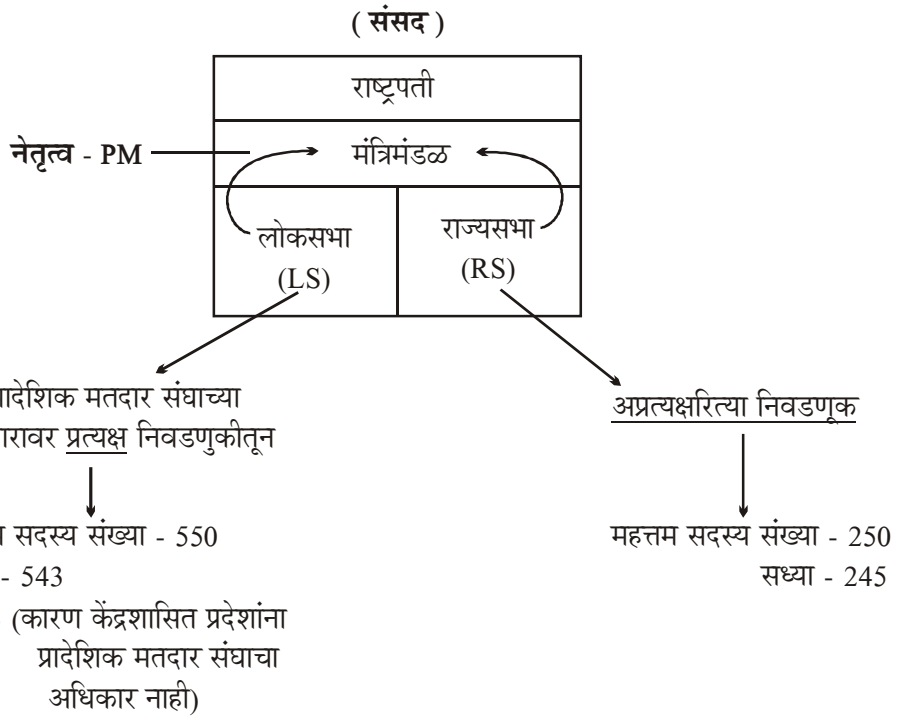
कायदेमंडळ (Legislature) :

1) **लोकसभा** → (House of Peoples)
→ कनिष्ठ सभागृह (कारण ते स्थायी सभागृह नाही)

2) **राज्यसभा** → (Council of States)
→ वरिष्ठ सभागृह (स्थायी सभागृह असल्यामुळे कधीही विसर्जित होत नाही)

3) **राष्ट्रपती** → (Head of the State)
→ राष्ट्रपती हे संसदेचा अविभाज्य भाग असून ते राष्ट्रप्रमुख असतात.

☞ **मंत्रिमंडळ (कार्यकारी मंडळ) मुख्यत: संसदेचा हिस्सा असतात; म्हणून भारतात 'संसदीय शासनव्यवस्था' आहे.**



महत्तम सदस्य संख्या - 550
सध्या - 543
543 - (कारण केंद्रशासित प्रदेशांना
प्रादेशिक मतदार संघाचा
अधिकार नाही)

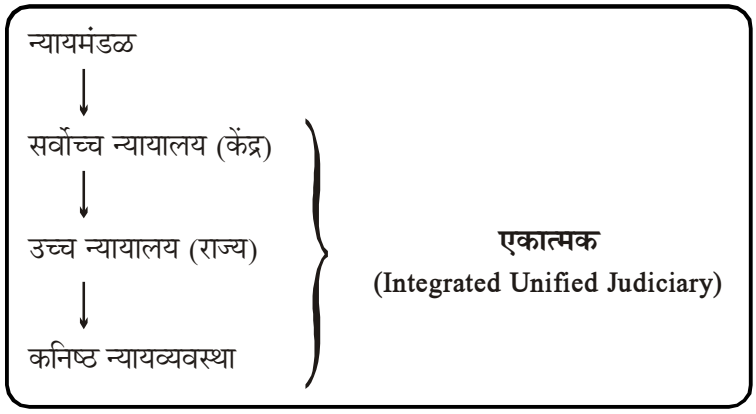
महत्तम सदस्य संख्या - 250
सध्या - 245

(A) मंत्रिमंडळ सामुहिकरित्या फक्त **लोकसभेला** जबाबदार असतात
(जरी त्यामध्ये राज्यसभेचे सदस्य असले तरी)

↓

म्हणजे कोणत्याही मंत्र्याची,
लोकसभा मंत्रीमंडळाला राजीनाम्याची मागणी करु शकते किंवा संपूर्ण सरकारबद्दल अविश्वासाचा ठराव मांडू शकते.

- **<u>न्यायमंडळ / न्यायव्यवस्था (Judiciary)</u>** :



भारत → न्यायव्यवस्था → Integrated Unified (एकात्मक)
अमेरिका → न्यायव्यवस्था → Federal (संघात्मक)

↓

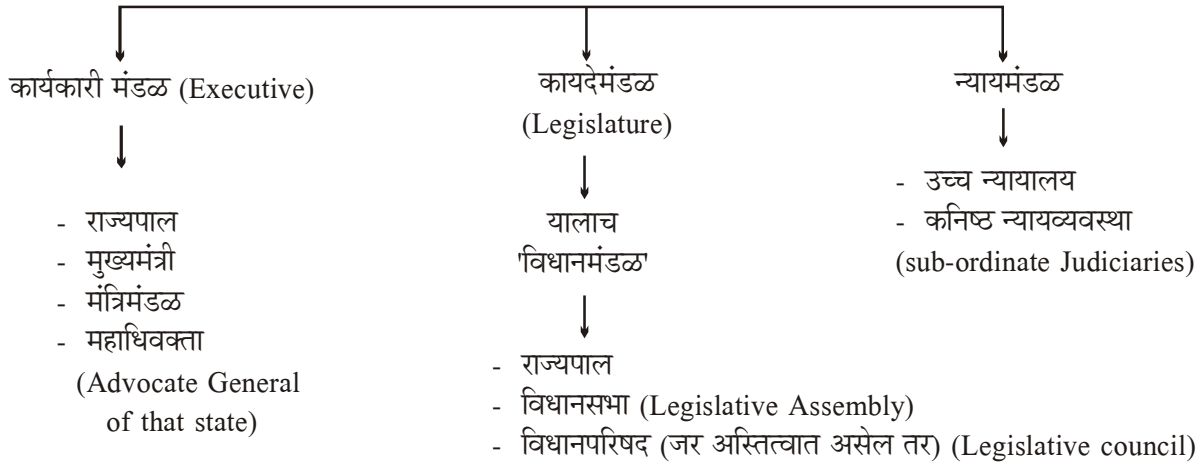
न्यायिक अधिकारांची विभागणी केंद्र व राज्य स्तरावर केली जाते.

↓

संघस्तरावरचे कायदे → फक्त संघस्तरावर
राज्यस्तरावरचे कायदे → फक्त राज्यस्तरावर

- भारतात कार्यकारीमंडळ व कायदेमंडळ संघात्मकरित्या काम करतात.
म्हणजे केंद्राचे कायदेमंडळ + कार्यकारी मंडळ वेगळे
आणि
राज्याचे कायदेमंडळ + कार्यकारी मंडळ वेगळे

राज्यशासन व्यवस्था



भूगोल

महाराष्ट्राचा भूगोल

- **भारताचे क्षेत्रफळ** - 32,87,263 **चौकिमी, जगाच्या** - 2.42 % , **पृथ्वीच्या** - 0.57 %
- **महाराष्ट्राचे क्षेत्रफळ** - 3,07,713 **चौकिमी, भारताच्या क्षेत्रफळाच्या** - 9.36 %
- **क्षेत्रफळानुसार राज्य** - 1) **राज्यस्थान**
  2) **मध्यप्रदेश**
  3) **महाराष्ट्र**
  4) **उत्तर प्रदेश**
  5) **गुजरात**
- **भारताचे स्थान** :- **अक्षवृत्तीय स्थान** - 8^0 4' उ.अ. ते 37^0 6'उ.अ.
  रेखावृत्तीय स्थान - 68^0 7'पु.रे. ते 97^0 25' पु.रे.
- **महाराष्ट्राचे स्थान**:- **अक्षवृत्तीय स्थान** - 15^0 44' उ.अ. ते 22^0 6' उ.अ.
  रेखावृत्तीय स्थान - 72^0 36' पु.रे. ते 80^0 54' पु.रे.

◆ महाराष्ट्राच्या नैसर्गिक सिमा :

अ.क्र.	दिशा	सिमा
1)	उत्तर	सातपुडा पर्वत.
2)	दक्षिण	हिरण्यकोशी नदी, तेरेखोल नदी.
3)	पुर्व	भामरागड, चिरोली (टेकड्या).
4)	पश्चिम	अरबी समुद्र.
5)	आग्नेय	निर्मल आणि मुदखेड डोंगर.
6)	नैऋत्य	अरबी समुद्र.
7)	वायव्य	अक्राणी गाळणा टेकडया सातमाळा (डोंगर).
8)	ईशान्य	दरेकसा टेकड्या.

◆ महाराष्ट्राच्या राजकीय सीमा :

दिशा	संलग्न राज्य	संलग्न महाराष्ट्रातील जिल्हे
पुर्व	छत्तीसगड(2)	गोंदिया, गडचिरोली.
अग्नेय्य	तेलंगणा (4)	गडचिरोली, चंद्रपूर, यवतमाळ, नांदेड.
दक्षिण	कर्नाटक (7)	नांदेड, लातुर, धाराशिव सोलापुर, सांगली, कोल्हापूर, सिंधुदुर्ग
दक्षिण	गोवा (1)	सिंधुदुर्ग.
वायव्य	गुजरात (4)	पालघर, नाशिक, धुळे, नंदुरबार.
वायव्य	दा.न.ह. (1)	पालघर.
उत्तर	मध्यप्रदेश(8)	नंदुरबार, धुळे, जळगाव, बुलढाणा, अमरावती, नागपूर, भंडारा, गोंदिया.

◆ **महाराष्ट्रातील असे जिल्हे ज्यांची सीमा दोन राज्यांशी संलग्न आहेत.**

अ.क्र.	जिल्हे	संलग्न राज्ये
1)	पालघर	गुजरात, दादरा नगर हवेली
2)	धुळे	गुजरात, मध्यप्रदेश
3)	नंदुरबार	गुजरात, मध्यप्रदेश
4)	गोंदिया	मध्यप्रदेश, छत्तीसगड
5)	गडचिरोली	छत्तीसगड, तेलंगणा
6)	नांदेड	तेलंगणा, कर्नाटक
7)	सिंधुदुर्ग	कर्नाटक, गोवा

◆ **महाराष्ट्रातील असे जिल्हे ज्यांची सिमा कोणत्याही राज्यांना संलग्न नाही** - 16

1) पुणे 2) सातारा 3) अहिल्यानगर 4) छ. संभाजीनगर
5) जालना 6) बीड 7) परभणी 8) हिंगोली
9) वाशिम 10) अकोला 11) रत्नागिरी 12) रायगड
13) वर्धा 14) मुंबई 15) मुंबई उपनगर 16) ठाणे

◆ **महाराष्ट्राच्या समुद्रकिनाऱ्याची लांबी** - 877.97 **किमी**

❐ **महाराष्ट्राला समुद्र किनारा लाभलेले जिल्हे** - 7

अ.क्र.	जिल्हे	तालुके
1)	पालघर	डहाणु, तलासरी, पालघर, वसई.
2)	ठाणे	ठाणे.
3)	ब्रृन्हमुंबई	कुर्ला, अंधेरी, बोरीवली.
4)	सिंधुदुर्ग	देवगड, मालवण, वेंगुर्ला.
5)	रायगड	पनवेल, ऊरण, पेण, अलिबाग, मुरुड,तळा,म्हसाळा, श्रीवर्धन.
6)	रत्नागिरी	मंडणगड, दापोली, गुहाघर, रत्नागिरी, राजापुर.

PHYSICS

GENERAL SCIENCE

1. QUANTITIES AND MEASUREMENT

Physical quantity

- Quantities such as mass, weight, distance, speed, temperature, volume are called physical quantities.
- A value and a unit are used to express the magnitude of a physical quantity.

Mass

- The amount of matter present in a substance is called mass.
- Matter has a natural tendency to resist a change in its state, which is called inertia.
- Mass is the qualitative measure of the inertia of an object. The larger the mass, the greater is the inertia. Mass is a scalar quantity. It does not change from place to place anywhere in the world. The quantities mass and weight are, however, different. Gram and kilogram are the units of mass.

Vector quantity

- The quantity that is expressed completely only when magnitude and direction are both given is called a vector quantity.
- Displacement, velocity are vector quantities.

Scalar quantity

- A quantity that can be completely expressed by its magnitude alone is called a scalar quantity.
- For example, only magnitude, i.e. a value with a unit, is used to express quantities such as length, breadth, area, mass, temperature, density, time, work, etc.

Weight

- What we measure in grams, kilograms is mass, and not weight. The gravitational force that acts on this mass is called its weight.
- The gravitational force by which the earth attracts an object towards its centre is called the weight of the object.
- Therefore, weight is a vector quantity. It is different at different places on the earth.

Standardized measurement

- Standardized measures are required for measuring things. Such measures are called standard units. We have to measure many physical quantities accurately.
- To measure any quantity, we use the unit specified for it. For example, the metre (m) is the specified unit for measuring length.

Fundamental quantities :

- It is enough to select a few out of the many quantities and standardize their units.
- The units of the quantities length and time need to be standardized. Such quantities are called fundamental quantities and their units are called standard units.

System of Units :

- The internationally accepted systems are 1. CGS system 2. MKS System 3. FPS System 4. SI Units.
- In SI Units, there are seven fundamental units given in the following table :

Physical Quantity	SI Unit	symbol
Length	metre	m
Mass	kilogram	kg
Time	second	s
Electric Current	ampere	A
Temperature	kelvin	K
Luminous intensity	candela	Cd
Amount of substance	mole	mol

Dimension

- Dimension of a physical quantity are the powers through which different fundamental quantities are raised to define the quantity.

Sr.	Quantity	Dimensional Formula	Sr.	Quantity	Dimensional Formula
1	Volume	$M^0L^3T^0$	10	Pressure, Stress, Modulus of Elasticity	$ML^{-1}T^{-2}$
2	Density	$ML^{-3}T^0$	11	Moment of Inertia	ML^2T^0
3	Velocity	$M^0L^1T^{-1}$	12	Torque/ Moment of Force	ML^2T^{-2}
4	Acceleration	$M^0L^1T^{-2}$	13	Angular Momentum, Planck's Constant	ML^2T^{-1}
5	Angular Velocity, Frequency	$M^0L^1T^{-1}$	14	Coefficient of Viscosity	$ML^{-1}T^{-1}$
6	Momentum, Impulse	MLT^{-1}	15	Surface Tension	$M^1L^0T^{-2}$
7	Force	MLT^{-2}	16	Universal Gravitational Constant	$M^{-1}L^3T^{-2}$
8	Work, Energy	ML^2T^{-2}	17	Latent Heat	$M^0L^2T^{-2}$
9	Power	ML^2T^{-3}	18	Specific Heat	$M^0L^2T^{-2}K^{-1}$

Derived quantity / Units :-

The physical quantities which are produced with the help of other 'Fundamental quantities' are known as derived units.

Sr No	Physical Quantity	Unit (SI)	symbol	Sr No	Physical Quantity	Unit (SI)	symbol
1	Force	Newton	N	**11**	Magnetic flux	Weber	Wb
2	Energy	Joule	J	**12**	Luminous flux	Lumen	lm
3	Speed	Meter/Second	m/s	**13**	Optical wavelength	Angstrom	A^O
4	Frequency	Hertz	Hz	**14**	Impulse	Newton second	N_S
5	Momentum	Kilogram meter/ second	Kg.m/s	**15**	Pressure	Pascal	pa

CHEMISTRY

GENERAL SCIENCE

1. INSIDE THE ATOM

Introduction

- All the substances in this universe are made up by the small - small particles. As our body is built up by the small cells. Smallest complete unit of matter is called "Atoms'. Combination of two or more atoms forms a molecule. The word "atom' comes from the ancient Greek word atoms, which means uncuttable particle.
- The concept of the atom was revisited and elaborated upon by many scientist and philosophers, including Galileo, Newton, Boyle and Lavoisier. In 1661, Boyle presented a discussion of atoms in his the sceptical chemist. The concept of atom is more than 2500 years old. However, it was forgotten in the course of time. The English chemist and meteorologist John Dalton is credited with the first modern atomic theory, as explained in his book. New system of chemical philosophy.

Theories of Discovery of atom

A. Daltons atomic Theory

- In 1808, Dalton published, A Newsyster of chemical philosophy, in which he proposed the first atomic theory. Matter is made of small particles called atoms. **Atoms cannot be created, divided into smaller particles, nor destroyed in the chemical process**. Atom is rigid and massive Ball like structure.
- According in the theory proposed by Dalton, he had not given any information about by charge on atom and the positive and negative charge present in it. It was confirmed earlier that when glass or ebonite are rubbed with silk or fur, it produces electricity. It means that matter is electrical in nature. He had not given any information about the charge.

B. Thomson's Plum Pudding Model of Atom

- A British physicist. J. J. Thomson in 1896 tried to pass electricity through gases at high voltage. This scientist found the existence of extremely minute particles inside atoms. So he may be described as the man who split the atom for the first time. The compared the atom with a "watermelon' in which the red part resemble the positively charged protons while black seed resemble the negatively charged electrons. Atom itself is Neutral in nature, as it have equal positive and negative charge. Thomson studied the properties of these rays which led to the discovery electron.

C. Rutherford's /nuclear Model of Atom (1911)

- Rutherford proposed that an atom is composed of empty space mostly with electrons orbiting in a set, predictable paths around fixed positively charged nucleus. He conducted an experiment where he bombarded - particles on a thin sheet of gold. Rutherford overturned Thomson's atom model in 1911 with his well known Gold foil experiment.

Experiment

- Rutherford made an experiment, he beamed alpha particles through a thin gold foil. From this he came to know that:
- Most alpha particle passed straight through the gold foil.
- Very few particles bounced back exactly toward the source.

- Some of the particles deviate at various angles.
- For him, it was a miracle; in his words, it was like "Bouncing back of a bullet after striking the tissue paper'.
- An atom has a tiny, dense, "positively charge' core where all mass is concentrate known as Nucleus.
- Thickness of gold foil = **0.00004 centimetre**
- 'a' particle = Helium Nucleus (He_2^4)

D. Bohr's stable Orbit Atomic model (1913)

- A Danish physicist named Neil Bohr in 1913 proposed the Bohr atomic model. He modified the problems and limitations associate with Rutherford's model of an atom. According to Bohr Atomic model, a small positively charged nucleus is surrounded by revolving negatively charge electrons in fixed orbits. He concluded that electron will have more energy if it is located away from the nucleus whereas the electrons will have less energy if it located near the nucleus.
- This scientist made some modifications in Rutherford's model. Electrons were confined into clearly defined orbits, but could not freely change the orbits while revolving. (i.e. they do not freely spiral inward or outward in intermediate stages). An electron must absorb or emit a specific amount of energy for transition between these fixed orbits. In this way, some small particles are discover inside the atom by the contribution of the above four scientist and their theories.

Atomic structure

- An atom is firmed from the nucleus and the extra - nuclear part. These contain three types of subatomic particles.

1. Nucleus

- Atom contains a massive nucleus. Atom has an empty space around the atom in which the electrons revolve. Nucleus of an atom mainly consist of protons neutrons combinedly they are known as "Nucleus'. The number of electrons the no of proton is same in an atom, but number of neuron may vary.
- Proton = electron same

(A) Proton (P) - Positively charged (+ 1.6 × 10-19 coulomb)

- Situated inside nucleus
- Discovered by scientist named Goldste. But Rutherford named it as a "proton' after doing experiments on Anode rays. In early days only proton and electron were known a subatomic particles. According Prout's theory oxygen with atomic mass 16, must contain 16 protons and 16 electrons. Similarly, Helium contain 4 protons and 4 electrons. This observation should that Oxygen, Helium and almost all atoms contain almost half numbers of electrons as compared to number predicted by Prout's theory.

(B) Neutron (n) - No charge

- situated inside nucleus
- Discovered by a scientist named **Chadwick.** · In 1920, Rutherford proposed the existence of neutral particle made from combination of proton and electrons. He named it **Neutron**. In 1932, James Chadwick first proved existence of Neutron. He bombarded lighter elements like **boron** and **beryllium** by alpha particles and highly penetrating neutral radiations differed in interaction with

BIOLOGY

GENERAL SCIENCE

1. BOTANY

Classification of Organisms

Five-Kingdom Classification System:

- **Robert H. Whittaker**, in 1969 Proposed the five-kingdom classification system.
- While proposing this system, he primarily considered the body structure, tissue structure, and nutritional methods of organisms. According to R.H. Whittaker's five-kingdom classification system, the five kingdoms are as follows:

1) Kingdom Monera (Bacteria);
2) Kingdom Protista (Algae, Protozoa);
3) Kingdom Fungi (Yeast, Mold, etc.);
4) Kingdom Plantae;
5) Kingdom Animalia

Binomial Classification System:

- **Swedish scientist Carl Linnaeus** Proposed the binomial classification system for organisms. This system includes two names. The first name indicates the genus, while the second name denotes the species. For example, the scientific name of a lion is Panthera leo , where Panthera is the genus and leo is the species.
- The scientific name of mango is Mangifera indica .
- The scientific name of tulsi (holy basil) is Ocimum sanctum .
- **Theophrastus (3791–287 BCE):** Classified plants into three groups: trees, shrubs, and herbs.
- **Eichler:** In 1883, classified the plant kingdom into non-seed-bearing and seed-bearing plants.

Hierarchical Order of Organism Classification:

1) Kingdom	2) Phylum
3) Subphylum	4) Class
5) Order	6) Family
7) Genus	8) Species

Kingdom is the largest level in the classification of organisms, while Species is the smallest level.

Plant Classification: Plants are classified into two main types: Cryptogams and Phanerogams.

Cryptogams

- Cryptogams are plants that do not produce flowers and do not reproduce through seeds (non-flowering and non-seed-bearing).
- Cryptogams are also referred to as innumerable (i.e., lacking xylem and phloem) plants.
- Subdivisions of Cryptogams (based on body structure): Thallophyta, Bryophyta, Pteridophyta

a) Thallophyta:

- Innumerable, lacking roots, stems, and leaves. Found in water.
- Their body is called a non-cellular body (thallus).
- Thallophyta is divided into three types:

1) Algae: E.g., Spirogyra, Ulothrix, Chlamydomonas, Volvox, Chlorella, Laminaria, Diatoms, Sargassum, Gelidiella.

Oscillatoria is an example of blue-green algae.

2) Fungi: E.g., Mucor, Mold, Penicillium, Yeast, Pepsinea.

3) Bacteria: E.g., Bacillus, Spirilla, Vibrio, Rickettsia, Mycoplasma.

b) Bryophyta:

- Innumerable (lacking xylem and phloem).
- These plants do not have true roots, stems, or leaves.
- They lack specific structures for chemical processes. Instead of roots, they have structures called "rhizoids."
- These rhizoids anchor the plant and absorb water. Bryophytes are called the "amphibians" of the plant kingdom because, like amphibians, they require water for reproduction. Their structure is sticky and ribbon-like.
- Examples: Riccia, Anthoceros, Marchantia, Moss.

c) Pteridophyta:

- These are cryptogam-type plants.
- Non-flowering and non-seed-bearing plants.
- They have developed roots, stems, and leaves.
- They possess xylem and phloem.

Examples: Nephrolepis, Lycopodium, Selaginella, Equisetum, Psilotum, Salvinia, Isoetes, Ferns, Horsetails, Pteris.

In Pteridophytes, reproduction occurs through both sexual (spores) and asexual (gametes) methods.

Phanerogams

- Phanerogams are seed-bearing, flowering plants.
- Phanerogams are divided into two subgroups:

a) Gymnosperms

b) Angiosperms

a) Gymnosperms: Gymnos : naked; Sperm : seed.

- - These are seed-bearing and flowering plants.

- Flowers result in the formation of fruits and seeds.

- Seeds can be either dicotyledonous (with two cotyledons) or monocotyledonous (with one cotyledon).

- If the seeds are not enclosed in a fruit, meaning they are naked, they are called gymnosperms.

- Simple, multicellular, or complex plants.

- Their stems lack vessels. The leaves are scale-like or needle-like.

Examples: Cycas, Thuja (Morpankhi), Pinus (Christmas tree), Picea (deodar), Araucaria. These are gymnosperms.

b) Angiosperms: Angios : cover (enclosed); Sperm : seed.

- This is the largest group of seed-bearing plants.

- Seed-bearing, flowering plants.

- Seeds are enclosed in a fruit, hence they are called angiosperms.

- Angiosperms are further divided into two classes:

1) Dicotyledonous plants
2) Monocotyledonous plants

***1*) Dicotyledonous (Dicot) Plants:** These plants have seeds with two cotyledons.
- The main root is of the taproot type.
- Reticulate venation is present in the leaves.
- Examples: Sunflower, Geranium, Mango, Jasmine, Cotton, Chickpea, Pea, Tomato, Surajmukhi (Sunflower).

2) Monocotyledonous (Monocot) Plants: These plants have seeds with one cotyledon.
- The main root is fibrous. The leaves have parallel venation.
- Examples: Coconut, Gulmohar (Royal Poinciana), Jowar, Bajra, Wheat, Maize, Barley.

Study of Cells

- The size of cells is measured using a "micrometre." 1 micrometre equals 0.001 millimetres.
- Unicellular organisms: Examples include Amoeba, Chlamydomonas.
- Multicellular organisms: Humans, Rat, Maize.

Discovery of Cells: In 1665, Robert Hooke discovered cells. He observed the dead cells in the bark of a tree. Antonie van Leeuwenhoek, in 1674, was the first to observe living cells under a simple microscope.

Schleiden and Theodor (1838): These scientists stated that all plants and animals are made up of cells.
- The cell is the basic unit of organisms, as concluded.

R. Virchow (1885): He stated that all cells arise from pre-existing cells.
- Based on the presence or absence of a distinct nucleus, cells are classified into two groups:
1) Eukaryotic cells
2) Prokaryotic cells

Eukaryotic Cells
- Cells that have a distinct nucleus are called eukaryotic cells.
- These cells have a distinct nucleus enclosed by a nuclear membrane.
- The cell is made up of a protoplasm called cytoplasm.
- Cell Organelles: Substances inside the cytoplasm, such as carbon-acarbon compounds, are called cell organelles. These include DNA or RNA, which are acidic substances in the nucleus.
- Functions of Cell Organelles: The cell organelles in eukaryotic cells provide an appropriate environment for cellular activities.
- DNA in eukaryotic cells: It creates a copy (replica) of itself through division (mitosis).
- RNA: It assists in protein synthesis in the ribosomes.
- Photosynthesis occurs in algae and plant cells containing chloroplasts, where light is present.

Prokaryotic Cells
- Cells that do not have a distinct nucleus (enclosure) are called prokaryotic cells.
- These cells have a distinct nucleus enclosed by a nuclear membrane.
- Algae, fungi, plants, or animals have a cytoplasm called protoplasm. There is no protoplasm in animal cells.
- Functions of Prokaryotic Cells: Cell size, shape, cell protection.

APTITUDE AND REASONING

1. NUMBER SERIES

What is Number Series

Number series is an order of numbers which are not arranged randomly but follow a pattern. Here in these notes, we will understand how to identify which kind of pattern is following because without this it is next to impossible to have a command on number series. Number series is a form of numbers in a certain sequence, where some numbers are mistakenly put into the series of numbers and some number is missing in that series, we need to observe first and then find the accurate number to that series of numbers.

Different types of Number Series

There are some formats of series which are very frequently asked in Exams.

Difference series: In this type of series pattern can be found by using difference of terms. If any pattern is found after the first difference like square, cube or multiplication then this is called one tier series otherwise we need to proceed further and then it is called two tier series.

Prime Number series: In this kind of series the next term is found by adding, multiplying or dividing by prime numbers.

2 4 12 60 420 4620

Perfect Square Series: These Types of Series are based on the square of a number which is in the same order and one square number is missing in that given series.

480 525 572 621 672 725

$22^2 - 4$ $23^2 - 4$ $24^2 - 4$ $25^2 - 4$ $26^2 - 4$ $27^2 - 4$

Perfect Cube Series: This Types of Series are based on a cube of a number which is in the same order and one cube number is missing in that given series.

2197 3375 4913 6859 9261

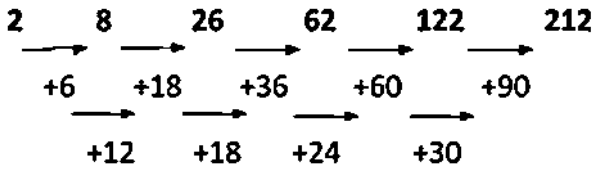
13^3 15^3 17^3 $19^3 - 21^3$

Ration Series: This type of series is based on ration series, where sequence is in form of ratio in difference between the numbers. All numbers are arranged in ratio sequence order.

4096 5120 6400 8000 10000

Here the ratio between each consecutive term is 4 : 5 or we can say the next term can be found by multiplying 5/4 to the previous term.

Mixed Series: This series is most important and asked in exams more frequently than any other pattern. Mixed Number series is an arrangement of numbers in a certain order. As you know that the given series is a mixed series, notice that this type of series is more than one different order which is arranged alternatively in a single series or created according to any non-conventional rule.



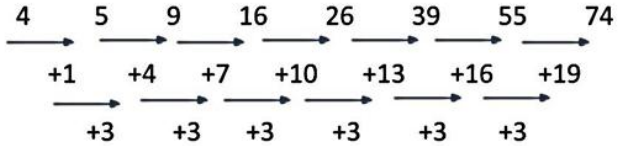
In mixed Series a mixed number is a combination of numbers in another way it is not a sequential number of series number that you have arranged.

In example, 111, 220, 438, ?, 1746

where you need to count them in a one step or two step calculation to obtain the difference common result according to the series of mixed numbers.

Type of questions asked in exam

Missing number: In this type of series one number is missing in a given series. Such type of series, find the given pattern and find the missing number.



Wrong Number Series: In this type of series one number is odd man out. Which does not follow the sequence.

Coding Decoding Series: In this type of series firstly one series is given and with the help of first series next number of second series is to be found out.

MULTIPLE CHOICE QUESTIONS

Q1. What value will come in place of question mark (?) in the number-series given below?
23 28 38 53 73 ?
(1) 98 (2) 99 (3) 95
(4) 97 (5) 96

Q2. What value will come in place of question mark (?) in the number-series given below?
7 127 187 217 232 ?
1. 237.5 2. 239.5 3. 236
4. 240.5 5. 2413

Q3. What value will come in place of question mark (?) in the number-series given below?
723 712 690 657 613 ?
(1) 556 (2) 551 (3) 552
(4) 558 (5) None of these

Q4. What should come in place of question marks (?) in the following number series: -
90 110 132 156 182 ?
(1) 207 (2) 307 (3) 309
(4) 323 (5) 310

Q5. What should come in place of question marks (?) in the following number series:
2 18 95 384 1155 ?
(1) 2212 (2) 2629 (3) 2735
(4) 2312 (5) 2412

Q6. What will come in place of question mark (?) in the following number series given below?
5 366 655 ? 1049 1170
(1) 880 (2) 882 (3) 876
(4) 872 (5) None of these

Q7. What will come in place of question mark (?) in the following number series given below?
17 45 148 607 ? 18331
(1) 3048 (2) 3056 (3) 3060
(4) 3052 (5) None of these

Q8. What will come in place of question mark (?) in the following number series given below?
38 ? 204 1421 11360
(1) 32 (2) 35 (3) 36
(4) 30 (5) None of these

Q9. What will come in place of question mark (?) in the following number series given below?
15 32 83 168 287 ?
(1) 442 (2) 438 (3) 440
(4) 445 (5) None of these

Q10. What will come in place of question mark (?) in the following number series given below?
31 39 ? 130 255 471
(1) 65 (2) 68 (3) 62
(4) 60 (5) None of these

ANSWERS

Q.1. (1) +5, +10, +15, +20, +25

Q.2. (2) +120, +60, +30, +15, +7.5

Q.3. (4) –11, –22, –33, –44, –55

Q.4. (5) +20, +22, +24, +26, +28

Q.5. (4) 2 × 6 + 6 = 18 18 × 5 + 5 = 95 95 × 4 + 4 = 384 384 × 3 + 3 = 1155 1155 × 2 + 2 = 2312

Q.6. (1) +192, +172, +152, +132, +112

Q.7. (4) × 2 + 11, × 3 + 13, × 4 + 15, × 5 + 17

Q.8. (2) × 4 – 4, × 5 – 5, × 6 – 6, × 7 – 7

Q.9. (3) +17, +51, +85, +119

Q.10. (5) +23, +33, +43, +53, +63

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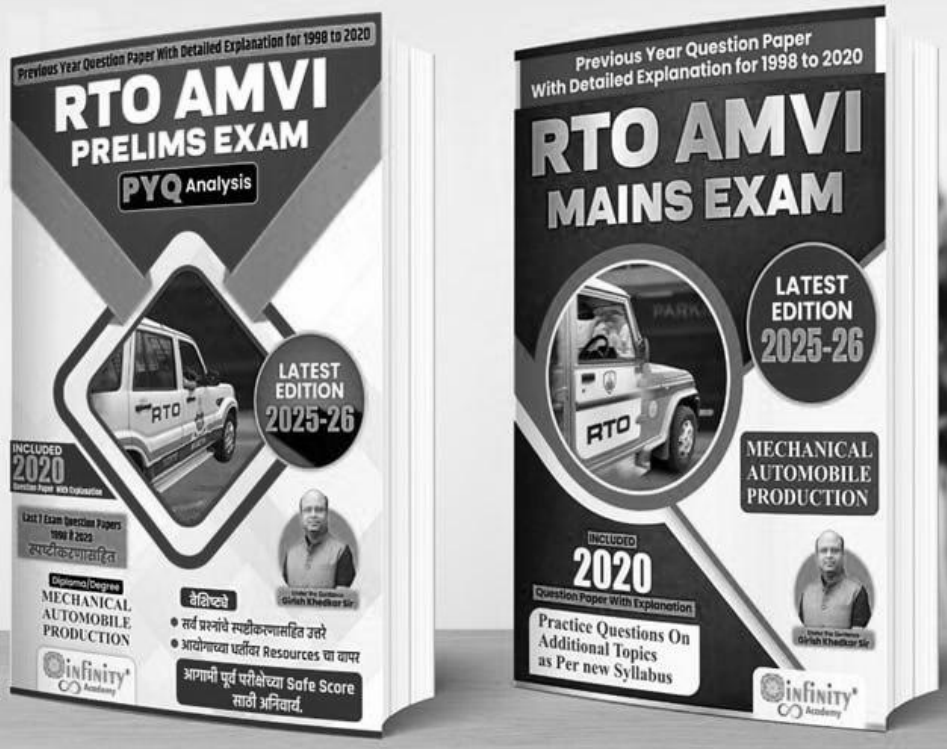

येथे उपलब्ध

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